Career and Technical Education Course Updates 2020

CTE programs are approved annually through the consent calendar process as directed in R277- 911-2.

CTE courses make up these approved CTE programs of study. Following the board-approved CTE course revision process, approximately one-fourth of the courses are reviewed and updated annually through a program rotation calendar. After working with subject matter experts and business/industry partners, the standards for these courses are being submitted to the Board for approval.

Table of Contents

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Course Changes 2020: Agriculture Pathways

New Courses:
N/A

Revised – Updated Courses:

Course: Equine Science 1 and 2
Revisions: Revisions were made to the strands that address personal and leadership development and work-based learning activities to address the importance and reinforcing of employability skills.

Course: Small and Companion Animal Science
Revisions: Revisions were made to the strands that address personal and leadership development and work-based learning activities to address the importance and reinforcing of employability skills. Small changes were made to grammar and format.

Course: Veterinary Assistant 1 and 2
Revisions: Revisions were made to the strands that address personal and leadership development and work-based learning activities to address the importance and reinforcing of employability skills. Changes were made to several standards to clarify specifically what needed to be taught. Small changes were made to grammar and format.

Course: Metalworking
Revisions: Revisions were made to the strands that address personal and leadership development and work-based learning activities to address the importance and reinforcing of employability skills. Changes were made to several standards to clarify specifically what needed to be taught. Small changes were made to grammar and format.

Course: Machining 1 and 2
Revisions: Revisions were made to the strands that address personal and leadership development and work-based learning activities to address the importance and reinforcing of employability skills. Changes were made to several standards to clarify specifically what needed to be taught. Small changes were made to grammar and format. In the current Machining 2 document, many of the strands and standards in Machining 1 were also found in Machining 2. That duplication was removed.

STRANDS AND STANDARDS
EQUINE SCIENCE 1

Learning that works for Utah
CTE®

Course Description

Students will be exposed to equine science principles which include the history of the horse, anatomy, nutrition, diseases, pests and overall health. The scientific processes of observation, measurement, hypothesizing, data gathering, interpretation, analysis, and application are stressed. Career opportunities and educational preparation are examined. Learning activities are varied, with classroom, laboratory, and field experiences emphasized.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	30.02.00.00.072
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	127
Test Weight	.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Animal Science & Technology
Endorsement 3	

ADA Compliant: October 2020

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.
- Lead a group discussion or serve in a leadership capacity.

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
- Track and communicate progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Prepare for entry into the work force by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program:
  - Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
  - Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected SAE/WBL experience.

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

STRAND 3

Students will understand the history of the modern horse and the development of horse breeds, types, and classes.

Standard 1

Students will describe the development of the modern horse.

- Students will discuss the domestication of the horse.
- Students will identify historical trends of human utilization of horses.
- Students will describe the current horse industry.

Standard 2

Student will classify horses by breed, type, and class.

- Students will list and describe equine breeds and their origins
- Students will classify and describe equine as pony, light, draft, and long eared.
- Students will describe the gait and movement of horses.

STRAND 4

Students will analyze equine anatomy and physiology.

Standard 1

Students will identify feeds important to horses and discuss their nutrient value.

Standard 2

Students will balance an equine ration.

Standard 3

Students will list and describe equine nutritional disorders.

STRAND 5

Students will learn about equine nutrition and feeding management.

Standard 1

Students will identify feeds important to horses and discuss their nutrient value.

Standard 2

Students will balance an equine ration.

Standard 3

Students will list and describe equine nutritional disorders.

STRAND 6

Students will explore concepts in equine health management.

Standard 1

Students will list, identify, and describe equine diseases.

Standard 2

Students will identify horse internal and external parasites.

Standard 3

Students will properly care for hooves and explain hoof anatomy.

Standard 4

Students will determine proper horse health management practices.

- Vaccination program
- Teeth floating and aging
- Sanitation

Performance Skills

- Attend an FFA Meeting.
- The student will participate in a Supervised Agricultural Experience (SAE) Program.
- Correctly classify specific equine breeds.
- Identify equine breeds.
- Identify the external parts of a horse.
- Develop a balanced equine ration.
- Identify symptoms of equine diseases and parasites.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Point by St and										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Equine Science 1	127	2	2	8	23	21	15	9				80	80

STRANDS AND STANDARDS
EQUINE SCIENCE 2

Course Description

Students will be exposed to equine science principles which include genetics, reproduction, horse behavior, horse facilities and equipment and the selection of the appropriate horse for the task. The scientific processes of observation, measurement, hypothesizing, data gathering, interpretation, analysis, and application are stressed. Career opportunities and educational preparation are examined. Learning activities are varied, with classroom, laboratory, and field experiences emphasized.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	30.02.00.00.074
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	128
Test Weight	.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Animal Science & Technology
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.
- Lead a group discussion or serve in a leadership capacity.

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
- Track and communicate progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Prepare for entry into the work force by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program:
  - Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
  - Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected SAE/WBL experience.

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

STRAND 3

Students will understand horse genetics.

Standard 1

Students will explore the fundamentals of genetics.

Standard 2

Students will investigate horse coat color and markings.

Standard 3

Students will explain the heritability of performance traits.

STRAND 4

Students will explore horse reproduction and parturition.

Standard 1

Students will describe the physiology of the reproduction tracts of stallions and mares.

Standard 2

Students will summarize the estrus cycle and proper times to breed.

Standard 3

Students will describe proper horse gestation management.

Standard 4

Students will discuss proper care during pregnancy and parturition.

Standard 5

Students will describe the horse condition scoring system.

STRAND 5

Students will study and utilize equine behavior training.

Standard 1

Students will list and discuss horse behavioral categories.

Standard 2

Students will demonstrate safe handling of horses.

Standard 3

Students will explain imprinting.

Standard 4

Students will identify abnormal horse behavior (vices).

STRAND 6

Students will learn about equine facilities and equipment.

Standard 1

Students will identify, discuss, and describe the usage of Western and English tack.

Standard 2

Students will discuss how to safely load and haul a horse.

Standard 3

Students will investigate horse facilities and fencing.

Standard 4

Students will discuss waste management.

STRAND 7

Students will know how to evaluate and select a horse.

Standard 1

Students will summarize the considerations of purchasing a horse.

Standard 2

Students will recognize the ideal horse conformation characteristics.

Standard 3

Students will recognize conformation faults and predict potential unsoundness and/or lameness.

Standard 4

Students will present oral and written reasons in horse evaluation.

Performance Skills

- Attend an FFA Meeting.
- The student will participate in a Supervised Agricultural Experience (SAE) Program.
- Predict the heritability of coat color, markings, and performance traits.
- Develop a breeding schedule for a mare.
- Demonstrate the safe handling of horses.
- Develop a waste management plan.
- Select a horse based on conformation characteristics.
- Present oral reasons in horse evaluation.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Point by Sk and										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Equine Science Year	128	2	2	10	26	21	7	12				80	

STRANDS AND STANDARDS

SMALL COMPANION ANIMAL SCIENCE

Learning that works for Utah
CTE®

Course Description

This class is a look at the relationship between humans and their companion animals. Species covered include dog, horse, and cats, with an emphasis on dogs. The curriculum will cover a broad variety of areas include zoology, animal behavior, training and learning theories, genetics and health care, animal husbandry, animal rescue, competition events and career exploration. Students will also participate in personal and leadership development through the FFA and work-based learning activities through their supervised agricultural experience program.

Intended Grade Level	9-12
Units of Credit	1.0
Core Code	30.02.00.00.005
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	129
Test Weight	1.0
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Animal Science
Endorsement 3	

ADA Compliant: October 2020

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.
- Lead a group discussion or serve in a leadership capacity.

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
- Track and communicate progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Prepare for entry into the work force by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program:
  - Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
  - Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected SAE/WBL experience.

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

STRAND 3

Students will understand the meaning of Taxonomy, Binomial Nomenclature and Dichotomous keys.

Standard 1

Know the common names used to identify the sex and age of the following companion animals, horse, dog, and cat.

Standard 2

Demonstrate a knowledge of Binomial Nomenclature as it is used to identify and classify animals including how it helps to identify how different species may be related.

Standard 3

Know the seven levels of taxonomic classification in order from most general to most specific.

- Kingdom, Phylum, Class, Order, Family, Genus, and Species.

STRAND 4

Students will understand the processes of domestication.

Standard 1

Understand the difference between domestication and tameness.

Standard 2

Understand the difference between Artificial Selection (Selective Breeding) and Natural Selection.

Standard 3

Understand that the process of domesticating animals can also create physiological, behavioral, and physical changes in the animal.

Standard 4

Be able to define Charles Darwin's "Mysterious Law of Correlation", that as you select for specific genotypes there can be multiple side effects that are correlated to the genome that you are manipulating. Example: selecting for temperament can also bring changes to conformation or color.

STRAND 5

Students will understand animal anatomy and physiology as it relates to nutrition, health, management, and the behavior of domesticated animals.

Standard 1

Demonstrate knowledge of the following anatomic systems.

- Skeletal, Muscular, Nervous, Circulatory, Respiratory, Digestive, Excretory, Endocrine, and Reproductive.

Standard 2

Demonstrate knowledge of dog, horse, and cat senses.

- Olfactory system (smell)
- Gustation (taste)
- Auditory System (hearing)
- Tactile (touch)
- Vision (sight): With an understanding of the differences in vision of prey and predator animals.

Standard 3

Demonstrate knowledge of common diseases and parasites.

- Understand how disease are transmitted.
- Understand common diseases in dogs, horses, and cats.
  - Horse: Eastern / Western Equine Encephalitis, Tetanus, West Nile Virus, Strangles, Colic, etc.
  - Canine; Canine distemper, Canine parvovirus, Canine heartworm, Canine kennel cough, Canine Roundworm, etc.
  - Feline; Feline Panleukopenia (distemper), Feline Immunodeficiency Virus, Feline Infectious Peritonitis, Toxoplasmosis, Rabies, etc.
- Understand vaccination protocols in dogs, horses, and cats.

Standard 4

Demonstrate a knowledge of basic First Aid and CPR with companion animals.

- Understand and demonstrate CPR.
- Understand and demonstrate First Aid techniques.
- Understand signs of an emergency.
  - Respiratory distress, Blood loss, Swelling, Non-weight bearing lameness, Fever, Pain.
- Demonstrate knowledge of first aid supplies and uses.

Standard 5

Demonstrate knowledge of nutritional needs of dogs, horses, and cats.

- Understand the basic nutritional diets for dogs, horses, and cats.
- Understand alternative diets to treat medical condition in dogs, horses, and cats.

Standard 6

Understand nontraditional health care.

- Acupuncture, Massage therapy, Hydrotherapy, Chiropractic therapy, etc.

STRAND 6

Students will understand the reproduction processes for dogs, cats, and horses.

Standard 1

Understand the estrous cycle in dogs, horses, and cats.

Standard 2

Understand natural breeding practices and alterative breeding practices for dogs, horses, and cats.

Standard 3

Understand the gestation period and fetal development for dogs, horses, and cats.

Standard 4

Understand population control methods in dogs and cats.

STRAND 7

Students will understand different methods employed for animal training, different learning styles and behavior problems of domesticated animals.

Standard 1

Understand animal behavior and learning theory.

- Classical Conditioning
- Operant Conditioning
- Trial and Error Learning
- Observational Learning

Standard 2

Demonstrate a knowledge of different training methods.

- Demonstrate methods such as luring, placement, compulsion, and operant conditioning.

Standard 3

Demonstrate knowledge of common behavior problems.

- Dog; barking, house soiling, separation anxiety, noise anxiety, biting and aggression, resource guarding, etc.
- Cat; urine marking, aggression, scratching, fear behaviors, etc.

Standard 4

Demonstrate knowledge of behavior modification protocols.

- Remedial socialization
- Desensitization
- Clicker training
- Counter conditioning

STRAND 8

Students will understand Ethology and how it relates to animal behavior.

Standard 1

Demonstrate a knowledge of how animals use body language to communicate (Ethology).

Standard 2

Demonstrate knowledge for the use of ethograms and how they are used in animal welfare.

STRAND 9

Students will understand Animal Welfare and Animal Rescue

Standard 1

Demonstrate a knowledge of animal enrichment and welfare.

- Understand that animal welfare involves both the physical health of the animals as well as their psychological well-being.
- Understand enrichment activities for different species.
- Describe and understand the difference between animal welfare and animal rights.

Standard 2

Demonstrate a knowledge of Animal Rescues.

- Demonstrate knowledge of different organizations involved in animal rescues.
- Demonstrate knowledge of the causes and effects animal rescues plays in a community.

STRAND 10

Student will understand different competitions relating to dogs or horses.

Standard 1

Demonstrate a knowledge of different competitions with animals.

- Dog showing.
- Horse showing.

Standard 2

Students will understand correct structure (confirmation) and movement.

- Demonstrate knowledge of the part this plays in working ability and breeding.

Standard 3

Students will understand the concept of different breeds in a species.

- Demonstrate knowledge of a breed standards and selective breeding.
- Demonstrate knowledge of roles different breeds have.
- Demonstrate knowledge of the role a breed standard places in showing competitions.

STRAND 11

Students will understand roles that animals play in the community.

Standard 1

Understand the role of service and therapy animals.

Standard 2

Understand the role of human-animal bonding.

Performance Skills

Attend a FFA Chapter meeting.
Successfully complete a Supervised Agricultural Experience Program.
Use proper terminology to identify the sex and age of dogs, cats, and horses.
Demonstrate 3 of the following first aid skills: check respiratory rate, temperature, capillary refill time, pulse, put on a splint, preform CPR.
When given an animal behavior problem the student will be able to demonstrate at least one behavior modification protocol to fix the problem.
Demonstrate how to use different training techniques.
Using an ethogram, observe a dog and determine what they are trying to communicate.
Demonstrate the use of an enrichment activity with dogs, cats, and horses.

STRANDS AND STANDARDS

VETERINARY ASSISTANT 1

Learning that works for Utah
CTE®

Course Description

This course provides the opportunity for students to explore different avenues of the veterinary profession. Students will be exposed to veterinary science and principles which include anatomy, physiology, chemistry, animal health and disease, dentistry, and laboratory procedures. Students will provide hands-on care as they develop skills in the areas of surgical assisting, bandaging, wound care, oral care, and general nursing care.

Intended Grade Level	11-12
Units of Credit	1.0
Core Code	30.02.00.00.090
Concurrent Enrollment Core Code	N/A
Prerequisite	Biology
Skill Certification Test Number	124
Test Weight	1.0
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Animal Science & Technology
Endorsement 3	

ADA Compliant: October 2020

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.
- Lead a group discussion or serve in a leadership capacity.

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
- Track and communicate progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Prepare for entry into the work force by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program:
  - Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
  - Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected SAE/WBL experience.

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

STRAND 3

Students will demonstrate an understanding of medical terminology, to be able to appropriately read and discuss medical information.

Standard 1

Students will be able to identify prefixes, suffixes, and root words, to be able to define medical terms.

Standard 2

Students will be able to interpret and extract information from realistic medical documents.

Standard 3

Students will interpret and apply medical abbreviations and symbols.

STRAND 4

Students will demonstrate an understanding of animal anatomy and physiology.

Standard 1

Students will be able to define medical terms related to each body system and directional anatomy.

Standard 2

Students will dissect preserved cats, or other appropriate animals, to gain an understanding of animal anatomy and physiology.

Standard 3

Students will be able to correctly identify superficial muscles that are involved in the movement of an animal.

Standard 4

Students will learn the bones in the body and be able to identify them on skeletal models.

Standard 5

Students will be able to identify various body parts and organs.

Standard 6

Students will be able to compare the anatomy of different species of animals, to include small animals, large animals, laboratory animals, and exotic animals.

Standard 7

Students will be able to describe the basic physiology involved in the functioning of each body system.

STRAND 5

Students will explore concepts in health management and disease.

Standard 1

Students will know the common vaccines, how to administer the vaccines, and when to give them.

Standard 2

Students will identify and describe common animal diseases and how they are transmitted.

Standard 3

Students will understand the purposes of basic treatments for common animal diseases.

Standard 4

Students will know the common zoonotic diseases and the precautions needed to prevent these diseases.

STRAND 6

Students will explore concepts in animal behavior and proper animal handling and restraint.

Standard 1

Students will study and develop an understanding of animal behavior.

Standard 2

Students will understand the principles of restraint/handling techniques and be able to demonstrate safe restraint/handling practices on small, exotic, and large animals.

STRAND 7

Students will express an understanding of the fundamental principles of veterinary medicine and be able to demonstrate proficiency in each area.

Standard 1

Students will be able to correctly perform breed identification.

Standard 2

Students will be able to accurately take a preliminary history from a client and perform a basic physical examination, to include vital signs and other necessary assessments.

Standard 3

Students will know the basic nutritional requirements for each species of animal.

Standard 4

Students will be able to accurately assess wounds and provide appropriate wound care and management.

Standard 5

Students will know the materials needed and how to apply common splints, casts, and bandages on animals.

STRAND 8

Students will develop a basic understanding of medication administration.

Standard 1

Students will be able to name common medications used in veterinary practice.

Standard 2

Students will be able to demonstrate appropriate administration of oral, topical, and injectable medications.

Standard 3

Students will be able to demonstrate how to correctly determine appropriate medication dosages.

Standard 4

Students will be able to recognize adverse effects of medications.

Standard 5

Students will be able to identify contraindications for administering certain medications.

STRAND 9

Students will demonstrate proficiency in the office procedures related to veterinary practice.

Standard 1

Students will correctly demonstrate infection control practices, such as hand washing, gowning, gloving, and masking.

Standard 2

Students will always follow OSHA Standards/safe practices to avoid injury to themselves or others including the handling and disposal of biohazardous waste and sharps.

Standard 3

Students will appropriately demonstrate communication skills and client education.

Standard 4

Students will demonstrate the ability to accurately complete and file health certificates and medical forms. (e.g. SOAP Subjective, Objective, Assessment, Plan)

STRAND 10

Students will study and demonstrate the ability to perform surgical procedures while maintaining sterile technique.

Standard 1

Students will verbalize understanding of surgical and aseptic principles.

Standard 2

Students will be able to accurately identify surgical instruments.

Standard 3

Students will correctly demonstrate preparation for surgical procedures, to include preparing and sterilizing equipment and preparing the patient for surgery.Students will demonstrate an understanding of how to maintain a sterile zone during surgery.

Standard 4

Students will demonstrate the ability to assist with common surgical procedures.

Standard 5

Students will be able to perform basic suture patterns.

STRAND 11

Students will study and demonstrate an ability to perform laboratory procedures.

Standard 1

Students will demonstrate an understanding of concepts and the ability to perform skills related to microbiology and mycology.

Standard 2

Students will demonstrate an understanding of concepts and the ability to perform skills related to hematology.

Standard 3

Students will demonstrate an understanding of concepts and the ability to perform skills related to parasitology.

Standard 4

Students will demonstrate an understanding of concepts and the ability to perform skills related to urinalyses and other animal laboratory tests.

STRAND 12

Students will demonstrate an ability to identify, treat and manage exotic and laboratory animals.

Standard 1

Students will correctly identify exotic and laboratory animals.

Standard 2

Students will be able to identify the care required by various exotic and laboratory animals.

Standard 3

Students will know the husbandry requirements for common exotic and laboratory animals.

Standard 4

Students will be able to identify common problems seen in the exotic and laboratory species.

Performance Skills

- Attend an FFA meeting.
- The student will participate in a Supervised Agricultural Experience (SAE) Program.
- The student will be able to interpret and extract information from realistic medical documents.
- The student will interpret and apply medical abbreviations and symbols.
- The student will dissect preserved cats, or other appropriate animals.
- The student will demonstrate appropriate administration of subcutaneous vaccines.
- The student will demonstrate animal restraint/handling techniques on small, exotic, and large animals.
- The student will demonstrate the ability to apply common bandages and splints.
- The student will be able to demonstrate appropriate administration of oral, topical, and injectable medications.
- The student will demonstrate appropriate use and disposal of needles and other sharps.
- The student will appropriately demonstrate the ability to communicate with and educate clients.
- The student will demonstrate aseptic techniques.
- The student will demonstrate the ability to perform skills related to laboratory tests including urinalyses, microbiology, mycology, hematology, and parasitology.

Standards Brief – The following will assist in focusing instruction in regards to Core Diseases, Equipment and Materials, Parasites, and Breeds/Species.

Canine Core Diseases: Distemper, Parvovirus, Adenovirus -2 (Hepatitis), Rabies
Feline Core Diseases: Herpesvirus 1 (Rhinotracheitis), Calicivirus, Panleukopenia (Distemper), Rabies
Equine Core Diseases: Tetanus, Eastern/Western Equine Encephalomyelitis, West Nile, Rabies
Bovine Core Diseases: Costridial diseases (*Clostridium chauvoei*—Blackleg; *Clostridium septicum*—Malignant edema; *Clostridium perfringens*—Enterotoxemia; *Clostridium sordellii*—Sudden death; *Clostridium novyi*—Sudden death; *Clostridium haemolytica*—Redwater), IBR (infectious bovine rhino-tracheitis), BVD (bovine virus diarrhea), PI-3 (parainfluenza-3), BRSV (bovine respiratory syncytial virus)
Ovine/Caprine Core Diseases: *Clostridium perfringens* C and D toxoid, *Tetanus*
Porcine Core Diseases: Erysipelas (Diamond Skin Disease), Leptospirosis, Parvovirus
Camelid Core Diseases: Clostridium perfringens type C, D, C. tetani
Ferret Core Diseases: Rabies, Distemper

The National FFA Career Development Event Handbook will be used as a reference for this course specifically in regards to Equipment and Materials identification, Parasite identification, and Breeds/Species identification.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Points by Strand												Total Point:	Total Questions
		1	2	3	4	5	6	7	8	9	10	11	12		
Veterinary Assistant 1	124	1		9	8	10	11	3	5	7	1		2	57	48

STRANDS AND STANDARDS

VETERINARY ASSISTANT 2

Learning that works for Utah
CTE®

Course Description

This course is designed for students who have previously taken the Veterinary Assistant I course and wish to further their education and training in the veterinary field. The Veterinary Assistant II course expands student knowledge, reinforces skills previously learned, and builds proficiency in highly scientific areas, such as pharmacology, anesthesiology, radiology and imaging, fluid therapy, and critical care nursing.

Intended Grade Level	11-12
Units of Credit	1.0
Core Code	30.02.00.00.095
Concurrent Enrollment Core Code	N/A
Prerequisite	Veterinary Assistant 1
Skill Certification Test Number	125
Test Weight	1.0
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Animal Science & Technology
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.
- Lead a group discussion or serve in a leadership capacity.

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
- Track and communicate progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Prepare for entry into the work force by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program:
  - Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
  - Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected SAE/WBL experience.

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

STRAND 3

Students will demonstrate the ability to provide safe and appropriate care of animals, to include small, large, exotic and laboratory animals.

Standard 1

Students will further develop and refine animal-care skills that were taught during the Veterinary Assisting 1 course.

Standard 2

Students will further develop assessment skills and be able to demonstrate the ability to evaluate patient needs and develop a safe, effective plan of care.

Standard 3

Advanced students will demonstrate their technical and clinical skills, as well as their communication and leadership abilities, as they assist in teaching veterinary assisting skills to first-year students.

STRAND 4

Students will exhibit an understanding of pharmacological principles as they demonstrate the ability to calculate dosages, safely administer medications, and monitor patient outcomes.

Standard 1

Students will demonstrate knowledge of and ability to follow safe practices related to medication administration and the ability to recognize adverse effects.

Standard 2

Students will demonstrate the ability to interpret medication orders and follow them as ordered.

Standard 3

Students will become familiar with the generic and brand names of various drugs.

Standard 4

Students will have knowledge of the drug categories and what drugs are commonly found in those categories.

Standard 5

Students will be able to accurately calculate dosages and know how to administer medications by parenteral, enteral, topical, and other routes.

Standard 6

Students will apply their knowledge of anatomy and physiology principles as they evaluate how medications will affect various body systems.

Standard 7

Students will demonstrate the ability to properly educate clients about medications.

Standard 8

Students will demonstrate an understanding of the regulations governing the use of controlled substances.

Standard 9

Students will demonstrate compliance with all regulatory guidelines related to drug purchase, storage, administration, disposal, and inventory control.

STRAND 5

Students will assist with surgical procedures, further developing the skills gained during the Veterinary Assisting 1 course.

Standard 1

Students will demonstrate an understanding of surgical and aseptic principles.

Standard 2

Students will be skilled in passing and utilizing surgical instruments.
Students will demonstrate the ability to assist with surgical procedures, from the pre-operative through the post-operative stage.

STRAND 6

Students will demonstrate the ability to manage patients safely and effectively from pre- anesthesia to anesthesia recovery.

Standard 1

Students will demonstrate the ability to follow safe practices related to anesthesia administration.

Standard 2

Students will demonstrate an understanding of the use and maintenance of anesthesia machines.

Standard 3

Students will demonstrate the ability to calculate dosages of appropriate anesthetic-related drugs.

Standard 4

Students will be able to utilize their knowledge of anatomy and physiology to evaluate the possible effects of anesthesia on the patient.

Standard 5

Students will demonstrate the ability to administer anesthetic-related drugs by injection and inhalation techniques.

Standard 6

Students will demonstrate the ability to monitor patients while under anesthesia.

Standard 7

Students will demonstrate the ability to provide post-operative patient care.

Standard 8

Students will demonstrate effective trouble shooting skills, for both machine and patient problems that may arise.

Standard 9

Students will be able to compare anesthesia requirements and concerns in various species of animals.

STRAND 7

Students will be able to produce radiographs and alternative images safely and effectively.

Standard 1

Students will demonstrate knowledge of and ability to follow safe practices related to radiology and imaging procedures.

Standard 2

Students will implement radiographic quality control measures.

Standard 3

Students will demonstrate the ability to correctly position animals for imaging procedures.

Standard 4

Students will exhibit an understanding of animal anatomy as they implement radiographic and imaging procedures.

Standard 5

Students will demonstrate the ability to accurately utilize ultrasonography, digital, and endoscopic equipment.

Standard 6

Students will accurately demonstrate developing techniques for both manual and automatic processors.

Standard 7

Students will demonstrate the ability to utilize table-top and portable radiography machines.

Standard 8

Students will demonstrate the ability to troubleshoot as problems arise.

STRAND 8

Students will demonstrate the ability to provide fluid therapy safely and effectively.

Standard 1

Students will demonstrate the correct placement of peripheral and central line IV catheters.

Standard 2

Students will properly maintain and care for IV catheters.

Standard 3

Students will be able to correctly calculate fluid needs and drip rates based on dehydration status.

Standard 4

Students will be able to describe the use of the various fluids used for fluid therapy and delivery systems.

Standard 5

Students will correctly demonstrate how to administer fluids.

Standard 6

Students will identify the clinical symptoms of fluid overload and know the proper treatment of this condition.

STRAND 9

Students will demonstrate an ability to evaluate the patient's condition and provide critical care nursing, as needed.

Standard 1

Students will apply acquired knowledge of anatomy and physiology as they evaluate patient condition.

Standard 2

Students will demonstrate an understanding of medical terminology relating to medical records.

Standard 3

Students will demonstrate knowledge of emergency protocols and implement them, as needed.

Standard 4

Students will demonstrate proficiency at performing triage, CPR, and first aid. Students will demonstrate an understanding of concepts and the ability to perform skills related to the following types of emergencies:

- Respiratory Emergencies
- Gastrointestinal Emergencies
- Musculoskeletal Emergencies
- Metabolic and Endocrine Emergencies
- Neurological Emergencies
- Toxicological Emergencies
- Cardiology Emergencies (ECGs)

Standard 5

Students will demonstrate an understanding of appropriate nutritional needs for the critical patient.

Standard 6

Students will maintain emergency supplies

Standard 7

Students will understand the physical therapy techniques used in neurological and musculoskeletal disorders.

Standard 8

Students will demonstrate an understanding of appropriate critical care nursing by analyzing case studies and identifying the appropriate treatment.

STRAND 10

Students will express an understanding of veterinary laws and ethics.

Standard 1

Students will understand the laws that govern veterinary medicine.

Standard 2

Students will recognize the legality of the veterinary-client-patient relationship.

Standard 3

Students will be able to identify the various associations available in the veterinary field.

Performance Skills

- Attend an FFA meeting.
- The student will participate in a Supervised Agricultural Experience (SAE) Program.
- The student will demonstrate the ability to evaluate a patient.
- The student will be able to accurately calculate dosages.
- The student will be able to correctly interpret medication orders and correctly administer medication.
- The student will demonstrate safe practices related to anesthesia administration.
- The student will be able to correctly calculate fluid needs and drip rates based on dehydration status.
- The student will correctly demonstrate how to administer fluids
- The student will demonstrate the ability to appropriately respond to respiratory and cardiology emergencies.
- The student will demonstrate proficiency at performing triage, CPR, and first aid.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Point by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Veterinary Assistant 2	125	2	2	2	8	4	12	4	6	7	2	49	

STRANDS AND STANDARDS

METALWORKING 1

Course Description

This is an entry-level course in Metalworking. Through demonstrations, lectures, research and practical experiences is designed to introduce the student to a broad experience in the use of; equipment, tools, materials, processes and techniques of metalworking trades. This is a one- semester course of instruction.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.10.00.00.085
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machine Tool or Welding
Endorsement 2	
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team

Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

STRAND 3

Students will be able to understand safe practices in a metals shop.

Standard 1

Follow safety manuals and all safety regulations and requirements.

Standard 2

Use protective equipment.

- Wear protective safety clothing as recommended by OSHA, UOSHA, and the Utah State Risk Management Office.
- Maintain and use appropriate protective guards and equipment on machinery.
- Locate and properly use protective equipment.
- Use lifting aids when necessary.

Standard 3

Maintain a clean and safe work environment.

- Keep work areas clean.
- Clean machine and hand tools when work is completed.
- Put tools away when work is finished.
- Keep aisles clear of equipment and materials.
- Perform preventive maintenance as required.
- Understand chemical hazards and the use of Material Safety Data Sheets (MSDS).
- Keep storage rooms well organized and free of clutter.

Standard 4

Request a courtesy UOSHA or State Risk Management inspection at least every 2 years.

- Keep accurate records of and take appropriate action on their findings.
- Make a copy of their findings available to your administration.

Standard 5

Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

STRAND 4

Students will be able to apply mathematical concepts.

Standard 1

Perform basic arithmetic functions.

- Add, subtract, multiply, and divide whole numbers.
- Add, subtract, multiply, and divide fractions.
- Add, subtract, multiply, and divide decimals.
- Use a ruler or measuring tape to measure within a sixteenth (1/16) of an inch.

Standard 2

Convert fractions to decimal equivalents.

- Convert fractions to decimal equivalents.
- Convert decimal values to nearest fraction equivalent.
- Use Decimal Equivalent Chart for conversions.

Standard 3

Convert metric to inch measurements.

- Convert inch dimensions to metric.
- Convert metric dimensions to inch.
- Use metric/inch conversion chart.

STRAND 5

Students will be able to interpret engineering drawings.

Standard 1

Review blueprints.

- Identify types of lines within a drawing.

Standard 2

Identify basic layout of drawings.

- Identify types of lines within a drawing.
- Identify item number symbols.
- Identify general note symbols.
- List the essential components found in the title block.
- Locate bill of materials on a drawing.

Standard 3

Identify basic types of drawings.

- Identify orthographic views.
- Identify positions of views (top, front, side, and auxiliary).
- Visualize one or more views from a given view.
- Identify isometric views.
- Determine the scale of the view or section.

STRAND 6

Students will understand the relationship of metals, machines, and processes.

Standard 1

Explain how metals are classified.

- Describe the properties and characteristics of many different metals.

Standard 2

Identify how metals and alloys are developed for specific applications.

STRAND 7

Students will understand metal forming operations and processes using both hand tools and machines.

Standard 1

Sheet-metal operations and processes.

- Explain the need for patterns and stretch-outs.
- Use the different methods for pattern development.
- Cut and bend sheet metal using several different tools.
- Identify and use a variety of sheet metal tools.
- Make hems, edges, and seams in sheet metal.
- Bend sheet metal into three-dimensional shapes using machines.
- Join sheet metal sections with rivets and other mechanical fasteners.
- Apply sheet metal safety rules.

Standard 2

Forging operations and processes.

- Identify the tools used in hand forging.
- Demonstrate several forging techniques.
- Bend, draw out, and upset metal by hand forging.
- Practice hand forging safety rules.
- Explain industrial forging processes.

Standard 3

Gas welding and SMAW operations and processes.

- Describe the basic welding processes.
- Identify the parts of a gas welding outfit.
- Recognize basic weld joints.
- Safely light, adjust, and use a gas torch.
- Select the correct rod and flux for a job.
- Prepare a joint for gas welding.
- Explain the difference between welding and brazing.
- Dress properly and use safety precautions when welding.
- List various components of SMAW system.
- Select the proper electrode for the job.
- Perform basic SMAW operations.

Standard 4

Foundry operations and processes.

- Explain various casting techniques.
- Explain the sand-casting process.
- Demonstrate the correct way to make a silicon mold with pewter.
- Demonstrate the correct way to make a green sand casting with aluminum.
- Describe simple patterns, split patterns, and match plate patterns.
- Heat and pour molten metal safely.
- Use a pyrometer.
- Follow safe casting procedures.

Standard 5

Metal machining operations and processes.

- Explain the operation of typical grinding machines.
- Adjust and prepare a grinding machine for operation.

- Select and safely use the correct drill and drilling machine for a given job.
- Make safe setups on a drill press.
- Calculate cutting speeds.
- Understand drill size classifications.
- Properly drill, countersink, counter bore, and tap steel.
- Select proper coolant for drilling select materials.
- Identify various types of drilling machines.
- Properly use a hand hack saw.
- Describe the operation of the three-principle metal-cutting power saws.
- Mount work properly for sawing.
- Safely operate a power saw.
- Describe how a lathe works.
- Identify the various parts of a lathe.
- Sharpen lathe cutting tools.
- Safely setup and operate a lathe using various work-holding devices.
- Practice proper safety precautions when operating metal cutting machines.

Performance Skills

Understand safe practices in a metals shop.

- Maintain a clean and safe work environment.
- Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

Apply mathematical concepts.

- Convert fractions to decimal equivalents.
- Convert metric to inch measurements.

Interpret engineering drawings.

- Interpret information located in the title block and bill of materials.

Understand metal forming operations and processes using both had and machine tools.

- Sheet-metal operations and processes.
- Forging operations and processes.
- Welding operations and processes.
- Foundry operations and processes.
- Metal machining operations and processes.

STRANDS AND STANDARDS

MACHINING 1

Course Description

This course is the first in a sequence that will use technical knowledge and skills to plan and manufacture projects using machine lathes, mills, drill presses, and other equipment in safe working conditions to promote the manufacturing industries.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.10.00.00.072
Concurrent Enrollment Core Code	40.10.00.13.072
Prerequisite	N/A
Skill Certification Test Number	580
Test Weight	0.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machine Tool
Endorsement 2	
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

STRAND 3

Students will be able to understand safe practices and professional machine shop procedures.

Standard 1

Follow safety manuals and all safety regulations and requirements.

Standard 2

Use PPE (personal protective equipment) and protective shields.

- Wear PPE as recommended by OSHA, UOSHA, and the Utah State Risk Management Office.
- Maintain and use appropriate protective guards and equipment on machinery.

Standard 3

Follow safe operating procedures for hand and power machine tools.

- Identify and understand safe machine operating procedures.
- Demonstrate safe machine operations at all times.

Standard 4

Maintain a clean and safe work environment.

- Keep work areas clean.
- Clean machine and hand tools when work is completed.
- Put tools away when work is finished.
- Keep aisles clear of equipment and materials.
- Perform preventive maintenance as required.
- Understand chemical hazards and the use of Material Safety Data Sheets (MSDS).
- Keep storage rooms well organized and free of clutter.

Standard 5

Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

STRAND 4

Students will be able to apply mathematical concepts.

Standard 1

Perform basic arithmetic functions.

- Add, subtract, multiply, and divide whole numbers.
- Add, subtract, multiply, and divide fractions.
- Add, subtract, multiply, and divide decimals.

Standard 2

Convert fractions to decimal equivalents.

- Convert fractions to decimal equivalents.
- Convert decimal values to nearest fraction equivalent.
- Use Decimal Equivalent Chart for conversions.

Standard 3

Calculate speeds and feeds for machining.

- Given appropriate reference materials, calculate RPM for various metals and tools.

Standard 4

Locate basic machining points from a Datum Point.

- Identify points using the Cartesian coordinate system.
- Identify points using the absolute dimensioning system
- Identify points using the incremental dimensioning system

STRAND 5

Students will be able to interpret engineering drawings and control documents.

Standard 1

Identify basic layout of drawings.

- Identify types of lines within a drawing.

Standard 2

Identify basic types of drawings.

- Identify orthographic views.
- Identify positions of views (top, front, side, and auxiliary).
- Identify and describe the purpose of orthographic (three views) drawings.
- Identify and describe the purpose of isometric drawings.
- Identify and describe the purpose of exploded isometric drawings.
- Identify and describe the purpose of assembly drawings.
- Determine the scale of the view or section.
- Check for revisions and describe the current specifications.
- Recognize out-of-date blueprints and know appropriate related procedures.

STRAND 6

Students will be able to properly perform measurement/inspection.

Standard 1

Select proper measurement tools as they best relate to part characteristics and specified accuracy.

- Discuss how measurement tool selection can contribute to part accuracy/inaccuracy.
- Demonstrate proper manipulation and care of precision measuring tools.

Standard 2

Apply proper measuring techniques.

- Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, etc.).
- Demonstrate how to check calibration of various precision instruments.

Standard 3

Accurately perform measurements with hand-held instruments.

- Read a tape measure to 1/16”.
- Read a micrometer to .001”.
- Read a steel rule.
- Read a dial/digital caliper to .001”.

STRAND 7

Students will be able to understand planning, hand tools, and recognize different manufacturing materials and processes.

Standard 1

Prepare and plan for machining operations.

- Read and interpret blueprints.
- Plan machining operations, write a plan of procedure.

Standard 2

Demonstrate proper use of hand tools.

- Select the most appropriate hand file and properly demonstrate its use.
- Correctly identify and use hand taps.
- Demonstrate the proper use of thread-cutting dies.
- Identify common hand tools and describe their basic applications.

Standard 3

Identify common materials and explain basic properties.

- Discuss the classification systems for metals.
- Describe general characteristics for carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals.

STRAND 8

Students will be able to understand and demonstrate the use of grinding machines and band saws.

Standard 1

Demonstrate proper use of grinding abrasive machines.

- Identify common types of grinding machines and discuss the major differences and applications.
- Discuss the variety and describe the proper selection and application of grinding fluids.
- Demonstrate the proper use and care of bench and pedestal grinders.

Standard 2

Demonstrate proper use of band saws.

STRAND 9

Students will be able to understand and demonstrate the use of milling machines.

Standard 1

Demonstrate proper use of a vertical milling machine.

- Demonstrate the proper setup, operation, care, cleaning, and lubrication of the vertical milling machine.
- Correctly identify common cutters and explain their basic applications.
- Identify and demonstrate the proper use of all controls and adjustments on the vertical milling machine.
- Properly set up the milling machine and demonstrate the use of an edge finder. Locate a point within .001”.
- Select the proper cutter and work holding device, demonstrate their proper installation and setup

to machine a part (This may include end mills, fly cutter, etc.).
- Having properly installed a drill chuck and an appropriate work holding device, demonstrate how to locate and drill a hole.
- Demonstrate the ability to use the Machinery Handbook as a reference for milling.

STRAND 10

Students will be able to understand and demonstrate the use of metal lathes.

Standard 1

Demonstrate proper use of metal lathes.

- Demonstrate the proper cleaning, lubrication, and care of the metal lathe.
- Identify common parts and demonstrate the proper use of basic controls and adjustments on the engine lathe.
- Identify and demonstrate the proper installation and application of standard tools and tool holders for the lathe.
- Identify common chucks and demonstrate proper procedure for changing and installing them.
- Demonstrate proper procedure for facing one end of a part.
- Demonstrate proper setup and procedure for center drilling parts.
- Demonstrate proper setup and procedure while drilling a hole.
- Demonstrate proper setup and technique for power tapping a through hole on a metal cutting lathe.
- Demonstrate proper setup and procedure for turning a part to diameter.
- Demonstrate proper setup and procedure for turning a 90 degree shoulder.
- Using the compound rest demonstrate the proper setup and procedure for turning a diameter and a taper.
- Demonstrate proper setup and procedure for turning between centers. (Optional)
- Demonstrate proper setup and procedure while single point cutting threads to standard pitch diameter and shape specifications.
- Demonstrate the proper procedure for grinding a HSS cutter bit.

Performance Skills

- Use PPE – personal protective equipment.
- Maintain a clean and safe work environment.
- Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating
- Perform basic arithmetic functions.
- Convert fractions to decimal equivalents.
- Calculate speeds and feeds for machining.
- Locate basic machining points from a Datum Point.
- Identify basic layout of drawings.
- Identify basic types of drawings.
- Select proper measurement tools as they best relate to part characteristics and specified accuracy.
- Apply proper measuring techniques.
- Accurately perform measurements with hand-held instruments.
- Demonstrate proper use of hand tools.
- Demonstrate proper use of grinding abrasive machines.
- Demonstrate proper use of band saws.

- Demonstrate proper use of a vertical milling machine.
- Demonstrate proper use of metal lathes.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Point by Sk and										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Machining 1	580	7	7	8	6	6	14	3	8	4		63	51

STRANDS AND STANDARDS

MACHINING 2

Course Description

This course is the second in a sequence that will use technical knowledge and skills to plan and manufacture projects using machine lathes, mills, drill presses, and other equipment in safe working conditions to promote the manufacturing industries.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.10.00.00.070
Concurrent Enrollment Core Code	40.10.00.13.070
Prerequisite	N/A
Skill Certification Test Number	582
Test Weight	0.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machine Tool
Endorsement 2	
Endorsement 3	

ADA Compliant: October 2020

STRAND 1

Student will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

STRAND 3

Students will be able to understand safe practices and professional machine shop procedures.

Standard 1

Follow safety manuals and all safety regulations and requirements.

Standard 2

Use PPE (personal protective equipment).

- Use PPE – Personal Protective Equipment.
- Wear protective safety clothing as recommended by OSHA, UOSHA, and the Utah State Risk Management Office.
- Maintain and use appropriate protective guards and equipment on machinery.

Standard 3

Follow safe operating procedures for hand and power machine tools.

- Identify and understand safe machine operating procedures.
- Demonstrate safe machine operations at all times.

Standard 4

Maintain a clean and safe work environment.

- Keep work areas clean.
- Clean machine and hand tools when work is completed.
- Put tools away when work is finished.
- Keep aisles clear of equipment and materials.
- Perform preventive maintenance as required.
- Understand chemical hazards and the use of Material Safety Data Sheets (MSDS).
- Keep storage rooms well organized and free of clutter.

Standard 5

Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

STRAND 4

Students will be able to apply mathematical concepts.

Standard 1

Perform basic trigonometric functions.

- Solve for unknown angles.
- Solve for unknown sides.
- Calculate bolt hole patterns.

Standard 2

Calculate speeds and feeds for machining.

- Given appropriate reference materials, calculate RPM for various metals and tools.
- Given appropriate reference materials, calculate the proper feed for various metals, tools, and depths of cut.

Standard 3

Locate basic machining points from a Datum Point.

- Identify points using the Cartesian coordinate system.
- Identify points using the absolute dimensioning system.
- Identify points using the incremental dimensioning system.
- Identify points using the polar coordinate system.

Standard 4

Perform calculations for sine bar and sine plate.

- Calculate gage block build up for 5" since bar.
- Calculate gage block build up for 10" sine plate.

STRAND 5

Students will be able to interpret engineering drawings and control documents.

Standard 1

List the purpose of each type of drawing.

- Identify and describe the purpose of orthographic (three views) drawings.

Standard 2

Practice geometric dimensioning and tolerancing (GD&T) methodology.

- Describe the purpose of GD&T.

STRAND 6

Students will be able to properly perform measurement/inspection.

Standard 1

Select proper measurement tools as they best relate to part characteristics and specified accuracy.

- Discuss how measurement tool selection can contribute to part accuracy/inaccuracy.
- Demonstrate proper manipulation and care of precision measuring tools.

Standard 2

Apply proper measuring techniques.

- Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, etc.).
- Demonstrate how to check calibration of various precision instruments.
- Accurately perform measurements with hand-held instruments.
- With steel rules (metric and/or inch) take six (6) different measurements to within 1/64th and accurately write each dimension.
- Provided an accurately calibrated micrometer, designed to read in .0001, consistently take at least four (4) different readings within the designed accuracy of the tool and numerically write each dimension.

- Measure a hole with a telescope gage and an accurately calibrated micrometer of appropriate size.
- Given a properly calibrated dial or digital caliper, measure to within .001" and phonetically write the measurement.

Standard 3

Accurately perform measurements with hand-held instruments.

- Demonstrate the proper care and use of the surface plate and related tools.
- Use surface plate accessories correctly (sine bar, gage blocks, etc.).
- Check for part squareness.
- Check part dimensions for accuracy.

STRAND 7

Students will be able to understand project planning, hand tools, and recognize different manufacturing materials and processes.

Standard 1

Prepare and plan for machining operations.

- Read and interpret blueprints.
- Perform basic semi-precision and precision layout as necessary.
- Calculate proper speeds, feeds and depth of roughing and finish cuts for applications.
- Plan machining operations and write a plan of procedure.
- Describe machine-ability and chip formation.
- Use the best applicable and available cutter materials, especially carbides, to maximize productivity.

Standard 2

Demonstrate proper use of hand tools.

- Proper care and use of arbor and shop presses.
- Select the most appropriate hand file and properly demonstrate its use.
- Correctly identify and use hand taps.
- Identify common hand tools and describe their basic applications.

Standard 3

Identify common materials and explain basic properties.

- Discuss the classification systems for metals.
- Describe general characteristics for carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals.

STRAND 8

Students will be able to understand and demonstrate the use of milling machines.

Standard 1

Demonstrate proper use of a vertical milling machine.

- Demonstrate the proper setup, operation, care, cleaning, and lubrication of the vertical milling machine.
- Correctly identify common cutters and explain their basic applications.
- Properly dial in the vertical milling machine head to within .002 TIR with at least a 6" offset.
- Identify the common work holding devices and select the most appropriate device based on part shape and type of machining to be done.

- Dial in a milling machine vise to within .001" TIR.
- Properly set up the Milling Machine and demonstrate the use of an edge finder. Locate a point within .001".
- Demonstrate proper procedure for dialing in on a pin or a hole to within .001" TIR.
- Accurately calculate speeds and feeds for an assigned milling machine operation.
- Demonstrate proper setup and procedure for squaring a part.
- Demonstrate the proper setup and procedure for reaming.
- Demonstrate proper setup and procedure for using an offset boring head to bore a hole.
- Demonstrate the proper setup and procedure for milling a slot or pocket.
- Demonstrate proper setup and procedure for power tapping.
- Demonstrate proper setup and procedure for milling an angle locating the work with an angle finder and holding it in a vise, producing at least a 63 micro inch finish. The angle should be within ½ degree of that specified.
- Demonstrate proper setup and procedure for milling an angle.
- Differentiate between conventional milling and climb milling.

STRAND 9

Students will be able to understand and demonstrate the use of metal lathes.

Standard 1

Demonstrate proper use of metal lathes.

- Demonstrate the proper cleaning, lubrication, and care of the metal lathe
- Identify and discuss the sizes and applications of common types of metal cutting lathes.
- Identify size, common parts, and demonstrate the proper use of the basic controls and adjustments on the engine lathe.
- Identify and demonstrate the proper installation and application of standard tools and tool holders for the lathe.
- Identify common work holding devices and demonstrate proper procedure for changing and installing them.
- Using a four-jaw chuck, demonstrate proper procedure for dialing in a part to within .001" TIR.
- Using appropriate reference material, accurately calculate relevant speeds and depths of cuts as required for two assigned applications.
- Demonstrate proper procedure for facing both ends of a part to length.
- Demonstrate proper setup and procedure for center drilling parts.
- Demonstrate proper setup and procedure while drilling a hole.
- Demonstrate proper setup and technique for power tapping a through hole on a metal cutting lathe.
- Demonstrate proper setup and procedure for reaming a hole.
- Demonstrate proper setup and procedure for boring a hole.
- Demonstrate proper setup and procedure for turning a part.
- Demonstrate proper setup and procedure for turning a 90 degree shoulder.
- Using the compound rest demonstrate the proper setup and procedure for turning a diameter and a taper.
- Demonstrate proper setup and procedure for turning between centers. (Optional)
- Demonstrate proper methods of filing and using strip abrasives while working on a metal cutting lathe.
- Demonstrate proper setup and procedure while single point cutting a thread to standard pitch di-

ameter and shape specifications.
- Identify the common types of tapers used in a machine shop and discuss their major applications.
- Using a taper attachment, demonstrate proper setup and operations for cutting a taper.
- Demonstrate the proper procedure for grinding a HSS cutter bit.
- Discuss and demonstrate the proper setup, speeds, feeds, and use of indexable insert carbide cutting tools, carbide, and HSS cutters.
- Demonstrate the ability to use the Machinery Hand book as a reference for technical information related to turning.

STRAND 10

Students will be able to understand CNC machining processes.

Standard 1

Demonstrate proper planning for CNC machining.

- Prepare and plan for CNC machining operations.
- Demonstrate proper cleaning, care lubrication and operation of CNC machines.
- Properly identify common types of CNC machines and describe their size and general applications.
- Demonstrate ability to read and interpret complex blueprints.
- Create a plan of operation for CNC machining.
- Calculate speeds, feeds, and depths of cut for CNC machine operations.
- Use the Machinery's Handbook as a reference for CNC machining applications.

Standard 2

Select and use CNC tooling systems.

- Describe the machinability index and how it affects CNC machining.
- Identify tooling components and discuss their specific applications.
- Based on geometry, identify common carbide inserts and discuss their general applications.
- Based on material to be machined and part characteristics, select an appropriate insert and tooling system.
- Demonstrate ability to properly change inserts and set up tooling systems to industry standards.
- Work with vendors and produce a cost comparison report for comparable inserts and tooling.

Standard 3

Program common CNC machines.

- Identify common CNC operations.
- Identify common CNC machine control systems, and describe their major differences and applications.
- Demonstrate the proper applications of absolute and incremental coordinate systems.
- Create a plan of operation and manually write programs for CNC mills.
- Create a plan of operation and manually write programs for CNC lathes.
- Using a CAD system, select a pre-existing program and dump it onto a controller.
- Using a CAD-CAM system create a drawing for a part, and create a machine program for that part. Load it on to a controller and take all necessary steps to create the part.

Standard 4

Demonstrate proper use of CNC Machining Centers (mills).

- Demonstrate the proper care, setup, lubrication and operation of Machining Center.
- Select and properly install and align appropriate work holding devices to applicable standards.
- Demonstrate proper loading and aligning materials into the machine.

- Demonstrate proper loading of tools into machine.
- Demonstrate proper techniques of establishing accurate tool length offsets for each tool.
- Establish/set machine references to within appropriate tolerances.
- Load programs into CNC mill controller.
- Demonstrate working knowledge of all controls on the MCU.
- Demonstrate proper operation of CNC machining center to include single block, “dry run” and final production.
- Edit CNC programs for accuracy and optimum part production.
- Operate machine in DNC mode, if that capability exists.

Standard 5

Demonstrate proper use of CNC Turning Centers (lathes).

- Demonstrate proper setup care and operation of CNC turning centers.
- Identify common types of turning centers and discuss size and different applications and restrictions.
- Identify and describe common work-holding devices and discuss the major applications.
- Demonstrate proper techniques for changing and installing common work-holding devices.
- Select and install appropriate work holding device to match assigned project.
- Install and true soft jaws as required.
- Select appropriate tools and demonstrate proper loading into the machine.
- Establish accurate machine and part reference.
- Set initial tool offsets.
- Monitor/adjust offsets for accurate part production.
- Load programs into CNC lathe.
- Demonstrate working knowledge of all controls on the MCU.
- Demonstrate proper operation of CNC lathe to include single block, dry run and final production.
- Edit CNC programs for optimum part production.

Standard 6

Program CNC machines using CAD-CAM systems.

- Create plan of operation for machining assigned parts.
- Construct part geometry. (PS)
- Program tool path for roughing and finishing operations.
- Verify tool path.
- Generate CNC code.
- Prove program.
- Generate part to match required specifications.
- Inspect part to verify accuracy.

Standard 7

Demonstrate proper care, setup, and operation of electrical discharge machines.

- Identify common EDM machines and describe their applications.
- List advantages and disadvantages of the EDM process.
- Identify and discuss common electrode materials and their major applications.
- Machine EDM electrodes.
- Set up and operate sinker EDM machines.
- Calculate overburn.
- Identify generator setting of machine.

- Choose proper techniques for flushing.
- Estimate number of roughers and finishers.
- Demonstrate proper electrode mounting techniques.
- Utilize 3R tooling.
- Perform touch-off procedures.
- Recognize optimum machine settings, and make necessary adjustments to maintain this level of machining.
- Perform continuity checks.
- Determine R-MAX finish required.
- Set up and operate wire cut EDM machines.
- Recognize optimum machine settings, and make necessary adjustments to maintain this level of machining.
- Perform continuity checks.
- Determine R-MAX finish required.
- Set up and operate wire cut EDM machines.

Performance Skills

- Use PPE – personal protective equipment.
- Maintain a clean and safe work environment.
- Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.
- Perform basic trigonometric functions.
- Calculate speeds and feeds for machining.
- Locate basic machining points from a Datum Point.
- Perform calculations for sine bar and sine plate.
- Practice geometric dimensioning and tolerancing (GD&T) methodology.
- Accurately perform measurements with hand-held instruments.
- Accurately perform measurements on a surface plate.
- Demonstrate proper use of hand tools.
- Identify common materials and explain basic properties.
- Demonstrate proper use of a vertical milling machine.
- Demonstrate the proper use of metal lathes.
- Select and use CNC tooling systems.
- Program common CNC machines.
- Demonstrate proper use of CNC Machining Centers (mills).
- Demonstrate proper use of CNC Turning Centers (lathes).
- Program CNC machines using CAD-CAM systems.
- Demonstrate proper care, setup, and operation of electrical discharge machines.

Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Point by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Machining 2	582	5	15	10	9	3	7	14	4	4		71	64

Course Changes 2020: Business and Marketing Pathways

Summary of Changes to Sports & Entertainment Marketing Strands and Standards:

- Added larger focus on the impact of current technology and social media to all components of the Sports and Entertainment Marketing strands and standards
- Added SWOT analysis
- Added “event triangle” diagram for better clarification
- Made small verbiage changes and grammatical changes to better clarify what should be taught

Summary of Changes to Business & Marketing Capstone Strands and Standards:

- This course is fairly new and was piloted by teachers last school year 2019-2020. We reviewed the course, made small clarifying changes/details to the strands and standards. This course will now be open for all qualified Business & Marketing teachers to teach.

STRANDS AND STANDARDS

SPORTS AND ENTERTAINMENT MARKETING

Learning that works for Utah
CTE®

Course Description

This is an introductory course that will help students gain an understanding of marketing concepts as they apply to the sports and entertainment industry. The areas this course will cover include: core marketing standards, market segmentation, target marketing, the event marketing triangle (events, fans, and sponsors), sports and entertainment promotion and marketing plans.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	37.01.00.00.260
Concurrent Enrollment Core Code	
Prerequisite	
Skill Certification Test Number	416
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business and Marketing (CTE/Gen)
Endorsement 2	Business and Marketing Essentials
Endorsement 3	

STRAND 1

Students will gain an understanding of basic marketing concepts and terminology as they pertain to the sports and entertainment industry.

Standard 1

Identify and understand the basic concepts and the core standards of marketing.

- Define the following basic marketing terms and give an example of each:
  - marketing
  - market
  - producer
  - consumer
  - exchange
  - marketing concept
  - marketing mix (product, price, place, promotion). Discussion of the 5th element "people" is optional

Standard 2

Identify the reasons a sports/entertainment property would have need to incorporate marketing into their business plan and some common marketing activities that would be utilized.

- Explain the concept of the marketing of sports/entertainment.
  - Understand the impact of professional athletes and stars (music and movie) as part of the marketing process.
  - Understand the impact of team performance/star power as it relates to demand.
  - Understand seasonal interests (peak season vs. off season--marketing emphasis changes but must not be neglected)--the high season for movie entertainment (holidays/summer).
- Describe activities to market/promote a sports/entertainment property:
  - Sales and advertising (print and electronic)
  - Lead Generation
  - World premier (opening week),
  - Press conferences,
  - "Midnight Madness" events (season-long promotions are more important than "one-offs").

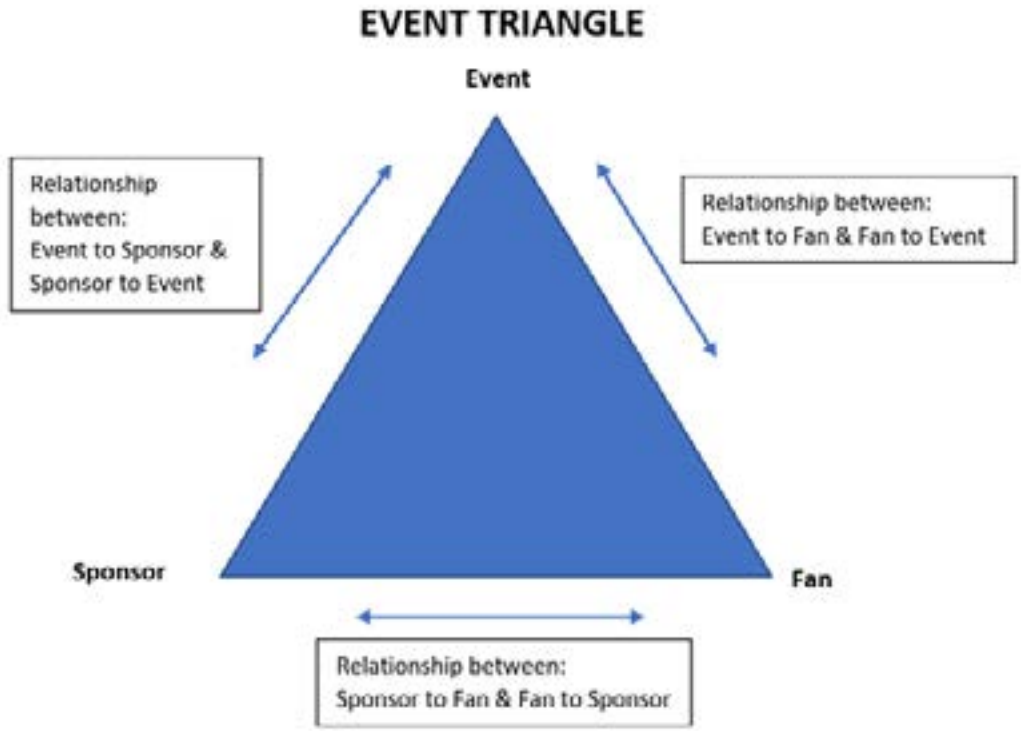
STRAND 2

Students will be able to identify and define the "event triangle" and identify its various components (event, sponsor, and fan) and their inter-relatedness.

Standard 1

Describe the "event triangle" and identify its three sides.

- Summarize the exchanges in the event triangle.
  - Fans to Sponsors and Event
  - Sponsors to Event and Fans
  - Event to Fans and Sponsor



STRAND 3

Students will gain a greater understanding of the "event" component of the Event Triangle.

Standard 1

Students analyze the importance of event marketing.

- Identify and describe the key components of an event.
  - Ticketing
  - Gate Receipt
  - Venue
  - Concessions
  - Merchandising Opportunities Including Licensed Merchandise
  - Seating
  - Staffing and Training
  - SWOT Analysis (strengths, weaknesses, opportunities, threats)

Standard 2

Discuss and review means of evaluating an event.

- Explore:
  - Ticket Sales
    - Ticketing options (Individual, Season, Luxury, Group, Mini-plan packages)
    - Pricing (variable/fixed, supply/demand, surplus/shortage, primary/secondary market)
  - Event Enjoyment (Fan Reaction and Consumer Evaluations)
  - Hospitality (clubs, parking, luxury boxes, etc.)
  - Return on Investment
  - Venue (Capacity, Perceived Crowding, Security, concessions)

Standard 3

Discuss how current technology and social media impacts the "event" component of the Event Triangle.

STRAND 4

Students will gain a greater understanding of the "sponsor" component of the Event Triangle."

Standard 1

Students will understand the role of corporate partners (sponsors) in sports and entertainment marketing.

- Understand the concept of sponsorship.
  - Define, understand and identify sponsorship and sponsorship levels. (Categories, Exclusivity, Signature Sponsor, Title Sponsor)
  - Discuss reasons a company would be involved in an event or sports/entertainment property.
  - Understand and discuss the concept of borrowed equity
  - Understand and discuss the concept of marketing through sports (ex. promotion of non-sports products using sports properties as a medium) vs. marketing of sports (ex. advertising the sport itself).
  - Discuss concerns related to ambush marketing.

Standard 2

Recognize major goals of sponsorship

- Increase sales
- Increase awareness
- Be competitive
- Reach the target market
- Build customer relationships
- Develop image
- Leveraging
- Describe activities to market products using sports/entertainment (celebrity/star athlete endorsements, influencers, promotional tie-ins, etc.), venue signage, merchandising tie-ins, fan gear, etc.
- Understand that sponsorship may be outsourced in sports and entertainment and how this is done: marketing agencies.

Standard 3

Discuss how current technology and social media impacts the "sponsor" component of the Event Triangle.

STRAND 5

Students will gain a greater understanding of the "fan" component of the Event Triangle.

Standard 1

Students will understand the role of fans in sports and entertainment marketing.

- Understand the reasons why fans attend or participate in sports and entertainment (entertainment, diversion from everyday life, career opportunities, etc.)
- Explain and evaluate fan attendance factors (sports team's success, star power, loyalty, pricing, other entertainment options, etc.)
- Compare and contrast (audience, consumers, and customers).
- Identify sports/entertainment fans as valuable target markets.
  - Market Segmentation

- Demographic Segmentation
- Psychographic Segmentation
- Geographic Segmentation
- Behavioral Segmentation (Provide specific details such as seat location, frequency of visits, merchandise purchases, social engagement, and arrival time.)

Standard 2

Recognize various ways that fans can be part of an audience.

- Explain venues (stadiums, concert halls, theaters, etc.) as places of distribution.
  - In person attendance
  - Fan-fun events
  - Virtual or digital
- Explain media distribution and ways to be involved in events.
  - Watch or listen "for free" at home (TV, radio, Internet, streaming online).
- Purchasing events through media (pay-per-view, premium subscriptions, downloads, etc.).
- Discuss how the many merchandising products allow a fan to enhance their experience. (i.e. jerseys/apparel, posters, memorabilia, fan stores, video games, etc.).

Standard 3

Discuss how current technology and social media impacts the "fan" component of the Event Triangle.

STRAND 6

Students will understand how basic marketing components are utilized within the entertainment industry (music, movies, plays, and the fine arts).

Standard 1

Students will be able to explain the promotional strategies for motion pictures, music, plays and the fine arts such as those found in museums, centers for performing arts, as well as traveling exhibitions.

- Understand the ways movies are marketed/promoted worldwide.
- Understand how the marketing technique of providing previews helps to create demand for movies.
- Identify the different ways fine/performing arts (ballet, museums, theatre/broadway, traveling exhibits, guest artists/conductors, etc.) are promoted.

Standard 2

Students will be able to describe channel management (distribution) for various segments of the entertainment industry.

- Explain sources of "at home" entertainment distribution (pay-per-view, on-demand, Netflix, Disney Plus, YouTube, etc.).
- Explain how an artist's music and appearances are distributed.

Standard 3

Students will understand how revenue is generated in the entertainment industry (movies, plays, music, and the fine arts) and the various factors which affect revenue generation.

- Identify the ways in which movie studios can generate money.
- Discuss what makes certain films more profitable ("star power", fan base following, sequels, etc.).
- Understand how the music industry operates financially and the various components of the revenue generating process and factors which can affect revenues.

- Identify the many merchandising products that evolve from a motion picture (i.e. action figures, lunchboxes, clothing, computer games, posters etc.).

Standard 4

Discuss how current technology and social media impacts the entertainment industry.

STRAND 7

Students will discover the importance and elements used in developing a sports and/or entertainment marketing promotion.

Standard 1

Identify the roles and goals of promotions.

- Define promotion and discuss its role.
  - Inform, persuade, remind
- Identify goals of promotion.
  - Increase sales
  - Increase awareness
  - Be competitive
  - Reach the target market
  - Build customer relationship
  - Develop image (for new prospects – access to the product (Jazz game) as low risk trial

Standard 2

Identify the components of the promotional mix and understand how the components are integrated to form a promotional campaign.

- Define and identify examples of:
  - Advertising (branding and action based-advertising done to create a specific task--season ticket sales promotion/play-off ticket sales promotion/ fan-fun event attendance, etc.)
  - Public Relations
  - Personal Selling
  - Sales Promotion
- Recognize and discuss media types as well as the advantages and limitations of each:
  - Social Media
  - Digital Media
  - Print Media
  - Broadcast Media
  - Direct Mail
  - Outdoor
  - Specialty Media
  - Other

Standard 3

Be able to develop a promotion plan for an event or sports property.

- Promotions and advertising used to promote the event/property to fans.
- Personal selling efforts.

STRAND 8

Students will discover the importance and elements used in developing a sports/entertainment marketing plan.

Standard 1

Determine the components of a sports/entertainment marketing plan.

- Identify and explain the components of a conventional marketing plan:
  - Executive Summary
  - Introduction
  - Situation Analysis
  - Target Market Identification
  - Goals
  - Media Strategies
  - Implementation
  - Evaluation
  - SWOT
- Explore some existing marketing plans and their application in industry.

Standard 2

Explain the role and identify how promotional plans as well as event are integrated into a sports/entertainment marketing plan.

Standard 3

Be able to develop a sports/entertainment marketing plan for a team and/or event incorporating the components identified in objective 1 and 2 as well as some optional components such as:

- Scheduling, season summary, season preview, ticketing goals
- Sales strategies, season promotions at games
- Game by game summary, price promotions/theme nights
- Social media technologies: web- and mobile-based
- Students will want to reference examples as well as evaluation methods from the Internet.

STRAND 9

Students will explore career opportunities in sports and entertainment marketing.

Standard 1

Identify some different jobs and describe the training needed to secure an entry-level position in the sports and/or entertainment marketing.

- What are some of the jobs/careers within the sports and entertainment industry?
  - Talent Director
  - Marketing Director
  - Sales
  - Public Relations
- Students will be able to describe the knowledge/skill sets needed for specific jobs within the sports and entertainment marketing field.
- Students will be able to describe the preparation necessary for a career in the sports and entertainment marketing field.

Performance Skills

Strand 7: Promotional Plan

Develop a promotion plan for a sports/entertainment property or event including the following elements:

- Target Market Identification (Who are we trying to reach?)
- Strategies (What do we wish to accomplish?)
- Establish Target Market Identification (Who are we trying to reach?)
- Strategies (What do we wish to accomplish?)
- Scheduling (When-time frame?)
- Implementation/run of event (How?)
- Evaluation
- Summary

and at least five (5) of the following twelve (12) elements:

- In-Game Give Away
- Sports Website/Sports Blog Ad
- Print Ad – Newspaper/Magazine/Direct Mail
- Outdoor/Transit Advertisement
- Venue Advertisement
- Group/Season Sales Campaign
- Press Release/News Release
- Advertising Schedule (including rates)
- TV Storyboard
- Radio Script
- Internet/e-Commerce Advertisement
- Retailer Promotion

Strand 8: Marketing Plan

Develop a sports/entertainment marketing plan for a sports/entertainment property or event including the following elements:

- Executive Summary
- Introduction
- Situation Analysis
- Target Market Identification
- Goals
- Strategies (Promotional Plan)
- Scheduling
- Implementation
- Evaluation
- Summary

STRANDS AND STANDARDS
BUSINESS AND MARKETING CAPSTONE

Course Description

The purpose of this course is to research and solve real world business needs. This course is designed for advanced business students to further their business knowledge and skills. The Business Capstone encourages students to think analytically, logically, and creatively to integrate experience and knowledge in real world situations. Membership and participation in DECA and FBLA is highly encouraged.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	32.02.00.00.260
Concurrent Enrollment Core Code	
Prerequisite	
Skill Certification Test Number	
Test Weight	
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business and Marketing (CTE/Gen)
Endorsement 2	Business and Marketing Essentials
Endorsement 3	

STRAND 1

Students will develop a better understanding of real world application within the business industry.

Standard 1

Students will gain greater insight into the business world.

- Develop a greater understanding of real world business operations including, but not limited: management, finance, marketing, sales.

Performance Skills

Complete one or more of the following:

- Tour a business to learn about business operations
- Offer job shadowing opportunities in various areas of business
- Invite guest speaker(s) to speak to students about business AND
  1. Partner with a business to create a solution or solve a need within the business.
  2. Communicate with a local business
  3. Obtain background knowledge about current operations and determine need(s)
  4. Identify goals and objectives to solve need
  5. Develop a solution-oriented plan
  6. Present plan to business

STRAND 2

Students will gain a greater understanding of how research and analytics impact business.

Standard 1

Students will use research skills and data analysis to gain a greater understanding of business operations. This will be accomplished as students' research, analyze, and evaluate business decisions.

Performance Skills

Complete the following:

Develop a research paper which defines, analyzes, and evaluates the impact of business decision(s) or business principle(s). Research papers may follow DECA and FBLA written project guidelines.

AND

Analyze at least 4 current business case studies referencing the following content areas:

- Marketing and sales
- Business operations
- Financial management
- Opportunity recognition
- Entrepreneurship Ventures

*Case studies may be found through DECA and FBLA Competitive Events.

STRAND 3

Students will implement leadership skills throughout the course.

Standard 1

Students will recognize the impact of leadership skills in business.

Performance Skills

Demonstrate leadership in the following areas:

- Lead a team during a project, activity, or event related to business
- Create assignments for team members
- Follow directions from team leaders
- Practice ethical leadership
- Learn effective communication by completing at least one of the following:
  - read a related book/article and summarize what was learned.
  - organize an event
  - complete a hands-on activity related to effective communication

STRAND 4

Students will use various forms of technology throughout the course.

Standard 1

Students will recognize current technological tools and their impact on business.

Performance Skills

Complete the following:

- Students will use one or more of the following technological tools throughout the course.
  - Examples include:
    - Online surveys
    - Podcasts
    - Advanced presentation tools - Adobe Spark, Microsoft Sway, Prezi, PowerPoint, etc.
    - Website and Wikipedia sites
    - Search engine optimization
    - Digital marketing
    - Social media marketing
    - New and upcoming technologies

STRAND 5

Students will explore career opportunities in business.

Standard 1

Analyze Career Opportunities

- Research career opportunities in business
- Analyze the academic and professional paths to career choices

Performance Skills

Students will develop online career platform to further career goals

- Examples include:
  - LinkedIn profile
  - Digital portfolio
  - Personal website
  - Professional social media accounts

Course Changes 2020: Computer Science Pathways

Exploring Computer Science Update-

The Exploring Computer science course has been updated in rigor and standards to make this course a "true" grade 9-12 Digital Studies graduation requirement. Topics such as web development, CS careers, Programming and Algorithms, and computational thinking have been added to the course for more rigor and to make it more high school relevant.

Game Development 1 Update-

Standards did not change in structure, but did get a 2020 update for devices, terminology, and development programs.

Game Development 2 Update-

Standards are no longer identical to Game Dev 1. Game Development 2 Standards now include:

1) Game Development Life Cycle
2) Communication Features and Game Interface design.
3) Post-production strategies

STRANDS AND STANDARDS
EXPLORING COMPUTER SCIENCE

Course Description

Exploring Computer Science is designed to introduce students to the breadth of the field of computer science through an exploration of engaging and accessible topics. The course focuses on the conceptual ideas of computing and helps students understand why certain tools or languages might be utilized to solve particular problems. The goal of Exploring Computer Science is to develop in students the computational thinking practices of algorithm development, problem solving, and programming within the context of problems that are relevant to the lives of today's students. Students will also be introduced to topics such as artificial intelligence, web development, programming, and physical computing.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	35.02.00.00.007
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	802
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	ECS (Historic)
Endorsement 2	Computer Science 1 (Historic)
Endorsement 3	Computer Science 2 (Historic)
Endorsement 4	Intro to Computer Science
Endorsement 5	Programming and Software Development

STRAND 1

Computer Science Practices

Students will employ the following practices throughout the course. They provide a framework and serve as helpful reminders of the high-level skills and dispositions computer scientists should be continually developing.

Standard 1

Critical Thinking

- Use the structured problem-solving process to help address new problems
- View challenges as solvable
- Decompose or break down larger problems into smaller components

Standard 2

Persistence

- Expect and value mistakes as a natural and productive part of problem solving
- Continue working with new ideas and consider multiple possible approaches
- Iterate and continue to improve partial solutions

Standard 3

Creativity

- Incorporate personal interests and ideas into activities and projects
- Experiment with new ideas and consider multiple possible approaches
- Extend or build upon the ideas and projects of others

Standard 4

Collaboration

- Work with others to develop solutions that incorporate all contributors
- Mediate disagreements and help teammates agree on a common solution
- Actively contribute to the success of group projects

Standard 5

Communication

- Structure work so that it can be easily understood by others
- Consider the perspective and background of your audience when presenting work
- Provide and accept constructive feedback in order to improve work

STRAND 2

Problem Solving with Computers

Students will learn how computers input, output, store, and process information. Students will gain the importance of solving problems, and/or automating tasks with the aid of computers, as well as a basic understanding of the algorithms computers use.

Standard 1

Students will understand computer hardware and the tasks they perform:

- Students will identify required functions for a device to be classified as a computer (receives input, processing; output; storage)
    - Analyze the characteristics of hardware components including processor, operating system, RAM, ROM, hard drive, and input and output devices.
    - Understand the relationship between bits and bytes
    - Compare and convert between the following sizes: kilobyte, megabyte, gigabyte, terabyte.
    - Discuss the speed of the computer (gigahertz).
- Students will identify examples of tasks that can and cannot be accomplished with a computer.

Standard 2

Students will describe changes technology has made on communication, privacy, and social interactions.

- Impacts of technology on society from the following perspectives: social, economic, political, legal, ethical and moral issues
- Permanence of online information
- Consider issues around privacy and collection of data
- Methods of communication appropriate for different situations including appropriate use of social media
- Online safety

Standard 3

Students will discuss how and why binary is used to represent data in a computer.

- Describe how binary digits (bits) are stored in different media
- Understand the binary system or pattern for counting up to 8 digits
- Convert numbers between 0 and 128 from decimal to binary and vice versa.
- Describe how real-world phenomena such as numbers, characters (ASCII), or images (RGB) are digitized and represented in a computer.

Standard 4

Students will understand different algorithms used in problem solving.

- Solve a problem through an iterative process.
    - **Define** - Understand the Problem
    - **Prepare** - Plan the Solution (design via pseudocode/flowcharts)
    - **Try** - Carry out the Plan (Code)
    - **Reflect** - Review and Discuss your Solution (Testing / Feedback)
    - **Repeat** - Reiterate through the steps until the problem is solved
- Explain when a binary search would be more efficient than a linear search

- Visualize and compare common sorting algorithms (e.g. insertion, selection, bubble, quicksort, merge sort)

Standard 5

Students will gain knowledge and skills while considering the social, moral, and ethical impacts of Artificial Intelligence (AI) systems and usage.

- Students will explain the idea of intelligence specifically as it relates to computers.
- Students will explain what it means for a machine to learn (Turing Test)
- Students will identify the AI being used, such as image recognition, speech recognition, translation.
- Students will train and test an existing AI system.
- Students will explore and explain the social and ethical impacts of AI (human and algorithmic bias, worker obsolescence through automation, user interface improvements, human/machine augmentation, etc.)
- Students will gain an understanding of how AI is changing different sectors such as medicine, agriculture, manufacturing, etc.

STRAND 3

Web Development

Students will learn social responsibility and ethics with regard to web development and how to use the basic building blocks of the World Wide Web: HTML5 and Cascading Style Sheets (CSS). Students will follow the steps to create a website by planning, designing, and coding a personal website.

Standard 1

Social Responsibility of Website Development

- Students will understand ethical behavior as it relates to an AUP, Intellectual Property, Netiquette, Respecting Privacy, Anti-Spamming Laws, etc.
- Students will demonstrate knowledge of standard copyright rules.
    - Understand copyright for original creations.
    - Understand the creative commons license
    - Understand when to obtain permission for non-original work.
- Students will identify the use and purpose of acceptable use policy (AUP).
    - Comply with the school's AUP

Standard 2

Design Process

Students will understand the need to know the purpose of website design in relationship to the intended audience and client needs.

- Students will plan a website design using storyboards, sketches, or wireframes (rough drafts).

Standard 3

HTML

Students will understand that the HTML programming language is used to create all websites on the internet and acts as the structure for a website.

- Students will code the foundation for a basic webpage including the element tags DOCTYPE, html, head, title, and body.
- Students will create pages with tags and attributes at the inline level. (DOCTYPE, title, head, body, h1, h2, h6, p, br, etc.)
- Students will create web pages with text formatting, links, images, and lists.

Standard 4

CSS

Students will understand that CSS (Cascading Style Sheets) are used to customize the style or looks of a website.

- Students will apply CSS to a website.
    - Apply CSS to an element using an inline style. (An inline style may be used to apply a unique style for a single element.)
    - Apply CSS to a website using an external stylesheet. (Best Coding Practice - One file changes the entire website.)
- Students will format web pages using CSS
    - Modify background properties such as color and image.
    - Modify font properties such as font-family, size, and color.
    - Modify border properties such as width, style, and color.
    - Implement tags and classes to modify an HTML element.

Standard 5

Careers in Web Development

Students will explore various careers in Web Development including front end developer, back end developer, full stack developer, and UX/UI designer.

STRAND 4

Programming and Algorithms

Students will understand that an algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are then translated into programs, or code, to provide instructions for computing devices. Programs control all computing systems and empower people to communicate with the world in new ways and solve compelling problems.

Standard 1

Program Design

Students will identify how planning strategies (such as flowcharts, storyboards, prototypes or pseudocode) are used when creating a program.

Standard 2

Algorithms

Define an algorithm as a set of clearly defined, logical steps to solve a problem.

- Students will describe the steps needed to efficiently solve a non-computing problem using a pseudocode algorithm
- Students will examine traditional programming algorithms such as searches, sorts, and minimal spanning trees.
- Students will examine and formulate algorithms that solve specific problems.

Standard 3

Input/Output

Students will recognize a variety of different user input sources such as text input, sensors, mouse response, movement, or event. Students will recognize a variety of different outputs such as sounds, light, vibrations, movement, text and/or graphics.

Standard 4

Variables

- Students will understand that variables are named locations in memory.
- Students will be able to identify variables and when they should be used in code.

Standard 5

Loops

Students will understand that programs use loops (iteration) to be more efficient and avoid code duplication.

Standard 6

Conditionals

Students will understand that programs use conditionals to perform different computations or actions based on whether a condition is true or false (booleans).

Standard 7

Operators

Students will understand that programs use mathematical symbols (+, -, *, /, >, <, ==, AND, OR) in a program to perform specific operations (mathematical, relational, or logical) and produce a single result.

Standard 8

Functions

Students will understand that a function is a named block of code that performs a specific task. Functions encourage efficiency, reusability, and readability.

Standard 9

Debugging

Students will understand that debugging is finding and removing errors from a program so it can operate as intended. Strategies students might learn for debugging could include:

- Guess and Check
- Deactivating sections to identify problematic code
- Looking for typos, missing tags, or incorrect syntax
- Making the problem smaller - identifying important points (changing variable values, getting input, etc.)
- Asking a friend or team member for help
- Printing, watching, or changing variable values while the program runs
- Using a debugging tool
- Thinking about when the code last worked and what has been added since then

Standard 10

Physical Computing

Students will demonstrate an understanding of the relationship between hardware and software.

- Students will define and explain an algorithm for a physical computing device. (sequence of instructions processed by the device.)
- Students will create a prototype of a physical computing device that uses algorithms to solve a computational problem.
- Students will create a physical project or program a physical device
    - Students will illustrate ways the project or physical device implements logic, input, and output through hardware components (sensors, buttons, switches, etc.)
    - Students will systematically identify and fix problems with the project or physical device.

Standard 11

Careers in Programming

Students will explore various careers in programming such as Software Engineer, Video Game Developer, Mobile App Developer, and Web Developer.

Performance Skills

- Students will design algorithms and create programming solutions to a variety of computational problems using a block or text programming language.
- Students will develop a program or programs that:
    - makes a decision based on data or user input (conditionals).
    - accepts user and/or sensor input and stores the result in a variable.
    - uses variables that represent different data types.
    - uses structures that repeat blocks/lines of code (loops).
    - uses operators.
    - uses functions.
- Students will analyze, test, improve and debug computer programs.

- Students will design and create a physical project or program a physical device and debug the project or device

STRANDS AND STANDARDS
GAME DEVELOPMENT FUNDAMENTALS 1

Course Description

This course is designed to provide students with knowledge and project based experience of fundamental gaming development concepts relating to STEM. These concepts include game design, scripting, creation of digital assets, graphic resources, animations, understanding hardware, problem solving, critical thinking, collaboration, and project management.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	35.02.00.00.045
Concurrent Enrollment Core Code	35.02.00.13.045
Prerequisite	Intro to Graphics Communication, Digital Graphic Art Intro, Digital Media 1, suggested Computer Programming 1
Skill Certification Test Number	#896
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Computer Science Level 1, or
Endorsement 2	Computer Science Level 2, or
Endorsement 3	Computer Programming (Historic), or
Endorsement 4	Multimedia

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STRAND 1

Video Game History (7% -4 of 54 pts): Students will understand the relevant history of video games.

Standard 1

Relevant History --The student will be able to discuss the history of gaming including; arcade, console, computer, mobile, and modern devices.

- Identify key figures and designers in the history of gaming (Ralph Baer/father of video games, Nolan Bushnell/founder of Atari, Shigeru Miyamoto/key figure in Nintendo, etc.)
- Identify early games (Pong, Pac-Man, Donkey Kong, Space Invaders, Centipede, Missile Command, Asteroids, etc.)
- Understand important milestones in gaming (why gaming boomed or dwindled over the years, Golden age of arcade video games, the North American Video Game crash of 1983, etc.)
- Console Wars – Generations of Consoles (Nintendo, Sony, Microsoft, Sega, etc.)

Standard 2

Game Ratings --Students will be familiar with the ESRB (Entertainment Software Rating Board) and its ratings categories:

- eC- early childhood
- E -Everyone
- E 10+ -Everyone 10 and up
- T –Teen
- M –Mature
- AO -Adults only
- RP -Rating Pending

Standard 3

Impact and Evolution of Gaming – Students will explore the evolution of pc / arcade / console gaming to online gaming and its societal impact.

- Explain how social gaming as evolved from meeting at physical location to online groups. (Arcade, sleepovers, online party gaming, etc.)
- Understand the economic impacts of the Video Game industry. (physical to digital distribution, evolution of advertising, growth of gaming industry, etc.)
- Understand the impact of gaming in other industries. (Health, education, military simulations, etc.)

Performance Skills

- Understand relevant video game history.
- Understand game ratings.

- Understand gaming evolution.

STRAND 2

Communication Features and Game Interface Design (15% -8 of 54 pts): Students will be able to apply communication features and game interface design.

Standard 1

Game Strategy & Feedback --Students will understand what it means to design a game strategy and provide game feedback.

- Identify game strategies -Victory / Loss conditions(high score, fastest time, most levels, % indicator, end of story)
- Identify Player Motivation (Bartle's Four Types of Gamers – socializers, achievers, explorers, and "griefer")
- Identify the feedback needed for progress in the game (defeating enemies, earning points, reducing health, specific sounds, winning screen, points earned, life lost, etc.)
- Understand duration (levels, time, rooms, lives, etc.)

Standard 2

Game Control --Students will understand the design of game control concepts

- Understand design functionality (determine what to include in the game with regard to movements, power-ups, jumping, avoiding obstacles, collecting, etc.)
- Create usability in game control (implement the ability for the player to change movements, switching views, etc.)
- Describe accessibility (refers to what is used to play the game -- keyboard and mouse, joystick, game controller, touch screen, motion control/gyroscope, etc.)
- Understand immersion (feeling part of the game, emotions, etc.)

Standard 3

Design Aesthetics -- Students will understand the aesthetics of game design, and its importance in creating an immersive experience.

- Design of World/Background (dark and gloomy, 8-bit art, photorealistic graphics, parallax, etc.)
- Player View -- Students will understand the importance of "Player View" in game design, understanding the many view options:
    - Two-Dimensional (flat, 2D-world, platform games are usually 2Dgames)
    - Isometric (3/4 perspective)
    - First-Person (from the character's point of view -- you don't see the character)
    - Third Person (view from behind the character -- you see the character -- often an over the shoulder view)
    - Top-Down (looking down from the top -- you usually see the character)

Standard 4

Interface Elements -- Students will understand the difference between diegetic and non-diegetic elements.

- Understand diegetic elements (elements that come from the world in the game -- sounds, graphics, etc.)
- Understand non-diegetic elements (in the game but added on top of the world - health bar, score, narration, etc.)

Performance Skills

- Understand game design functionally and feedback.
- Understand game design control, player view, and interface elements.

STRAND 3

Game Platforms (7% - 4 of 54 pts): Students will be able to identify various gaming platforms, understand their impacts, and develop at least one game on one of those platforms.

Standard 1

Identify different game platforms: Console, Desktop/Laptop Computer, and Mobile Device.

Consoles-

- Atari (2600, Lynx, etc.)
- Nintendo (NES, Gameboy, SNES, DS, Wii, Switch, etc.)
- Sony (PS series, PS Vita, PSP, etc.)
- Microsoft (Xbox series – Xbox, 360, One)
- Sega (Master System, Genesis, Sega-CD, Game gear, Dreamcast, etc.)
- Other (Neo Geo, Turbo Grafx 16, Arcade Cabinet, etc.)

Desktop/Laptop Computer –

- Windows
- Mac OS
- Linux

Mobile Devices –

- iOS
- Android

Standard 2

Identify considerations (strengths and weaknesses) when developing for a particular platform, or multiple platforms.

Standard 3

Understand impact of cloud computing and processing on game design.

Standard 4

Identify different distribution channels: Physical media, Digital download (Minecraft, League of Legends, etc), Steam, Epic Game Store, Apple Arcade, Console-specific Digital Distribution (Xbox Live, Playstation Network, etc.)

Performance Skills

- Describe game consoles, platforms..
- Identify different mobile platforms.
- Understand impacts of distribution and media format.

STRAND 4

Game Genres and Types (13% - 7 of 54 pts): Students will define various game genres and types.

Standard 1

Game Genres -- Students will be able to identify the following game genre categories (categories of games based on challenges):

- Action (includes physical challenges)
- Adventure (focuses on an interactive story)
- Role Playing Game/RPG (player undertakes a quest in a fictional world)
- Simulation (used to simulate a real setting)
- Strategy (decision making/skillful thinking and planning)
- Hybrid (combination of 2 or more above genres)

Standard 2

Game Types -- Students will be able to identify the following game types:

- Single-player (player vs. the situation)
- Two-player (player vs. another player)
- Multiplayer competitive (every player for themselves - against each other)
- Multiplayer cooperative (all of us in this together to defeat the enemy)
- Team-based (our team vs. their team, each team controlled by one or many players)

Performance Skills

- Identify and understand different game genres and game types.

STRAND 5

Game Design Production Cycle (54% -29 of 54 pts): Students will be able to create and develop a game, in one of the identified game genres (Action, Adventure, RPG, Simulation or Strategy), using the Game Design Production Cycle.

Standard 1

Game Concept Development --Students will be able to work alone and / or in a team (designer, programmer, project manager, graphic artist, etc.) to develop a game concept.

- Develop a concept with considerations for plan, cost, and time.
- Create a game proposal "Pitch Document" (components include: goal, characters, environment, obstacles, platform)
- Create storyboard
- Sketch and plan characters (protagonist, antagonist)

Standard 2

Pre-Production (Design) --Students will be able to design documents as part of the Preproduction of the game.

- Put together a "Game Design Document" (the overall blueprint) and include the following components:
    - Title
    - Genre (Action, Adventure, Role Playing Game/RPG, Simulation/fictional reality, Strategy/decision making)
    - Game type (Single-player: player vs. the situation, Two-player: player vs. another player, Multiplayer competitive: every player for themselves -against each other, Multiplayer cooperative: all of us in this together to defeat the enemy, Team-based: our team vs. their team, each team controlled by one or many players)
    - Brief description (short text on back of game box to entice gamers to purchase)
    - Rules of the game
    - Design of levels and rooms
    - Script (what the characters are going to say, dialogue, etc.)
    - Game mechanics (the challenges presented to the player and the actions the player is permitted to take)
    - Game goals (what it takes to win or lose the game)
    - Select which platform the game will be developed for.
    - Select a game engine (possible engines: Scratch, , Unity, , GameMaker, Game Salad, Unreal, Godot, etc.)

Standard 3

Production (Create) --Students will be able to create assets and incorporate them in a game.

- Create art and text
- Develop sounds for the game
- Implement scripting as needed
- Create game animations
- Design the User Interface/UI components (could include inventory, score, health bar, lives, navigation, powerbar, text indicators, maps, level, sound on/off, etc.)
- Create an analog or digital prototype version of a game

Standard 4

Post Production (Game Testing and Release) --Students will understand and explain the process of game testing and release the game after it has been developed.

- Alpha Testing (in-house/controlled, small group testing to find and repair bugs and glitches, make needed adjustments)
- Beta Testing (outside, large group testing to receive feedback from selected end users, make needed adjustments and repairs that were not discovered in-house)
- Game Release (game is open for playing)
- Game Maintenance (provide updates, repair more identified bugs and glitches)

Performance Skills

- Implement project management as part of the game design production cycle.
- Create and develop a game concept.
- Design and create the documents needed in the pre-production(design) of a game.
- Create the assets and incorporate them in a game.
- Explain alpha and beta testing processes of a game.

STRAND 6

Understanding Careers (4% -2 of 54 pts): Students will explore careers and training in the game design and production world.

Standard 1

Career Awareness --Students will develop career awareness related to working in the gaming industry.

- Identify personal interests and abilities related to game development, such as:
  - Identify personal creative talents
  - Identify organizational and leadership skills
  - Identify special interest areas
- Identify the primary game development job titles, such as: Lead Programmer, Lead Designer, General Game Designer, Mechanics Designer, Level Designer/World Builder, User Interface (UI) Designer, Animator, Writer, Audio Director, Art Director, Project Manager, etc.

- Investigate career opportunities, trends, and requirements related to game development careers.

Standard 2

Educational Pursuits --Students will develop a realistic plan for College and Career Readiness to help guide further educational pursuits.

- Identify factors for employability and advancement in the game industry.
- Research existing game development studios to determine what training is required.
- Research universities and colleges to determine programs, degrees and training availability.
- Develop employability competencies/characteristics: responsibility, dependability, ethics, respect, and cooperation.

Performance Skills

- Understand careers related to the gaming industry.
- Understand paths of skills development through ongoing education or industry experience.

Workplace Skills

Communication, Problem Solving, Teamwork, Critical Thinking, Dependability, Accountability, Legal requirements/expectations

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand							Total Points	Total Questions
		1	2	3	4	5	6	7		
Game Development Fundamentals 1	**896**	**4**	**8**	**4**	**7**	**25**	**4**	**2**	**54**	**34**
Related Industry Exam	**N/A**									

STRANDS AND STANDARDS
GAME DEVELOPMENT FUNDAMENTALS 2

Course Description

This course is designed to provide students with knowledge and project based experience of fundamental gaming development concepts relating to STEM. These concepts include game design, scripting, creation of digital assets, graphic resources, animations, understanding hardware, problem solving, critical thinking, collaboration, and project management.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	35.02.00.00.046
Concurrent Enrollment Core Code	35.02.00.13.046
Prerequisite	Game Development Fundamentals 1, Computer Programming 1 (recommended).
Skill Certification Test Number	Unity Certified Developer
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Computer Science Level 1, or
Endorsement 2	Computer Science Level 2, or
Endorsement 3	Computer Programming (Historical), or
Endorsement 4	Multimedia

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STRAND 1

Project based game development:

Game Development Life Cycle-Students will create a game using the Game Development Life Cycle.

Standard 1

Implement Project Management -- Students will implement project management skills in developing a game.

- Understand the difference between waterfall and iterative development
- Create an analog or digital prototype version of a game
- Work in a team
- Utilize project management skills

Standard 2

Game Concept Development -- Students will be able to develop and game concept.

- Create a game proposal - "Pitch Document"
- Develop a concept with considerations for plan, cost (not a budget, but cost to student and time outside of class), and project hours.

Standard 3

Pre-Production (Design) -- Students will be design documents as part of the Pre-Production (Design) of the game.

- Write a script - writing the storyline script
- Create storyboards
- Design concept of the game
- Select a game engine
- Plan game play mechanics
- Put together a comprehensive Game Design Document detailing the game's goals
- Plan level designs, rooms
- Sketch and plan characters
- Build an overall blueprint

Standard 4

Production (Create) -- Students will be able to create the assets and incorporate them in a game.

- Create a prototype of game
- Perform alpha testing (internal testing)

STRAND 2

Communication Features and Game Interface Design. Students will review communication features and game interface design

Standard 1

Aesthetic Game Design Components --
Students will be able to explain and implement key aesthetic (visual) components of game design being:

- Animation
- Sprites or 3D models (wireframe)
- Environment (Player view, surroundings, camera, lighting)
- Audio
- User Interface

Standard 2

Functional Game Design Components --
Students will explain and implement key functional components of game design:

- Physics (motion, gravity, collision, drag, etc.)
- User Input
- User Feedback
- Scripting

Standard 3

Design Usability and accessibility -- Students will implement the design control concepts

- Create usability in design control (implement the ability for the player to change movements, switching views, etc.)
- Describe accessibility (describe how game controls will accommodate users with disabilities and / or refer to what is used to play the game: touch screen, adaptive controller, motion control, etc.)
- Understand immersion (feeling part of the game, emotions, etc.)

Standard 4

- Interface Elements -- Students will implement classifications of interface elements

Understand diegetic elements(skins, weapons, overlays, dashboard of car, etc.)

- Understand non-diegetic elements (HUD, life meter, action bar, stats, etc.)Understand spatial elements (racing lines, directional arrows, floating texts, tool tips, etc)
- Understand meta elements color filters, subtitles, environmental effects, etc.

STRAND 3

Post Production -. Students will implement marketing strategies, engage in game testing, and release the game.

Standard 1

Beta Testing --Students will beta test games

- Implement beta testing
- Receive feedback from beta testers
- Make needed adjustments

Standard 2

Marketing -- Students will use marketing strategies to successfully advertise their game.

- Identify target market
- Research different marketing platforms
- Research and choose licensing options
- Understand the role of community management in marketing
- Develop advertisements using at least two different mediums (online, social media, print, etc.)
- Understand different sales (monetization) strategies [free download / paid content (freemium), upfront purchase, subscription model, etc.]

Standard 3

Game Release -- Students will publish/release game(s).

- Research intellectual properties
- Explain piracy and copyright
- Understand the process of publishing a game to your platform

Standard

Game Maintenance – Students will provide for maintenance of the game

- Develop strategies for post release content, bug fixes, and updates.

Performance Skills

- Design and create functional and aesthetic game assets.
- Perform tasks including project management and testing early versions of video games.
- Work as a team to develop a playable game using the Game Development Life Cycle.
- Use marketing strategies to promote the game.
- Develop strategies for post release content, bug fixes, and updates

Work Place Skills

Communication, Problem Solving, Teamwork, Critical Thinking, Dependability, Accountability, Legal requirements/expectations

Course Changes 2020: Family and Consumer Sciences Pathways

Agriculture, Food & Natural Resources, Hospitality & Tourism, Human Services Clusters

Course Code	Course Name	Changes Made
Family & Consumer Sciences Area		
39.01.00.00.005	FCS 6th Grade	• Restructure to provide clarity. • Added specific food preparation skills that need to be taught • Added specific kitchen equipment. • Removed independent living standard on balancing a career and family. • Removed career choices related to future family needs standard • Added standard on child safety and first aid • Added standard that outlines 3 keys of care giving • Added new strand on development of interpersonal skills including communication, social skills, decision making and personal values • Defined 3 basic sewing skills and basic textiles. • Removed standard on function of fashion • Added specific employability skills
Agriculture, Food & Natural Resources Cluster		
34.01.00.00.150	Foods & Nutrition 1	• Re structure of standards • Removed strand for specific first aid in the kitchen • Added knife skills standard • Simplify cooking terminology • Added suggested scope and sequence for each strand • Simplified amino acids standard • Added incomplete/complete protein standard • Added standard on saturated, monounsaturated, and polyunsaturated fats • Added sources and functions of specific vitamins and minerals • Removed specific electrolytes standard • Simplified standard on recommended water intake • Updated strand on dietary guidelines in anticipation of new 2020 recommendations

34.01.00.00.160	Foods & Nutrition 2	• Restructure of strands for clarification • Added Listeria to biological pathogens standard • Added use of gloves and procedures to standard • Added calibrating a thermometer procedure to standard • Added standard on consumption of high energy drinks • Added standard on exercise and electrolyte intake and recovery nutrition • Removed Dining and table setting standard • Added standard on the science of pies • Added seafood standard • Added standard on career opportunities within Nutrition field
34.01.00.00.170	Culinary Arts 1	• Restructure of strands • Moved Strand 1 to workplace safety and sanitation • Added Strand on Career opportunities within the Culinary/Hospitality industry • Remove Strand on history of food service industry • Removed strand on Nutritional Guidelines • Separated cooking techniques and spices/seasonings to two different strands • Removed Strand on sandwiches • Added strand on bread preparation • Removed strand on customer service and management skills • Removed strand on Baking production • Removed strand on regional cuisines
34.01.00.00.172	Culinary Arts 2	• Changed name from Culinary Management to Culinary Arts 2 • Restructure of Strands for clarification • Added history of culinary industry and Trends Strand • Added math concepts in menu development • Removed Marketing to Culinary Arts 3 • Removed Breakfast foods Strand • Added Stocks, Soups, Sauces Strand • Added Careers in Hospitality industry • Removed Grain/Potatoes production strand

		• Removed Poultry/Seafood Strand • Removed Regional cuisine Strand • Added Customer Service and Management strand
34.01.00.00.174	Culinary Arts 3	New Course
34.01.00.00.176	Baking & Pastry	New Course
40.03.00.00.200	Introduction to Behavioral Health	New Course

STRANDS AND STANDARDS

FCS 6TH GRADE

Course Description

CTE FACS 6th Grade — (.5 credit) This course is a general elective course to introduce students to career and life literacy skills in all areas of Family and Consumer Sciences. Students will receive instruction in career explo-ration, nutrition and food preparation, family life, childcare, interpersonal relationships, housing and interior design, sewing production and fashion, consumerism, and career-related tasks. Careers in the Family and Con-sumer Sciences CTE pathways will be explored. This course does not qualify for CTE credit.

Intended Grade Level	6-7
Units of Credit	0.5
Core Code	39-01-00-00-005
Concurrent Enrollment Core Code	39-01-00-13-005
Prerequisite	None
Skill Certification Test Number	
Test Weight	
License Area of Concentration	
Required Endorsement(s)	
Endorsement 1	FCS General Composite
Endorsement 2	FCS 6-8
Endorsement 3	

STRAND 1

Students will identify and discuss the importance of food and nutrition.

Standard 1

Demonstrate basic skills related to nutrition, kitchen and food safety, sanitation, and food preparation.

- Demonstrate basic kitchen management, kitchen and food safety, and sanitation.
  - Kitchen Management
    - Lab plan sheet
  - Kitchen and Food Safety
    - Cross contamination
    - Temperature Danger Zone
    - General Equipment Safety
  - Sanitation
    - Proper Handwashing
    - Proper Dishwashing
    - Kitchen Cleanliness
- Recognize the MyPlate model and the USDA dietary guidelines.
- Identify nutritional values of food and nutritional information on food labels.
- Practice food preparation skills.
  - Proper Measuring
  - Basic Cooking Terms
    - Cream
    - Fold
    - Simmer
    - Boil
    - Bake
    - Saute
    - Chop
    - Preheat
    - Beat/Whip
    - Grease
- Recipe Sequencing
    - Reading a recipe
    - Order of tasks
- Using basic appliances
- Identify basic kitchen equipment and tools
    - Rubber Scrapper/Spatula
    - Whisk
    - Turner/Spatula
    - Sauce Pan
    - Fry Pan
    - Liquid Measuring Cups
    - Dry Measuring Cups
    - Measuring Spoons

STRAND 2

Students will be introduced to the basic elements and principles of design in housing and interior design.

Standard 1

Identify the elements (tools) of design: space, line, texture, shape/form,

Standard 2

Identify the principles (rules) of design: balance, emphasis, rhythm, harmony, scale and proportion.

Standard 3

Describe the effect of color on shape, size, feelings, and moods.

Standard 4

Explore the science of color and color combinations to form color schemes.

Standard 5

Explore the impact of housing and interior design on families.

- Compare and Contrast different housing options
  - Depending on the stage of life

STRAND 3

Students will be introduced to family responsibilities, and child development.

Standard 1

Examine attributes and issues related to family life. Recognize how individual responsibilities at home contribute to the family's wellbeing.

Standard 2

Identify aspects related to the care and development of children.

- Identify appropriate child care skills for young children.
  - Child Safety
    - Six Points of Danger
    - Basic First Aid
- Develop or utilize age-appropriate learning activities for young children.
  - Developmentally Appropriate Practices (DAP)
- Understand skills related to appropriate child care.
  - The three keys of care giving
    - Emotional
    - Physical
    - Guidance

STRAND 4

Students will develop interpersonal skills.

Standard 1

- Explore effective personal, verbal, and nonverbal communication.
- Recognize acceptable social behaviors and how to develop social skills.
  - Cyber Social Skills
  - Dealing with stress
  - Dealing with peer pressure
  - Conflict Resolution
- Identify steps of decision making.
  - Identify
  - Brainstorm
  - Compare and contrast
    - Talk to a trusted individual
  - Make a decision
  - Evaluate
- Investigate personal values.

STRAND 5

Students will identify sewing techniques and basic textiles.

Standard 1

Demonstrate basic skills related to sewing construction.

- Basic sewing
  - Basic sewing machine parts
    - Threading
    - Straight stitch
    - Back stitching

Standard 2

Explore basic textiles.

- Identify the two fiber sources
  - Natural
    - Cotton
    - Wool
    - Linen
    - Silk
  - Manufactured
    - Polyester
    - Nylon
    - Rayon
    - Spandex

STRAND 5

Students will explore employability skills, entrepreneurship, the principles of the free enterprise system.

Standard 1

Develop employability skills

- Identify characteristics of a good employee/student.(Soft Skills)
  - Communication Skills
  - People Skills/Social Skills

Standard 2

Complete a FCS related free enterprise experience. Develop a business plan that incorporates the following:

- Four P's of Marketing
  - Product
  - Price
    - Profit/Loss Equation
  - Promotion
    - Jingle
    - Logo
    - Slogan
  - Place
    - Manufacturing to Distribution to Consumer
- Evaluate the effectiveness of the process

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS
FOODS AND NUTRITION 1

Course Description

This course is designed to focus on the science of food and nutrition. Experiences will include food safety and sanitation, culinary technology, food preparation and dietary analysis to develop a healthy life style with pathways to career readiness. Student leadership and competitive events (FCCLA) may be integrated into this course.

Intended Grade Level	9-12
Units of Credit	.05
Core Code	34.01.00.00.150
Concurrent Enrollment Core Code	
Prerequisite	None
Skill Certification Test Number	340
Test Weight	0.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family Consumer Sciences
Endorsement 2	CTE License Food Services/Culinary Arts
Endorsement 3	NA

ADA Compliant: October 2020

STRAND 1

Students will consistently demonstrate food safety procedures and sanitation techniques. (Suggested 6 days)
***Performance Skills for this strand included below.**

Standard 1

Apply established safety rules and guidelines in a work environment.

- Identify prevention, protocol and treatment for cuts.
  - Prevention
    - Use sharp knives, dull knives are more dangerous
    - Hold knife correctly, using the claw hand position on guide hand.
    - Use a stabilized cutting board.
    - Hold onto the knife handle while cleaning, do not soak.
  - Protocol
    - Clean and sanitize the affected area and equipment as soon as possible.
  - Treatment
    - Minor cuts clean wound, apply bandage and wear glove.
    - Sever cuts apply pressure and seek medical attention.
- Identify prevention, protocol and treatment for fires, chemical and heat related incidents.
  - Prevention
    - Avoid flammable materials or clothing on or near the range.
    - Turn handles away from the front of the range.
    - Lift lids on hot foods to direct steam away.
    - Use hot pads or oven mitts for handling hot baking pans.
    - Keep equipment clean.
    - Keep chemicals away from food.
  - Protocol
    - To extinguish a fire use the correct fire extinguisher. (A, B, C, or K)
    - To extinguish a grease fire, cover/smother the pan, pour baking soda/salt. Avoid water, flour or sugar on grease fires.
    - Follow manufactures directions for all chemical use and storage, do not mix chemicals.
  - Treatment
    - First Degree Burn and Second Degree Burn: immerse burn in cool water or use cool compress for 10-15 minutes.
    - Third Degree Burn: seek medical treatment
    - For Chemical Burn: seek medical treatment or call poison control.
- Identify prevention, protocol and treatment for break, strains and sprains.
  - Prevention
    - Keep floors clean and dry.
    - Post caution signs for wet floors.
    - Store heavy items on lower shelves.
    - Use ladders or step stools appropriately.
    - Lift heavy items appropriately.
    - Wear non-slip shoes.
  - Treatment
    - Seek medical attention.

Standard 2

Identify health and hygiene requirements for food handling.

- Identify proper hand washing.
  - Wash hands with soap and warm water for a minimum of twenty seconds.
  - Wash hands before and after handling raw meat, poultry or eggs.
  - Wash hands after using restroom, sneezing, coughing, changing diapers, etc.
- Identify appropriate clothing and hair restraints.
  - Clean clothing or uniform.
  - Cover and tie back hair with hair restraints before working with food.
- When tasting foods use clean utensils.
- Discuss appropriate use of gloves.
  - Single use gloves.
  - Wash hands before putting on gloves.
  - Change gloves when they get dirty, torn, or changing task.
  - Wear gloves when handling ready-to-eat (RTE) foods.
  - Wear bandage and gloves if there is a cut or open wound.

Standard 3

Recognize food-borne illness and prevention

- Identify the ways food becomes unsafe.
  - Physical: fingernail, hair, metal shard, band aid
  - Chemical: cleaning chemicals, sanitizers
  - Biological: pathogens
- Define food-borne illness.
  - Food-borne illness results from eating foods containing pathogens.
  - Pathogens are any bacteria, virus, parasite, or fungi that can cause illness.
    - Bacteria need certain conditions to grow. FATTOM: Food, Acid, Time, Temperature, Oxygen, and Moisture.
  - Common symptoms of a food borne illness include fever, headache, nausea, vomiting and diarrhea.
  - Common types of food borne illnesses may include: Campylobacter, Clostridium Perfringens, E-coli, Norovirus, Salmonella, Staphylococci
  - Food will often look and smell normal even if unsafe.
  - When in doubt, throw it out.
- Controlling time and temperature
  - Foods like milk/dairy, meat, fish, eggs, poultry, shellfish/crustaceans, baked potatoes, tofu, sprouts, cooked rice, beans and vegetables, sliced melons or tomatoes and lettuce are susceptible to pathogens. These are known as TCS foods (Time/Temperature Control for Safety).
  - Temperature Danger Zone: 41-135 degrees
    - Foods held in the danger zone for longer than 4 hours should be thrown out.
      - Time in the danger zone includes: shopping, transportation, preparation, and holding for service.
  - Frozen foods: 0°F
  - Refrigerator/Cold Food: 41°F or below
  - Holding Hot Foods: 135°F

- Seafood, Beef, Pork, Lamb: 145°F
- Ground Meats: 155°F
- Poultry Whole or Ground and Reheated food: 165°F
- Identify the ways to safely thaw TCS foods.
  - In the refrigerator.
  - In a sink of cold, running water or a sink/container full of cold water, changing the water every 30 minutes. Prepare and use food immediately.
  - In the microwave. Prepare and use food immediately.
  - As part of the cooking process.

- Preventing cross contact and cross contamination
  - Cross contact is when food item containing an allergen comes in contact with another food.
    - The big 8 allergens include: tree nuts, eggs, milk, soy, wheat, peanuts, fish, and shell fish
  - Cross contamination is the transfer of pathogens from people, surfaces or food to food.
    - Food should be stored 6 inches off the ground, label stored food correctly, store ready-to-eat (RTE) food separately or above raw food.
- Equipment Storage: Store glasses and cups upside down on a clean, sanitized surface, and store utensils with handles up.
- Food Preparation: clean and sanitize food contact surfaces and equipment, wash hands between task, never place cooked food on/in a container which has previously held raw meat, poultry or seafood.
- Serving food: no bare hand contact with RTE food.
- Cleaning and Sanitizing
  - Clean removes food and other dirt from surface.
  - Sanitize reduces pathogens on surface.
  - Steps to cleaning and sanitizing using a 3 compartment sink:
    - Scrape, Wash, Rinse, Sanitize, Air dry
  - Clean and sanitize food contact surfaces and equipment after completing a task or after 4 hours of constant use.
  - Remove garbage from prep area as soon as possible.
  - To reduce pest/insects, avoid crumbs or spills, keep food in airtight containers and dispose of garbage properly.

STRAND 2

Students will apply the skills of kitchen equipment and management. (Suggested 5 days)

Standard 1

- Identify various types of kitchen equipment.
  - serrated knife
  - chef's knife
  - paring knife
  - strainer
  - cutting board
  - turner
  - colander
  - pastry blender
  - rubber scraper/spatula
  - tongs
  - whisk
- Demonstrate basic knife skills, including safety and proper handling.
- Identify the basic principles of cooking in a microwave.
  - Fat, sugar and water molecules are most affected by microwaves.

- Follow manufactures instructions for microwave safe cooking containers.
- Shallow, round containers cook more evenly than square containers.
- The amount of food in the microwave increases cooking and standing time.
- Standing time is the time food continues to cook after the microwave has stopped.
- Covering foods holds in the moisture, helps foods cook more evenly, and prevent splattering.

Standard 2

Identify abbreviation, food measurement terminology and demonstrate proper measuring techniques.

- Identify abbreviations.
  - Tablespoon = T. or Tbsp.
  - Teaspoon = t. or tsp.
  - Gallon = gal.
  - Quart = qt.
  - Pint = pt.
  - Cup = c.
  - Pound = lb. or #
  - Ounce = oz.

- Identify measuring techniques and tools.
  - Use dry measuring cups for dry ingredients and level with a straight edge.
  - Use liquid measuring cups for liquid ingredients. Measure on a flat, level surface.
  - Brown sugar is packed and leveled in dry measuring cups.
  - Shortening is pressed into dry measuring cups and leveled.
  - Use most effective tools for measuring. For example: use ¼ cup rather than 4 Tbsp.
  - Do not measure directly over the mixing bowl.

Standard 3

Utilize equivalents and recipe adjustments.

- Identify equivalents.
  - 3 t. = 1 T.
  - 2 T. = 1/8 c.
  - 16 T. = 1 c.
  - 4 qt. = 1 gal.
  - 16 c. = 1 gal.
  - 8 fl. oz. = 1 c.
  - 2 c. = 1 pt.
  - 1 stick butter = ½ c.
  - 16 oz. = 1 lb.

- Adjust recipe size.
  - When adjusting a recipe, the cooking temperature will remain the same.
  - The amount of ingredients, overall length of cooking time and size or number of pans may be affected.

Standard 4

Define cooking terms.

- Chop: to cut into pieces
- Cream: to work sugar and fat together until the mixture is soft and fluffy
- Cut-In: to cut fat into flour with a pastry blender or two knives
- Fold-In: to mix ingredients by gently turning one part over another
- Mince: to cut or chop food as finely as possible
- Sauté: to brown or cook foods with a small amount of fat using low to medium heat
- Simmer: to cook just below the boiling point
- Steam: to cook by the vapor produced when water is heated to the boiling point
- Whip: to beat rapidly to introduce air bubbles into food

STRAND 3

Students will identify the sources and functions of carbohydrates and apply appropriate food preparation techniques. (Suggested 7 days)
***Performance Skills for this strand included below.**

Standard 1

Identify carbohydrates, their sources and functions and the importance of whole grains in the body.

- Define types and functions of carbohydrates.
  - Simple carbohydrates are sugars. These include natural sugar and refined sugar products. Added sugars should be limit in the diet.
  - Complex carbohydrates are starches. These include whole grains, refined grains, cereal products, dried beans, rice and pasta.
    - Refined grains should be limited in the diet.
    - Fiber is a type of complex carbohydrate.
  - The primary function of carbohydrates is to provide energy.
  - The parts of a whole grain kernel and the nutrients provided are:
    - Endosperm: starch and protein (in wheat this protein is called gluten)
    - Germ: vitamins and minerals
    - Bran: fiber

Standard 2

Identify fiber, its sources and functions.

- Fiber attracts water to the intestines and aids in digestion.
- Fiber helps to keep bowel movements soft and reduces constipation.
- Drink plenty of liquids, otherwise fiber can slow down or even block normal bowel function.
- The American Institute for Cancer Research recommends 30 grams of daily fiber.
- Fiber may reduce the risk of some diseases including colon and rectal cancer.
- Foods high in fiber: fruits and vegetables, whole grains, legumes, nuts and seeds.

Standard 3

Apply food selection and preparation guidelines related to quick breads, grains and pasta.

- Quick breads include: muffins, pancakes, waffles, biscuits, cornbread, and fruit bread.
  - Quick breads do not use yeast for leavening.
- Identify the function of each ingredient contained in breads.
  - Flour: structure.
  - Liquid: moisture.
  - Leavening Agents: makes the bread rise. Examples of leavening agents for quick breads include: baking powder, baking soda, eggs and steam.
  - Fat: tenderness, richness and some flavor.
  - Salt: flavor.
  - Sugar: flavor and browning.
- Identify types of rice.
  - Brown rice is the whole grain form of rice.
  - Instant rice is precooked and then dehydrated.
  - Long grain rice stays dry and fluffy.

- Short grain rice sticks together and is also known as “sticky rice”.
- Identify a cooking method for pasta.
- Bring water to a boil.
- Slowly add pasta so the boiling does not stop.
- Cook uncovered until pasta is al dente (firm to the tooth), stirring occasionally.

STRAND 4

Students will identify the sources and functions of proteins and fats/lipids and apply appropriate food preparation techniques. (Suggested 7 days)
***Performance Skills for this strand included below.**

Standard 1

Identify proteins, their sources, and functions.

- The primary function of protein is to build and repair body tissues.
- Amino acids are the building blocks of protein.
- There are many amino acids, nine are essential.
  - The body cannot manufacture essential amino acids so they must be obtained from food.
- Complete proteins contain all nine essential amino acids. Food sources from animals such as meat, chicken, fish and milk products are complete proteins.
  - A plant source of complete proteins is soy beans/soy products.
- Incomplete proteins contain some, but not all, of the essential amino acids. These include but are not limited to grains, dried beans, nuts and seeds.

Standard 2

Identify function and preparation methods for eggs.

- Functions of eggs:
  - Binder (Meat Loaf)
  - Thickener (Pudding)
  - Coating (Breading on Chicken)
  - Leavening agent (Angel Food Cake)
  - Emulsifier (Mayonnaise)
- Identify storage and preparation methods related to eggs.
  - Store eggs in the original container in the refrigerator. When properly stored in the refrigerator, eggs may be stored for several weeks.
  - Methods of cooking eggs include: boiled or steamed in shell, scrambled, fried, and poached.
  - Eggs are toughened by high heat.

Standard 3

Identify processing and preparations methods for milk and milk products.

- Discuss processing methods for milk.
  - Pasteurized milk has been heat treated to remove harmful bacteria.
    - Most of the nutritional benefits of drinking raw milk are available from pasteurized milk without the risk of disease that comes with drinking raw milk.
  - Homogenized milk has had the fat particles broken down and evenly distributed so the fat will not separate from the milk.
  - Milk is fortified with vitamins A and D.
- Explain milk preparation principles.

- Milk products scorch easily and need to be cooked at a low temperature with constant stirring.
- Heating milk in the microwave can prevent scorching.

Standard 4

- Identify the functions of fats:
  - Carrier for vitamins A, D, E, and K.
  - Reserve supply of energy.
  - Promotes healthy skin.
  - Satisfies hunger and helps one feel full longer.
- Explain the role of cholesterol, including HDL and LDL.
  - Cholesterol is essential for many body processes. Cholesterol produces hormones and bile acids. It is found in animal tissues, but is never present in plants.
  - HDL cholesterol is "good" cholesterol because it transports excess cholesterol found in the blood stream back to the liver.
  - LDL cholesterol is "bad" cholesterol because if too much LDL cholesterol is circulating in the blood stream, it can be deposited in the arteries and increase the chance of heart disease or stroke.
- Identify the differences between saturated, monounsaturated, and polyunsaturated.
  - Saturated:
    - Raises the LDL and HDL levels of cholesterol in the blood.
    - Examples: meat, poultry skin, whole milk, tropical oils, butter, shortening and lard.
  - Polyunsaturated:
    - Lowers both the LDL and HDL cholesterol levels in the blood.
    - Examples: corn oil, soybean oil and safflower oil.
  - Monounsaturated:
    - Lowers LDL and raises HDL levels of cholesterol in the blood.
    - Examples: olive oil, olives, avocados, peanuts and canola oil.

STRAND 5

Students will identify the sources and functions of select vitamins, minerals and water and apply appropriate food preparation techniques to foods high in these nutrients. (Suggested 7 days)
***Performance Skills for this strand included below.**

Standard 1

Identify select vitamins, their food sources, functions and deficiencies in the body.

- Identify water-soluble vitamins:
  - Vitamin C: Helps to form collagen which holds the cells together and aids in healing. Prevents scurvy. Sources include citrus, strawberries, broccoli and peppers.
  - Folate or Vitamin B9 is one of the B Vitamins. Folate helps tissue to grow and cells to work. Folate reduces the risk of neural tube birth defects. Sources include legumes, dark leafy greens, citrus, and eggs.
- Identify fat-soluble vitamins:
  - Vitamin A: Maintains normal vision and immune system. Prevents night blindness. Sources: Orange and dark green vegetables.
  - Vitamin D: Works with the body to build and maintain healthy bones and teeth. Prevents bone softening and loss. Sources include milk products. Manufactured by the body with exposure to sunlight.

- Vitamin K: Helps blood to clot. Prevents bruising and excessive bleeding. Sources include green leafy vegetables, Brussel sprouts, eggs and broccoli.

Standard 2

Identify select minerals, their food sources, functions and deficiencies in the body.

- Calcium: Builds strong bones and teeth. Calcium deficiency causes bones to become weak this is called osteoporosis. Good sources are found in dairy products.
- Iron: Helps to form the hemoglobin in red blood cells which carry oxygen throughout the body. Prevents anemia. Sources include red meat, spinach, black beans and dried fruit.
- Sodium: Helps maintain the fluid balance and blood pressure in the body. Deficiency is not generally a concern, unless over hydrating. Sources include salt and processed foods.
- Potassium: Helps maintain a regular heartbeat. Prevents muscle cramps. Sources include bananas, potatoes, and nuts.

Standard 3

Identify the functions and importance of water in the body.

- Carries water soluble vitamins.
- Carries waste through the body.
- Regulates body temperature through perspiration.
- Dehydration occurs from lack of water.
  - Thirst is an indicator of dehydration.
  - Urine should be a pale yellow color. Darker urine is another indication of dehydration.
- Water is the most important of all the essential nutrients.
- 64 fl. oz. of water is recommended daily.

Standard 4

Apply food selection and preparation guidelines related to fruits and vegetables.

- Identify how to preserve nutrients in the preparation process of fruits and vegetables.
  - Air, heat and water can reduce nutrients in fruits and vegetables.
  - Eat raw.
  - Good cooking methods include: microwave, steam, bake/roast, stir fry/sauté.
  - Cook in larger rather than smaller pieces when possible.
  - Use small amounts of water and cook only until fork tender.
- Identify how to select fresh produce.
  - Select fresh produce that is firm, free from decay, crisp, smooth, dense (heavy for size), free from bruises and have good color.
  - Seasonal produce is lower in cost, plentiful and have better quality.
  - Room temperature is needed to ripen some fruits.
- Discuss how to prevent enzymatic browning of fresh fruits.
  - Some produce will turn brown when cut and exposed to oxygen.
  - Prevent enzymatic browning of fresh produce by covering with liquid or dipping in an ascorbic acid liquid.

STRAND 6

Students will explore healthy nutrition guidelines. (Suggested 3 days)
***Performance Skills for this strand included below.**

Standard 1

Identify healthy nutrition guidelines.

- Follow a healthy eating pattern across the lifespan.
  - Choose a healthy eating pattern at an appropriate calorie level to help achieve and maintain a healthy body weight, support nutrient adequacy, and reduce the risk of disease.
- Focus on variety, nutrient density, and amount.
  - Nutrient dense foods provide vitamins, minerals and other beneficial substances with relatively few calories.
  - To meet nutrient needs within calorie limits, choose a variety of nutrient-dense foods across and within all food groups in recommended amounts.
    - 50-60% Carbohydrates—4 calories per gram
    - 10-20% Protein—4 calories per gram
    - No more than 30% fats/lipids—9 calories per gram
- Limit calories from added sugars and saturated fats, and reduce sodium intake.
- Include physical activity as part of healthy lifestyle.
  - Children and teens should be physically active for at least 60 minutes every day.

Standard 2

Explore resources for nutritional recommendations.

- Identify the characteristics of MyPlate.
  - Grains—Choose 100% whole grain. Make at least half of the grains consumed whole grain.
  - Protein—Choose a variety of foods. Keep portions small and lean.
  - Vegetable—Choose a variety including fresh, frozen, canned, or dried. Eat more red, orange, and dark green vegetables.
  - Fruit—Choose whole or cut-up fruits more often than fruit juice. Make half your plate fruits and vegetables.
  - Dairy—Choose a variety of dairy products. Check for added sugars.

Performance Skills

PERFORMANCE OBJECTIVE 1
Complete FCCLA Step One.
PERFORMANCE OBJECTIVE 2
Complete food safety instruction and an assessment comparable to that required for a Food Handlers Permit.
PERFORMANCE OBJECTIVE 3
Actively participate in the preparation of a nutrient dense carbohydrate food.
PERFORMANCE OBJECTIVE 4
Actively participate in the preparation of a nutrient dense protein food.
PERFORMANCE OBJECTIVE 5
Actively participate in the preparation of a nutrient dense produce food.
PERFORMANCE OBJECTIVE 6
Plan and evaluate a one-day menu based on healthy nutrition guidelines.

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS
FOOD AND NUTRITION 2

Learning that works for Utah
CTE®

Course Description

This course is designed to focus on principles of food preparation, sports nutrition, consumerism, and career options in the food industry. The study and application of nutrition, sanitation, food sciences and technology in this course provides students with laboratory-based experiences that will strengthen their comprehension of concepts and standards outlined in Science, Technology, Engineering and Math (STEM) education. FCCLA may be an integral part of this course.

Intended Grade Level	9-12
Units of Credit	0.50
Core Code	34.01.00.00.160
Concurrent Enrollment Core Code	00.00.00.13.000
Prerequisite	Food and Nutrition 1
Skill Certification Test Number	343
Test Weight	0.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family and Consumer Sciences
Endorsement 2	CTE License: Food Sciences/Nutrition
Endorsement 3	Culinary Arts

ADA Compliant: October 2020

STRAND 1

Students will review and apply the skills of kitchen management, safety and sanitation.

Standard 1

Identify food safety and sanitation rules and guidelines to maintain a safe working environment.

- Define food borne illness: An illness results from eating contaminated foods.
  - General Symptoms: Fever, headache and digestive troubles are symptoms of food-borne illness.
- Review causes of unsafe food.
  - Physical: hair, metal shavings, fingernails, pieces of glass, etc.
  - Chemical: cleaning products
  - Biological: pathogens
    - Salmonella: (Bacteria) Often found in fresh poultry and raw eggs.
    - E-coli: (Bacteria) Usually found in undercooked ground beef, unpasteurized milk, fruit juices, produce.
    - Botulism: (Spore) Associated with improperly canned foods, specifically low- acid foods.
    - Hepatitis A: (Virus) Virus that can be transferred to food when infected food preparers touch food or equipment.
    - Listeria: (Bacteria) Commonly found in unpasteurized foods and deli meats.
    - Staphylococcus: (Bacteria) Caused by eating foods that were contaminated by food workers.
      - General conditions for bacteria growth: temperature, moisture, food and time.
- Review methods of prevention for food borne illnesses.
  - Personal Hygiene
    - Practicing proper hand washing can prevent a large majority of food- borne illnesses.
    - Hair should be controlled/restrained and covered when preparing food.
    - Uniform should be clean.
    - Hand washing and hand care
    - Wash with hot water and soap, scrub for 20 seconds, cleaning under fingernails and between fingers. Fingernails should be short and clean, with no nail polish or false nails, and jewelry should be removed to help prevent the spread of pathogens.
- Discuss appropriate use of gloves.
    - Single use gloves.
    - Wash hands before putting on gloves.
    - Change gloves when they get dirty, torn, or changing task.
    - Wear gloves when handling ready-to-eat (RTE) foods.
    - Wear bandage and gloves if there is a cut or open wound.
    - When handling raw meat, poultry, and seafood.
- While handling ready-to-eat food (foods that won't be heated before serving).
    - Storage of food
      - FIFO: First in first out in food storage rotation.
- Do not buy or use bulging cans. (Botulism)
- Cold TCS (Temperature Controlled for Safety) foods should be stored at 41°F or below.
- Raw meat, poultry, and seafood should be stored in the following top- to-bottom order in the refrigerator: seafood, whole cuts of meat, ground meats, then poultry. All raw meat, poultry, or seafood should be stored below any ready-to-eat food.

- Ready to Eat Foods (Vegetables/Fruits)
- 145F Whole Cuts of Meat/Seafood/Eggs
- 155F Ground Meats
- 165F Poultry/Stuffed Foods/ Previously Cooked Foods

- Stored food must be labeled with the name of the food and the discard date.
- Cooling Foods – (from 135°F to 70°F within 2 hours and then 70°F to 41°F within 4 hours).
  - Dividing food into smaller portions and storing in shallow containers.
  - Cooling time can also be decreased by placing containers of hot food into an ice bath and stirring frequently or using a chill blaster.
- Food Preparation
  - Proper thawing of food
  - Refrigeration- Keep temperature at 41 degrees or lower.
  - Running Water- Cool running water.
  - Microwave- Cook food immediately.
  - Part of the cooking process.
  - Danger zone (41°F-135°F degrees)
    - If food is held in the danger zone longer than 4 hours, it should be thrown out.
  - Cross-contamination is how bacteria can spread. It occurs when pathogens from unclean objects, people, or food touch cooked or ready-to-eat foods.
    - Be aware of the tools used during cooking—never use the same knife or equipment for raw meat, poultry or seafood to prepare ready-to-eat foods.
    - Always wash hands. Wash and sanitize equipment when switching tasks.
  - Frequently clean and sanitize work surfaces.
    - Clean means to remove visible soil and food particles.
    - Sanitize means to use heat or chemical agents to reduce pathogens.
  - Food will often look and smell normal. When in doubt, throw it out.
  - Minimum Internal meat temperatures:
    - 145 °F - Seafood, pork, beef, veal, lamb (for 15 seconds)
    - 155 °F - Ground meats (for 15 seconds)
    - 165 °F - All Poultry (for 15 seconds)
- Reheat internal food temperature – 165 °F minimum (for 15 seconds)
- Apply established safety rules and guidelines to maintain a safe working environment.
- Preventing Accidents
  - Cuts
    - Maintain a sharp knife (sharp knives are safer than dull knives).
    - Always use the correct knife for the job.
    - Store knives safely.
    - Use a stabilized cutting board.
    - Never catch a falling knife.
    - When walking with a knife, keep it pointed at the floor.
  - Slips/Falls/Strains
    - Wear non-slip shoes.
    - Clean up spills immediately.
    - Don’t lift heavy objects without help.
    - Bend at the knees, not at the waist and keep the back straight.
  - Fire and burns
    - Stay in the kitchen when frying, grilling or broiling food.

- Keep anything flammable away from heat sources.
- Basic first aid
  - Cuts
    - In the case of a minor cut, clean wound, bandage and wear a glove. Apply direct pressure as needed.
  - Burns
    - Cool the burn with cool or lukewarm water. Never use ice.
    - In case of a grease fire, turn off the burner and cover with a lid, smother, or use the appropriate fire extinguisher. Never use water on a grease fire.

Standard 2

Discuss and apply basic food preparation principles.

- Terms
  - Mise en place: The planning and placement of ingredients and equipment before food preparation
- Measuring
  - Equivalents
    - 3 teaspoon = 1 tablespoon
    - 1 cup = 16 tablespoon
    - 16 ounce = 1 pound
    - 2 cups = 1 pint
    - 4 cups = 1 quart
    - 16 cups = 1 gallon
  - Yield—the amount produced by recipe
    - Conversion factor=desired yield divided by original yield
- Equipment
  - Thermometer (digital and dial)
    - Insert thermometer into the thickest part of the food without touching bone or fat, when checking the temperature.
    - Calibrate a thermometer:
      - If calibrating a traditional thermometer. Fill a large glass with ice. Add clean tap water until the glass is full and stir well, let water sit for 3 minutes. Put the thermometer stem or probe in the ice water mixture so that the entire sensing area is submerged. Do not let the stem of the thermometer or probe touch the sides or bottom of the glass. Wait until indicator stops moving. With the stem of the thermometer or probe still in the ice water mixture, use a wrench to turn the adjusting nut until the thermometer reads 32°F (0°C).
      - If calibrating a digital thermometer, press the reset button to automatically calibrate the thermometer.
  - Scale
    - Kitchen scales come in different types including a portion (spring) scale, electronic scale, and balance scale.
    - Scales are more accurate than volume measurements. More consistent results will occur with the use of a scale and recipes can be easily adjusted to fit any number of servings.
  - Identify types and use of knives.
    - Most commonly used knives
      - Chef's Knife: All-purpose knife.

    - Paring Knife: Used for peeling, trimming and cutting small fruits and vegetables.
    - Serrated Knife: Used to cut baked goods and other delicate food items.
  - Cutting boards
    - A cutting board is used to cut food to prevent damage to the countertop and knife.
    - Stabilize cutting boards for safety.
  - Identify and demonstrate different knife cuts
    - Batonnet = ¼" by ¼" by approx. 2" long.
    - Julienne = 1/8" by 1/8" by approx. 2" long
    - Brunoise=1/8" cubed
    - Dice
      - Large dice = ¾" cubed
      - Medium dice = ½" cubed
      - Small dice = ¼" cubed
  - Chiffonade
      - Cutting leafy vegetables into long, thin strips.
      - Diagonal=45 degree angle cut
- Principles of food preparation management
  - Plan:
    - Read the recipe completely before beginning
    - It should be organized according to time so that all foods are ready to eat at the same time.
  - Organize the kitchen.
    - Keep frequently used items such as cooking oils/sprays, spatulas, cutting boards, and spices within easy reach.
    - Before beginning to cook, clear off the counters.
    - Gather all ingredients needed for the meal.
    - Clean as you go.
  - Cooking Terms
  - Moist heat cooking methods
    - Boiling: Cooking in liquid at boiling point. (Not oil)
    - Blanching: Partially cooking by boiling and immediately cooling.
    - Simmering: Cooking in liquid just below the boiling point.
    - Poaching: Cooking in a flavorful liquid in a temperature just below simmering.
    - Steaming: Cooking food in closed environment with steam.
  - Dry heat cooking methods
    - Fat Frying: Completely submerge food in hot fat or oil.
    - Broiling/Grilling: Food cooked close to a direct heat source (high heat environment).
    - Baking/Roasting: Cooking in an oven using hot, dry air.
    - Sauteing: Hot pan with a small amount of fat. Food is tossed or flipped during the cooking process.
  - Combination cooking methods
    - Braising: Sear food. Add some liquid and cover pan to create a moist cooking environment.
    - Stewing: Small pieces of food are seared then covered completely with a liquid and simmered.

STRAND 2

Students will explore the changing nutritional needs through the life span and health concerns related to diet.

Standard 1

Identify the changing nutritional needs across the life span.

- Child (12 months to 11yrs)
  - Young children are active and growing, they need nutrient dense foods in small amounts frequently.
  - Set an example, children watch and learn from their caregivers.
  - Make meals fun, serve foods with bright color, different textures and shapes.
  - Do not use food as a reward or punishment.
  - Encourage children to drink water and/or milk instead of sugary drinks.
- Adolescence (12 to 20)
  - During growth spurts, more food is needed but the food should be nutrient dense.
  - Avoid high sugar and high fat snack foods and beverages.
  - Avoid high energy drinks.
- Adult (21 to 60)
  - Adults should be aware of the balance between caloric intake and spent energy.
  - Choose a variety of healthy nutrient dense foods.
  - Make regular physical activity a priority.
- Older Adults (60+)
  - Good nutrition plays a major role in wellness and disease prevention.
  - Thirst signals decline with age. Increase liquid intake by eating foods like soups, smoothies and cooked cereals.
  - Often older adults have special dietary needs such as low fat or low sodium.
  - Malnutrition is a concern especially for older adults that live alone. There are social service programs in most communities to help them receive nutritious meals.

Standard 2

Exploring common dietary needs related to health and lifestyle.

- Athletic nutritional needs
  - Training
    - Conditioning and nutrition is key to top athletic performance. Daily food choices can make a difference between a good performance and a poor one.
      - Athletes should eat a varied, nutrient dense diet following the dietary guidelines.
      - Athletes do not necessarily need supplements.
  - Pre-event/exercise
    - The last meal before a competition or intense exercise should be a carbohydrate-rich meal, with a moderate amount of protein, low in fiber and fat consumed 1-4 hours before event or competition.
  - Hydration
    - Water helps the body regulate many important functions. (Refer to Foods 1 Strand 5 Standard 3)
    - Allowing the body to become dehydrated can cause muscles to cramp, alter blood pressure, cause weight loss during exercise, delay recovery time, and decrease performance.
      - Drinking too much water can alter electrolytes and cause bodily harm.
      - Athletes should drink water before and after an event even if they don't feel thirsty. Fluid needs are highly individual.
      - Replenish electrolytes during and after vigorous exercise. (greater than or equal to 60 min-

utes) Sports drinks can be used for replenishment.
- During an event/exercise
  - Carbohydrate is the body's primary energy source during exercise.
  - Carbohydrates are stored in the liver and in the muscle as glycogen.
  - During exercise, the body draws upon these glycogen stores to fuel working muscles.
- Recovery
  - The body is primed to replenish lost nutrients soon after exercise.
  - Focus on carbohydrates and protein as replenishment. Protein is needed to help build and repair the body.
  - After an event start refueling within 60 minutes.

- Diet related health concerns
  - Diabetes:
    - Symptoms of diabetes are: increased thirst, frequent urination, extreme hunger, fatigue, blurred vision, slow-healing sores.
    - Type I
      - The body does not produce insulin.
      - No prevention.
      - Treatment involves insulin therapy and other treatments.
    - Type 2
      - The body does not use insulin properly.
      - Contributing factors for developing this type of diabetes: family history, obesity, blood pressure, age, ethnicity, physical activity, and weight.
      - Ways to reduce risk: maintain a healthy weight, eat nutritious foods, and keep active.
  - Heart disease
    - Plaque forms along the inner walls of the arteries.
    - Symptoms of a heart attack include: chest pain, shortness of breath, general pain, numbness and/or weakness or coldness in legs and/or arms.
    - Contributing factors: genetics, age, obesity, high-fat diet, lack of exercise, high stress, smoke and tobacco use, excessive alcohol consumption, high blood pressure, low fiber intake.
    - Ways to reduce risk: exercise, decrease foods that are high in saturated fats and sodium.
  - Anemia
    - Severe depletion of iron stores resulting in low blood hemoglobin.
    - Symptoms are: weakness, tired and mental state is affected.
    - Contributing factors: women of menstruating age, and diet.
    - Ways to reduce risk: eat iron rich foods.
  - Colon cancer
    - Often there are no early symptoms but may include bloody stool and abdominal pain.
    - Contributing factors: obesity, family history and lack of fiber in the diet.
    - Ways to reduce risk: Eat between 25 and 35 grams of fiber per day. Regular colonoscopy screening at age 50+.
  - Osteoporosis
    - Bones are porous and fragile due to a lack of calcium.
    - Symptoms: bones break easily, curvature of the spine.
    - Contributing factors: females, older adults, race, family history, body frame size.
    - Ways to reduce risk: Eat foods rich in calcium. Weight bearing exercises.

- Obesity
  - Obesity an excessive amount of stored body fat.
  - Contributing factors: poor diet and lack of exercise, genetics.
  - Balance calorie intake with output, generally people tend to underestimate their calorie intake and overestimate their calorie output.
  - Ways to reduce risk: eat nutrient dense foods, increase physical activity.
  - Complications: Type 2 diabetes, heart disease, cancer, high blood pressure, stroke, breathing disorders, mental disorders.

STRAND 3

Explore the purposes of planning meals: provide good nutrition, control cost, and present a complete dining experience.

Standard 1

Discuss planning meals to provide good nutrition.
(Refer to Foods 1 Strand 6 for general information. Consider individual dietary needs discussed in Foods 2 Strand 2.)

- Identify the components of a food label to determine nutritional content
  - The nutrition facts panel on a food package lists the calories, nutrients, number of servings, and portion size of food.
  - Ingredients are listed from the largest to the smallest amount by weight.
  - % Daily Value on the nutrition facts label indicates the nutrients in one serving of food in relationship to a 2000 calorie diet.
  - calorie needs differ with each person- based on age, sex, and activity level.
  - Serving size Nutrition information is given per serving. Make sure to note the number of servings in a package before consuming it.

Standard 2

Discuss the factors in controlling costs/budget when meal planning.

- A budget is a plan for managing money.
  - Factors to consider: The number of family members, time and skills available for food preparation, how often families eat out, , and the family income.
- Plan menus. Good planning can help consumers create tasty, nutritious meals within a budget.
- Apply shopping strategies.
  - Assess pantry and food inventory before planning a menu/meal.
  - Create a categorized shopping list.
  - Plan the menu based on what is on sale at the local grocery store. Fruits and vegetable that are "in season" usually are less expensive and have better quality.
  - Do not shop when hungry or tired.
  - Shop alone.
  - Take advantage of technology. Examples: grocery apps, shopping online, grocery delivery.
  - Coupon use:
    - Coupons should only be used on products that a consumer would purchase anyway. Coupons are instant savings.
  - Avoid Impulse buys.
    - Impulse purchases are unplanned purchases.
  - Check package date to assure freshness and avoid waste.

- Calculate unit pricing/cost per serving.
  - Unit pricing is the cost per ounce, quart, pound, etc.
  - Most stores show the unit price on the shelf label.
  - If no unit price is given, it can be calculated it by dividing the item's total price by the number of units.
- Comparison-shopping means matching prices and characteristics of similar items to determine which offers the best value.
  - Name brand products are usually more expensive than store brand products because more money is spent on advertising.
  - Explore the use of convenience foods in relation to time and money.
- Utilize smart shopping with bulk food items with frequently used food/items.
  - % daily value
  - Budget
  - Calories
  - Convenience Food
  - Etiquette
  - Food label
  - Serving size
  - Unit Price
  - Food label
  - Serving size
  - Unit Price

STRAND 4

Explore baking and pastry field basics.

Standard 1

Identify types of yeast dough.

- Lean Dough: Lean dough contains small amounts of sugar and fat, if any. Breads made from lean dough tend to have a chewier texture and a larger crumb.
  - Examples include: Hard rolls, soft pretzels, and French bread
- Rich/Enriched Dough: Enriched dough may have fat, dairy, eggs, or sugar added. It is usually softer, and the finished product has a softer texture and smaller crumb. They may be golden in color because of the use of eggs and sugar.
  - Examples include: sandwich breads, sweet rolls, and soft rolls

Standard 2

Identify ingredients in baked goods.

- Types flour
  - All-purpose, unbleached, bread, whole wheat, etc.
- Review common ingredients in baked goods (refer to Foods 1 Strand 3, Standard 3)
  - Leavening Agent
    - Yeast works by fermentation by using sugar and producing carbon dioxide and alcohol.
      - Yeast are living organisms.
      - In extremely hot or extremely cold temperatures they can die or slow down.

Standard 3

Identify the science principles of yeast breads.

- Kneading
  - When liquid and flour combine, they form gluten. As the dough is kneaded the gluten strands line up creating a structure where the carbon dioxide bubbles from the yeast are trapped, allowing the dough to rise.
- Fermentation
  - When yeast breaks down sugars, carbon dioxide and alcohol are produced, which causes the bread to rise.
- Proofing
  - The time period that dough rises prior to baking.
- Oven spring
  - The expansion of the carbon dioxide when put into the oven.

Standard 4

Distinguish types of pies (pie shell, single, double).

- A pie is any dish that has a crust with a filling.
  - Single Crust Pies: A pie with a crust on the bottom.
    - For some single-crust pies, the crust and filling are baked together. (pumpkin or pecan pies).
    - For others, the crust is baked empty or blind, and a prepared filling is added later (cream pies).
  - Double Crust Pies: A pie with a top and bottom crust.
    - Double-crust pies are fruit filled(apple, cherry) or savory pies (chicken pot pie).
  - Tarts: A tart is a filled dessert with a single crust.
    - Tarts are similar to a single crust pie based on the nature of the crust, shallow, varied of shapes and sizes.

Standard 5

Identify main ingredients of a pie crust and their functions.

- Flour
  - forms the structure of the pie crust.
- Fat
  - tenderizes and adds flavor (butter or lard).
- Salt
  - gives flavor to the pie crust.
- Water

Standard 6

Identify proper storage of pies.

- Cream/custard pies
  - Cream pies and custards need to be refrigerated.
- Savory pies
  - Savory pies contain cooked meat, poultry, seafood, or vegetables in a thickened sauce. Savory pies should be refrigerated.
- Fruit pies
  - Fruit pies can be stored at room temperature.

STRAND 5

Identify commonly used meat and poultry and appropriate preparation techniques.

Standard 1

- Identify sources of meat products.
  - Source of complete protein.
  - Meat products provide varying amounts of saturated fat based on the type of cut.
    - Pork: Meat from a pig.
      - Mild flavor.
      - Commonly used in processed meat products. (Sausage, bacon, ham cured meats)
    - Beef: Cattle more than one year old.
      - Some cuts of meat are more tender than others. The two main reasons for this are muscle movement and age.
      - Marbling is small white flecks of fat that melt during cooking making the meat more flavorful. Cuts with marbling are also more tender.
      - Ground beef is available with different amounts of fat.
    - Veal: Calves (young cattle), usually one to three months old.
      - Mild flavor, smooth, velvety texture,light gray-pink color with very little fat.
      - Can be expensive and difficult to source.
    - Lamb: Sheep less than a year old.
      - Unique, mild flavor; bright, pink-red color; brittle white fat.
      - Poultry
      - Poultry is any bird raised for food. (Chicken, Turkey, Duck etc..)
      - Most of the fat in poultry is attached to the skin.
      - Versatile; can be prepared using all cooking methods and compatible with a wide range of ingredients.
      - Within poultry, there are two types of meats—white and dark. The different colors are based on the different locations and uses of the muscles.
        - Dark meats occur in the legs. Dark meat generally has more flavor and fat than the white meat.
        - White meat is generally large pieces and a mild flavor.
    - Seafood
      - Crustaceans (crabs, lobsters, shrimp)
      - Mollusks/bivalves (clams, oysters, octopus, scallops)
      - Bony/Fin Fish (salmon, trout, cod, halibut, tuna)
        - Low in saturated fat.
        - Contains omega 3 fatty acids (salt-water fish contain more than fresh water fish).
        - Can be a common allergen.

Standard 2

Discuss inspection and grading of meat and poultry.

- All meat and poultry sold in the United States must be inspected for safety and wholesomeness.
- The USDA also grades meats and poultry. Grading is classifying products according to quality.
  - Grading of meats is based on marbling, maturity, and muscle conformation.
    - Common Beef Grades are: Prime, Choice, and Select
    - Grading of poultry is based on size and quality.
  - Grading is voluntary and helps meatpackers market their products.

Standard 3

Identify appropriate meat preparation techniques

- Cooking methods for less tender cuts (Moist Heat: Braising, Stewing)
- Cooking methods for tender cuts (Dry Heat: Broil, Grill, Roast, Sauté, Fry)
- Identify proper internal cooking temperatures of meat, poultry and seafood.
  - Whole meats (seafood, pork, beef, veal, lamb) – 145°F
  - Ground meats (pork, beef, veal, lamb) – 155°F
    - When ground meats are processed the surface bacteria can be ground and mixed throughout product. This is why it is important to cook ground products to a higher internal temperature than other cuts.
  - Poultry (whole or ground) – 165°F

STRAND 6

Students will identify the purpose of and explore preparation techniques of salads.

Standard 1

Identify the purpose of salads

- Accompaniment/side salad is served with and compliments the main course.
- Main dish salad is a large salad that includes protein and is substantial and satisfying.
- Dessert salad may be sweetened, molded or frozen using gelatin or fruit.
- Can provide a variety of vitamins, minerals, healthy fats, and fiber in a meal.

Standard 2

Identify salad preparation and serving techniques.

- Preparing greens
  - Rinse with cold water and drain/spin to remove as much water as possible.
  - If it must be washed before use, store in a plastic bag wrapped in a paper towel.
  - Do not over handle greens or they will become bruised and wilted.
  - Ingredients should be well drained and cut into bite size pieces.
- Plating and Serving
- Salads can be served:
  - Tossed or mixed
  - Arranged or composed
  - Layered
  - Bound (held together by a thick dressing).
- Chilling the bowl or plate in the refrigerator helps the salad stay cold for serving and eating.

Standard 3

Identify classifications of salad dressings

- Vinaigrette is made with oil and vinegar, usually in a 3:1 ratio.
  - Vinaigrette quickly separates. That is why it is necessary to shake oil-and- vinegar dressings before using them.
- Mayonnaise based dressing uses mayonnaise and ingredients to add flavor.
  - Mayonnaise is a thick, creamy dressing that is a permanent emulsion of oil, vinegar or lemon juice, egg yolk and seasonings.
- An emulsifier is a substance that keeps the oil and vinegar blended.

- Egg yolk and/or mustard are effective emulsifiers.

STRAND 7

Students will explore and prepare soups and sauces.

Standard 1

Identify terminology used in making soups and sauces.

- Mire poix: 50% onion, 25% carrots, 25% celery
- Roux: equal parts fat and flour
- Stock: flavored liquid made from simmering bone and/or vegetables in water.

Standard 2

Identify and discuss the role of the five Mother Sauces. Other sauces are derived from these five Mother sauces.

- Béchamel
  - A white sauce made from milk or cream and thickened with a roux (equal parts butter and flour). Béchamel sauces are often served with pasta, vegetables, eggs, or poultry.
- Veloute
  - Veloute is made from veal, chicken, or fish stock and a white or blond roux. Veloute sauces are often served with lighter dishes such as vegetables, fish, pasta, or poultry.
- Espagnole
  - Espagnole, often referred to as brown sauce, uses a brown stock, such as beef, as a base and is thickened with a brown roux. Espagnole is often flavored with aromatics, savory herbs, or tomato paste. Espagnole sauces are commonly served with roasted meats, such as beef, veal, lamb, or duck.
- Tomato
  - Made with sautéed aromatic vegetables and a tomato product. Red sauces have a tomato base and are thickened with purees, by reduction, or a roux. Red sauces can be served with nearly everything, including pasta, vegetables, fish, beef, veal, poultry, or polenta.
- Hollandaise
  - Made by whisking egg yolks with clarified butter and lemon juice over a double boiler. Hollandaise sauce is a rich creamy sauce that uses butter as a base and is a thickened emulsion. Hollandaise sauces are often served with eggs (eggs benedict), vegetables, or poultry.

Standard

Identify and prepare the two basic types of soup.

- Thick soup
  - Cream
    - A thick soup with a smooth texture.
  - Chowder
    - A thick soup typically containing potatoes.
  - Puree
    - Thickened through pureeing the main ingredient.
  - Bisque
    - A thick soup containing shellfish.
- Stock based soup.
  - Examples of Stock/Broth based soup: Chicken Noodle, Vegetable Beef, Minestrone, Pozole

Standard 4

Identify proper storage of soups.

- Divide soup into smaller portions in shallow containers. Cool to room temperature, refrigerate immediately.
- Soup can also be cooled by placing the soup container into an ice bath, stirring often, and then placing it into the refrigerator when it has cooled to room temperature.

STRAND 8

Students will explore career options and employment skills required in the food, nutrition, food science and agriculture industries.

Standard 1

Explore career opportunities and educational requirements associated.

- Dietitian
- Dietary Technician
- Health Coach
- Community Health Educator
- Sports Nutrition Specialist
- Food Safety Inspector
- Food Production Scientist
- Food Research and Development Scientist
  - Compare and contrast a career verses a job in the food nutrition, food science and agriculture industries.
    - Determine education and/or training requirements.
    - Explore earning potential.
    - Job Description
    - Soft skills needed to excel in the industry

Performance Skills

Strand 1

Demonstrate changing the yield in a recipe utilizing the conversion factor. Adjust a 4 serving recipe to yield 2, 8 and 16.

Correctly demonstrate 4 of the 6 knife cuts.

Strand 2

Actively participate in the preparation of a nutrient dense foods addressing any of the concerns in STRAND 2.

- Anemia
- Colon cancer
- Conditioning
- Diabetes
- Glycogen
- Heart disease
- Hydration
- Malnutrition
- Nutrient dense
- Obesity

- Osteoporosis
- Recovery

Strand 4

Actively participate in the preparation of yeast bread.

Vocabulary

- Carbon Dioxide
- Fermentation
- Kneading
- Lean dough
- Leavening Agent
- Oven Spring
- Proofing
- Rich/Enriched dough

Strand 4

Actively participate in the preparation of a pie or tart.

Vocabulary

- Baking Blind
- Double Crust
- Savory
- Single Crust
- Tart

Strand 5

Actively participate in the preparation of meat or poultry, use a thermometer to confirm the product has been heated to the proper internal temperature.

Vocabulary

- Grading
- Inspecting
- Marbling
- USDA

Strand 6

Actively participate in the preparation of a salad.

Vocabulary

- Accompaniment/Side
- Appetizer
- Arranged/Composed
- Bound
- Emulsion
- Layered
- Vinaigrette

Strand 7

Actively participate in the preparation of a mother sauce or soup.

Vocabulary

- Mother Sauces
- Cream
- Chowder
- Puree
- Bisque
- Broth

Strand 8
Research a career in the food nutrition, food science and agriculture industries using multiple sources (personal interview, internet, and periodicals) and present your findings.

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS

CULINARY 1

Course Description

This course is designed to focus on principles of food preparation and career options in the food industry. FC-CLA may be an integral part of this course.

Intended Grade Level	9-12
Units of Credit	.50
Core Code	34.01.00.00.160
Concurrent Enrollment Core Code	
Prerequisite	None
Skill Certification Test Number	343
Test Weight	0.5
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family Consumer Sciences
Endorsement 2	Food Service/Culinary Arts
Endorsement 3	NA

STRAND 1

Students will consistently demonstrate workplace safety, food safety, and sanitation techniques. (Suggested 5 days)
***Performance Skills for this strand included below.**

Standard 1

Apply established safety rules and guidelines in a work environment.

- Identify prevention, protocol and treatment for cuts.
  - Prevention
    - Use sharp knives, dull knives are more dangerous
    - Hold knife correctly, using the claw hand position on guide hand.
    - Use a stabilized cutting board.
    - Hold onto the knife handle while cleaning, do not soak.
  - Protocol
    - Clean and sanitize the affected area and equipment as soon as possible.
  - Treatment
    - Minor cuts clean wound, apply bandage and wear glove.
    - Sever cuts apply pressure and seek medical attention.
- Identify prevention, protocol and treatment for fires, chemical and heat related incidents.
  - Prevention
    - Avoid flammable materials or clothing on or near the range.
    - Turn handles away from the front of the range.
    - Lift lids on hot foods away from you.
    - Use hot pads or oven mitts for handling hot baking pans.
    - Keep equipment clean.
    - Keep chemicals away from food.
  - Protocol
    - To extinguish a fire use the correct fire extinguisher. (A, B, C, or K)
    - To extinguish a grease fire, cover/smother the pan, pour baking soda/salt. Avoid water, flour or sugar on grease fires.
    - Follow manufactures directions for all chemical use and storage, do not mix chemicals.
  - Treatment
    - First Degree Burn and Second Degree Burn: immerse burn in cool water or use cool compress for 10-15 minutes.
    - Third Degree Burn: seek medical treatment
    - For Chemical Burn: seek medical treatment or call poison control.
- Identify prevention, protocol and treatment for break, strains and sprains.
  - Prevention
    - Keep floors clean and dry.
    - Post caution signs for wet floors.
    - Store heavy items on lower shelves.
    - Use ladders or step stools appropriately.
    - Lift heavy items appropriately.
    - Wear non-slip shoes.
  - Treatment
    - Seek medical attention.

Standard 2

Identify health and hygiene requirements for food handling.

- Identify proper hand washing.
  - Wash hands with soap and warm water for a minimum of twenty seconds.
  - Wash hands before and after handling raw meat, poultry or eggs.
  - Wash hands after using restroom, sneezing, coughing, changing diapers, etc.
- Identify appropriate clothing and hair restraints.
  - Appropriate clothing includes clean clothing.
  - Cover and tie back hair with appropriate hair restraints before working with food.
- When tasting foods, always use a clean spoon and use only once.
- Discuss appropriate use of gloves.
  - Single use gloves only.
  - Wash hands before putting on gloves.
  - Change gloves when they get dirty, torn, or changing task.
  - Wear gloves when handling ready-to-eat (RTE) foods.
  - Wear gloves and bandage for an open cut or wound.

Standard 3

Recognize food-borne illness and prevention.

- Identify the ways food becomes unsafe.
  - Physical: fingernail, hair, metal shard, band aid
  - Chemical: cleaning chemicals, sanitizers
  - Biological: pathogens
- Define food-borne illness.
  - Food-borne illness results from eating foods containing pathogens.
  - Pathogens are any bacteria, virus, parasite, or fungi that can cause illness.
    - Bacteria need certain conditions to grow. FATTOM: Food, Acid, Time, Temperature, Oxygen, and Moisture.
  - Common symptoms of a food borne illness include fever, headache, nausea, vomiting and diarrhea.
  - Common food borne illnesses include: Campylobacter, Clostridium Perfringens, E-coli, Norovirus, Salmonella, Staphylococci
  - Food will often look and smell normal.
  - When in doubt, throw it out.
- Controlling time and temperature
  - Foods like milk/dairy, meat, fish, eggs, poultry, shellfish/crustaceans, baked potatoes, tofu, sprouts, cooked rice, beans and vegetables, sliced melons or tomatoes and lettuce are susceptible to pathogens. These are known as TCS foods (Time/Temperature Control for Safety).
  - Temperature Danger Zone: 41-135 degrees
    - Foods held in the danger zone for longer than 4 hours should be thrown out.
      - Time in the danger zone includes: shopping, transportation, preparation, and holding for service.
  - Frozen foods: 0°F
  - Refrigerator/Cold Food: 41°F or below
  - Holding Hot Foods: 135°F

- Seafood, Beef, Pork, Lamb: 145°F
- Ground Meats: 155°F
- Poultry Whole or Ground and Reheated food: 165°F
- Identify the ways to safely thaw TCS foods.
  - In the refrigerator.
  - In a sink of cold, running water or a sink full of cold water, changing the water every 30 minutes. Prepare and use food immediately.
  - In the microwave. Prepare and use food immediately.
  - As part of the cooking process.
- Identify correct cooling of TCS foods.
  - Shallow containers or reduce portion size in refrigerator
  - Ice bath
  - Blast chiller
- Preventing cross contact and cross contamination
  - Cross contact is when food item containing an allergen comes in contact with another food.
    - The big 8 allergens include: tree nuts, eggs, milk, soy, wheat, peanuts, fish, and shell fish
  - Cross contamination is the transfer of pathogens from people, surfaces or food to food.
    - Store food 6 inches off the ground, label stored food correctly, store ready-to-eat (RTE) food separately or above raw food.
- Equipment Storage: Store service-ware and food containers upside down on a clean, sanitized surface, and store utensils with handles up.
- Food Preparation: clean and sanitize work area and equipment, wash hands between task, never place cooked food on a plate which has previously held raw meat, poultry or seafood.
  - Serving food: no bare hand contact with RTE food.
  - Cleaning and Sanitizing
    - Clean removes food and other dirt from surface.
    - Sanitize reduces pathogens on surface.
    - Steps to cleaning and sanitizing:
      - Scrape and rinse
      - Wash
      - Rinse
      - Sanitize
      - Air dry
    - Clean and sanitize after completing a task or after 4 hours of constant use.
    - Remove garbage from prep area as soon as possible.
    - To reduce pest/insects, avoid crumbs or spills, keep staples in airtight containers and dispose of garbage properly.

STRAND 2

Students will explore career opportunities and employment skills required in the food service industry. (Suggested 5 days)

Standard 1

Identify career opportunities and educational requirements.

- Career paths
  - Such as: dietician, food stylist, chef, pastry chef, food scientist, event planner

- Education opportunities
  - College or tech, apprentices, work-based learning, CTE internships
  - On the job training
  - Industry certifications
    - Such as: National Restaurant Association, American Culinary Federation

Standard 2

Investigate and apply professional work behavior and employability skills.

- Communication
- Collaboration
- Creativity
- Critical Thinking
- Citizenship
- Character

STRAND 3

Students will identify knives and food service equipment; function, proper use and care. (Suggested 6 days)
***Performance Skills for this strand included below.**

Standard 1

Identify types of knives, understand their proper use and care, and demonstrate proper knife safety.

- Types of knives, including chef, paring, serrated
- Correct holding technique, sharpening, washing and storing

Standard 2

Identify common small-ware food preparation equipment and how it is to be safely used and cleaned. (i.e. peeler, micro plane (zester), whisks, spatula, tongs, bench scraper, stock pot, sauce pan, sauté pan)

Standard 3

Identify common food preparation and service equipment and how it is to be safely used and cleaned (e.g., scales, immersion blender, food processor, microwave, sheet pan, speed rack, hotel pan).

Standard 4

Identify and demonstrate different knife cuts, including:

- Batonnet—1/4 x 1/4 x 2-3 inch
- Julienne—1/8 x 1/8 x 1-2 inch
- Brunoise—1/8 x 1/8 x 1/8 inch
- Dice, small—1/4 x 1/4 x 1/4 inch; medium—1/2 x 1/2 x 1/2 inch; large—3/4 x 3/4 x 3/4 inch
- Chiffonade—stack leaves, roll and slice into thin shreds
- Diagonal—cut on a 45 degree angle

Standard 5

Identify the process of mise en place.

- Mise en place (to put in place): organizing equipment and preparing ingredients (measuring, doing knife cuts) before you begin cooking.

STRAND 4

Students will apply basic culinary math concepts and use in standardized recipes. (Suggested 2 days)
***Performance Skills for this strand included below.**

Standard 1

Utilize measuring techniques and tools.

- Measurements are either by volume or by weight.
  - Volume measuring tools include teaspoons, tablespoons, cups, pints, quarts, gallons, and various sizes of ladles and scoops.
  - Weight measuring tools include balance/baker scales, spring scale, and digital scale.

Standard 2

Identify measurement abbreviations and equivalents.

- Measurement Abbreviations:

- Tablespoon = T. or Tbsp.
- Teaspoon = t. or tsp.
- Gallon = gal.
- Quart = qt.
- Pint = pt.
- Cup = c.
- Pound = lb. or #
- Ounce = oz.
- Fluid oz. = fl. oz.

- Equivalents:

- 3 t. = 1 T.
- 16 T = 1 c.
- 8 fl. oz. = 1 c.
- 2c. = 1 pt.
- 4 qt. = 1 gal.
- 1 lb. butter = 2 c
- 16 c. = 1 gal.
- 4 c. = 1 qt.
- 16 oz. = 1 lb.

Standard 3

Define and identify components of a standardized recipe.

- Standardized recipe - specifically describes the exact, measurable amount of ingredients and the method of preparation needed to consistently produce a high-quality product.
- Components of a standardized recipe.
  - Title (name of the recipe)
  - Yield - how many servings the recipe will make.
  - List of ingredients and amounts, listed in order they appear in the recipe.
  - Step by step directions in order to be completed.
  - Equipment - container size and type.
  - Temperature and time

Standard 4

Convert recipe yields.

- Converting total yield: two-step method
  - Divide the new yield by the old yield to get the conversion factor. (New Yield ÷ Old Yield = Conversion factor)

- Multiply every recipe ingredient by the conversion factor to get the new quantity needed for the new yield. (Old ingredient quantity x Conversion factor = New quantity)

STRAND 5

Students will compare and contrast cooking techniques as applied to food preparation. (Suggested 10 days)
***Performance Skills for this strand included below.**

Standard 1

Moist heat cooking methods

- Boil: Cooking in liquid at boiling point. (Not oil)
- Blanch: Partially cooking by boiling and immediately cooling.
- Simmer: Cooking in liquid just below the boiling point.
- Poach: Cooking in a flavorful liquid in a temperature just below simmering.
- Steam: Cooking food in closed environment with steam.

Standard 2

Dry heat cooking methods

- Bake/Roast: Cook with dry heat in a closed environment, usually in an oven.
- Broil: To cook food directly under heat source.
- Grill: To cook food directly above heat source.
- Sauté/Stir Fry: Quickly cooking an item in a small amount of hot fat or oil, over moderate heat.
- Pan Fry: Cooking in a moderate amount of hot fat or oil.
- Deep Fat Fry: Completely submerge food in hot fat or oil.

Standard 3

Combination cooking methods

- Braise: Sear food. Add some liquid and cover pan to create a moist cooking environment.
- Stew: Small pieces of food are seared then covered completely with a liquid and simmered.

STRAND 6

Students will explore and prepare stocks and sauces. (Suggested days 4)

Standard 1

Vocabulary used in making stocks and sauces.

- Mire poix: 50% onion, 25% carrots, 25% celery
- Roux: equal parts fat and flour
- Stock: flavored liquid made from simmering bone and/or vegetables in water.
- Aromatics: mire poix, herbs, and spices

Standard 2

Apply concepts of making a stock.

- Start with cold water; never boil; never add salt.
- Meat based stock includes bones, aromatics, and water
- Vegetable based stocks include vegetables, aromatics, and water
- Simmering time is based on type of stock.

- Skim stock often to remove impurities.
- Strain stock, cool correctly, and remove fat after cooling.

Standard 3

Identify the five Mother Sauces.

- Béchamel is a white sauce made from milk or cream and thickened with a roux.
- Velouté is made from veal, chicken, or fish stock and a white or blond roux.
- Espagnole, often referred to as brown sauce, uses a brown stock, such as beef, as a base and is thickened with a brown roux.
- Tomato is made with sautéed aromatic vegetables and a tomato product.
- Hollandaise is made by whisking egg yolks with clarified butter and an acid such as lemon juice.

STRAND 7

Students will explore preparation principles of breads (Suggested days 6)
***Performance Skills for this strand included below.**

Standard 1

Types of breads.

- Quick and Yeast
- Review information from Foods and Nutrition 1 on Quick breads
- Compare and contrast quick breads and yeast breads including ingredients, preparation methods, texture/crumb and appearance.

Standard 2

Types of yeast dough.

- Lean Dough contains only small amounts of sugar and fat, if any.
  - Products made from lean dough tend to have a chewier texture and an open crumb.
  - Examples include: Hard rolls, soft pretzels, and French bread
- Rich Dough may have fat, dairy, eggs, or sugar added.
  - Products made from rich dough tend to have a softer and finer texture. They may be golden in color because of the use of eggs and sugar.
  - Examples include: sandwich breads, sweet rolls, and soft rolls

Standard 3

Identify ingredients in baked goods.

- Function of each ingredient.
  - Flour: structure.
  - Liquid: moisture and activates leavening agents.
  - Leavening Agents: makes the product rise.
    - Yeast works by fermentation, using sugar and producing carbon dioxide and alcohol.
    - Yeast are living organisms.
    - In extreme hot or cold temperatures, they can die or slow down.
  - Fat: tenderness, richness and some flavor.
  - Salt: flavor and controls yeast.
  - Sugar: flavor and browning

Standard 4

Principles of yeast dough production.

- Kneading is combining liquid and flour combine to form gluten. As the dough is kneaded the gluten strands line up creating a structure trapping carbon dioxide, allowing the dough to rise.
- Fermentation is the process of breaking down sugar to create carbon dioxide and alcohol, which causes the dough to rise.
- Proofing is the final rising of the dough prior to baking
- Oven spring is the expansion of carbon dioxide when put into a preheated oven.

Performance Skills

PERFORMANCE OBJECTIVE 1
Investigate food safety and complete an assessment in preparation for a Food Handlers Permit.
PERFORMANCE OBJECTIVE 2
Demonstrate competency with at least 4 of the knife cuts listed in STRAND 3.
PERFORMANCE OBJECTIVE 3
Adjust a 4 serving recipe to yield 2, 8 and 16 servings.
PERFORMANCE OBJECTIVE 4
Actively participate in both a moist heat and dry heat food preparation experience.
PERFORMANCE OBJECTIVE 5
Actively participate in the preparation of a mother sauce.
PERFORMANCE OBJECTIVE 6
Actively participate in the preparation of a bread product.

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS

CULINARY 2

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Course Description

Students will be trained for career opportunities in the food service/culinary arts industry. Students will have the opportunity to learn and practice safety and sanitation procedures, and to use and maintain commercial food service equipment. They will perform quantity food preparation as it relates to catering, bakery, restaurant, hospitality, and fast food business operations. Student leadership and competitive events (FCCLA) may be integrated into this course.

Intended Grade Level	9-12
Units of Credit	1.0
Core Code	34.01.00.00.170
Concurrent Enrollment Core Code	
Prerequisite	Foods and Nutrition; Culinary 1
Skill Certification Test Number	345
Test Weight	1.0
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family Consumer Sciences
Endorsement 2	Food Services/Culinary Arts
Endorsement 3	

STRAND 1

Differentiate knives and food service equipment function, proper use and care. (Suggested 6 days)

Standard 1

Identify types of knives, understand their proper use and care, and demonstrate proper knife safety.

- Types of knives, including chef, boning, paring, serrated
- Correct holding technique, sharpening, wash and storage

Standard 2

Identify common small ware food preparation equipment, and how it is to be safely used and cleaned. (i.e. knives, mandolin, piping tools, parisian scoop, scales)

Standard 3

Identify common food preparation and service equipment and how it is to be safely used and cleaned (e.g., convection oven, conventional oven, commercial dishwasher/sanitizer, ice machine, stand mixer, deep fat fryer, proofer, steam table, hotel pans, sheet pans, chafing dishes).

Standard 4

Identify and demonstrate different knife cuts, including:

- Batonnet—1/4 x 1/4 x 2-3 inch
- Julienne—1/8 x 1/8 x 1-2 inch, fine julienne- 1/16 x 1/16 x 1-2 inch
- Brunoise—1/8 x 1/8 x 1/8 inch
- Dice, small—1/4 x 1/4 x 1/4 inch; medium—1/2 x 1/2 x 1/2 inch; large—3/4 x 3/4 x 3/4 inch
- Chiffonade—stack leaves, roll and slice into thin shreds
- Diagonal—cut on a 45 degree angle
- Rondelle—also called coin cut
- Mince - to cut or chop into very small pieces.
- Chop - to cut into uniform size when shape is not important.

Standard 5

Identify the process of mise en place.

- Mise en place (to put in place): organizing equipment and preparing ingredients (measuring, doing knife cuts) before you begin cooking.

STRAND 2

Connect workplace safety, food safety, and sanitation as applied to food production. (Suggested 5 days)

Standard 1

Apply established safety rules and guidelines in a work environment.

- Identify prevention, protocol and treatment for cuts.

- Prevention
  - Use sharp knives, dull knives are more dangerous
  - Hold knife correctly, using the claw hand position on guide hand.
  - Use a stabilized cutting board.
  - Hold onto the knife handle while cleaning, do not soak.
- Protocol
  - Clean and sanitize the affected area and equipment as soon as possible.
- Treatment
  - Minor cuts clean wound, apply bandage and wear glove.
  - Sever cuts apply pressure and seek medical attention.

- Identify prevention, protocol and treatment for fires, chemical and heat related incidents.
  - Prevention
    - Avoid flammable materials or clothing on or near the range.
    - Turn handles away from the front of the range.
    - Lift lids on hot foods away from you.
    - Use hot pads or oven mitts for handling hot baking pans.
    - Keep equipment clean.
    - Keep chemicals away from food.
  - Protocol
    - To extinguish a fire use the correct fire extinguisher. (A, B, C, or K)
    - To extinguish a grease fire, cover/smother the pan, pour baking soda/salt. Avoid water, flour or sugar on grease fires.
    - Follow manufactures directions for all chemical use and storage, do not mix chemicals.
    - Chemical incident see Safety Data Sheet (SDS) for medical treatment and fire suppression.
  - Treatment
    - First Degree Burn and Second Degree Burn: immerse burn in cool water or use cool compress for 10-15 minutes.
    - Third Degree Burn: seek medical treatment
    - For Chemical Burn: seek medical treatment or call poison control.
- Identify prevention, protocol and treatment for break, strains and sprains.
  - Prevention
    - Keep floors clean and dry.
    - Post caution signs for wet floors.
    - Store heavy items on lower shelves.
    - Use ladders or step stools appropriately.
    - Lift heavy items appropriately.
    - Wear non-slip shoes.
  - Treatment
    - Seek medical attention.

Standard 2

Identify health and hygiene requirements for food handling.

- Identify proper hand washing.

- Wash hands with soap and warm water for a minimum of twenty seconds, and dry with single use paper towel.
- Water should be a minimum of 100 degrees.
- Wash hands before and after handling raw meat, poultry or eggs.
- Wash hands after using restroom, sneezing, coughing, changing diapers, etc.

- Identify appropriate clothing and hair restraints.
  - Appropriate clothing is clean and may include chef coat, apron, or other uniform.
  - Cover and tie back hair with appropriate hair restraints before working with food.
- When tasting foods, always use a clean spoon and use only once.
- Discuss appropriate use of gloves.
  - Single use gloves only.
  - Wash hands before putting on gloves.
  - Change gloves when they get dirty, torn, or changing task.
  - Wear gloves when handling ready-to-eat (RTE) foods.
  - Wear gloves and bandage for an open cut or wound.
- Any activity involving eating, drinking, smoking/vaping, or chewing gum needs to occur in a designated area away from food preparation areas.

Standard 3

Identify the steps in the flow of food, including purchasing, receiving, storage, preparation, cooking, holding (hot/cold), cooling, reheating, and serving.

- Explain the purpose of the Hazard Analysis Critical Control Point (HACCP) system (i.e., to ensure keeping food safe through a system of identifying and monitoring critical control points).
- Discuss methods of purchasing, receiving, and storage.
  - Purchase from an approved reputable vendor.
  - FIFO (first-in first-out) rule (i.e., the food that has been in the holding area the longest will be used first).
  - Store food and cleaning supplies separately.
- Refrigerator and freezer temperatures (refrigerator: 41°F or lower; freezer: 0°F or lower).

Standard 4

Identify the factors contributing to food-borne contamination, illness, and prevention strategies.

- Discuss general concepts of food-borne illness.
  - Food-borne illness results from eating foods contaminated with pathogens.
  - General conditions for bacterial growth include food, acidity, time, temperature, oxygen, moisture (FAT TOM).
  - Contaminated food does not always have an off odor or flavor, so it may look and smell normal.
- Three types of food contamination hazards.
  - Physical - hair, glass, metal shards, fingernails.
  - Chemical - cleaning supplies and pesticides.
  - Biological - harmful micro-organisms (pathogens)
- Identify the four types of pathogen contaminants
  - Bacteria - tiny single cell micro-organism including Salmonella and E-coli.
  - Viruses - simple organism responsible for majority of foodborne illness - Norovirus and Hepatitis A.

- Parasites - organism that must live in or on a host to survive ie. Giardia
- Fungi - spore producing organism including yeast and mold. Typically, visible on spoiled food.

- Food-borne illness symptoms that exclude a worker from handling food may include the following:
  - Sore throat with fever
  - Jaundice
  - Diarrhea
  - Vomiting
  - Open and infected sores
  - Food handlers need to be symptom-free for 24 hours before handling food.

- Discuss prevention strategies.
  - Controlling Time and Temperaturetes
    - In cold storage, place ready-to-eat (RTE) foods on top and uncooked animal products toward the bottom according to cooking temperature.
    - All TCS (Time and Temperature Control for Safety) foods need to be covered and stored in the refrigerator with a label including a use-by date, store at 41°F or lower, if produced on site for no more than 7 days.
    - Food should not be in the Danger Zone (the temperature range of 41-135°F), for longer than 4 hours total from start of preparation.
    - Cooking to safe internal temperatures; be sure to use a clean and sanitized thermometer.
      - Seafood, pork, beef, veal, lamb—145°F (for a minimum of 15 seconds)
      - Ground meats (pork, beef, veal, lamb) and eggs—155°F (for a minimum of 15 seconds)
      - All Poultry (whole or ground)—165°F (for a minimum of 15 seconds)
      - Reheat temp—165°F (for a minimum of 15 seconds)
    - Cooling and reheating foods to the correct temperature for the correct amount of time using proper equipment.tes
      - Keep hot foods hot and cold foods cold.
        - Hold hot 135°F and above.
        - Cold 41°F or lower.
      - Food needs to be cooled below 70°F within two hours and below 41°F within four more hours.
        - Methods include ice water baths, ice paddles, blast chiller, and dividing large amounts of food in small, shallow, covered containers for quick cooling.
        - Store foods in the refrigerator and freezer so that the cool air can circulate to keep food safe. Don't cover shelves or overcrowd.
          - Bring sauces, soups etc. to a boil when reheating; heat other TCS leftovers to 165°F (for a minimum of 15 seconds).
        - Safely thaw foods, including in the refrigerator, under cold running water, in the microwave, or as part of the cooking process.
          - Never defrost at room temperature.
          - Cold running water should not exceed 70°F.
          - The product should not exceed 41°F internal temperature.
          - If thawing food in the microwave, cook immediately.

- Preventing cross contamination and cross contact.
  - Cross-contact happens when one food containing allergens comes in contact with a surface or food, thereby posing a hazard for persons having that allergy.
    - The big 8 allergens include: tree nuts, eggs, milk, soy, wheat, peanuts, fish, and shell fish
  - Cross-contamination is the unintentional transfer of pathogens from people, surfaces or food to another food.
    - Food Storage: food is 6 inches off the ground, label stored food correctly, store ready-to-eat (RTE) food separately or above raw food.
    - Equipment Storage: Store service-ware and food containers upside down on a clean, sanitized surface, and store utensils with handles up.
    - Food Preparation: clean and sanitize work area and equipment, wash hands between task, never place cooked food on a plate which has previously held raw meat, poultry or seafood.
      - When serving foods: no bare hand contact with RTE food.

- Identify proper sanitation techniques used with tools, equipment, and surfaces.
  - Discuss three-compartment sink dishwashing and the order used when washing and sanitizing dishes (i.e., rinse and scrape, wash, rinse, sanitize and air dry).
  - Frequently clean and sanitize work surfaces (i.e., counters).
  - Clean and sanitize cutting boards, dishes, tools, etc., after preparing each food item, or every four hours of continuous use.
  - Never place cooked food on a plate which has previously held raw meat, poultry or seafood without first cleaning and sanitizing the plate.

STRAND 3

Students will explore the foodservice and hospitality industry; history, trends, and supply chains. (Suggested 4 days)

Standard 1

Identify various food service industry segments such as quick service, family dining, fine dining, catering, and institutional/non-commercial food service.

- Non-commercial: healthcare, education, military, charity, and corrections.
- Commercial: restaurants, caterers, lodging, travel, concessions, and retail.
- Identify various types of businesses including restaurants; quick service, full service and others.

Standard 2

Identify and discuss the history and influential chefs in the foodservice industry.

- Explain the history of food service.
- Identify the role of influential chefs.
  - Identify Marie-Antoine Careme
    - Implemented white chef coat and hats
  - Identify Auguste Escoffier
    - Organized kitchen management or brigade system
  - Identify Julia Child

- Revolutionized American home cooking through television

Standard 3

Identify current trends and their influence on the food service industry.

- Explore cultural influences on the food service industry such as, religion, health limitations, geographical, and age.

Standard 4

Differentiate the components of the food supply chain in regards to the food service industry.

- Agriculture
- Processing
- Distributor
- Retailer
- Consumer

STRAND 4

Students will compare and contrast various cooking techniques and how seasonings and flavorings create and enhance the natural flavors of food while practicing food presentation. (Suggested 5 days)

Standard 1

Standard 1 Review the various cooking techniques and how they affect food.

- Dry cooking applies heat directly as with flame or indirectly by surrounding food with heated air or fat. These techniques include: bake, grill, broil, roast, sauté/stir-fry, pan fry, deep fry.
- Moist cooking techniques apply heat to food by submerging it directly in hot liquid or steam. These cooking methods include: poach, simmer, boil, steam, and blanch.
- Combination (uses both dry and moist cooking methods): braise and stew.

Standard 2

Discuss the enhancement and creation of flavor when preparing food.

- Flavor can be defined as the sensory properties of food these are perceived with; taste, aroma, temperature, appearance (including color and arrangement), texture
    - There are four tastes that are universally agreed upon; sweet, sour, salty, bitter.
        - The taste umami, long recognized in Japan, and recently widely accepted by western cultures, is also called savory.
        - Seasoning enhances the flavor of food without changing the natural flavor. Seasonings are salt and monosodium glutamate (MSG).
    - Flavoring adds a new taste to food and/or alters its' natural flavors.
        - Herbs
            - The leaves, stems and flowers of aromatic plants.
            - Available fresh and dry. When using dry in the place of fresh, one third to one half the amount of fresh ask for should be used.
            - Fresh herbs are usually added at the end of cooking and dried are added at the beginning.

- Spices
  - bark, buds, fruit, roots, seeds or berries
  - Usually used in dry form, available whole or ground.
- Vinegars
  - Sour, acidic liquid that can be used to add flavor during cooking and/or as a condiment.
  - Vinegar is often named for the ingredient it is made from:
    - Wine vinegars are made from wine and contain no alcohol.
    - Cider=apples
    - Rice=rice
- Extracts are concentrated flavors that are used most often in baking.
- Ingredients commonly used to enhance flavor include onions, garlic, and lemon.

Standard 3

Elements of plating and food presentation.

- Avoid placing food on the rim or overfilling the plate, allowing for negative space.
- Avoid the use of non-edibles on the plate.
- Odd numbers are more pleasing than even numbers.
- Choose a variety of colors, texture, heights, size and shapes in meals.
- Consider food temperature.

STRAND 5

Students will utilize basic culinary math concepts. (Suggested 4 days)

Standard 1

Practice proper measuring techniques using appropriate tools.

- Volume and weight are the two standard methods of measuring food. Weight is the most accurate.
  - Volume measuring tools include teaspoons, tablespoons, cups, pints, quarts, gallons, and various sizes of ladles and scoops.
- Weight measuring tools include balance/baker scales, spring scale, and digital scale.

Standard 2

Identify measurement equivalents and apply by adjusting recipe yield.

- Identify measurement equivalents used in food preparation including, but not limited to:

- 3 t. = 1 T.
- 16 T. = 1 c.
- 2 c. = 1 pt.
- 4 qt. = 1 gal.
- 8 fl. oz. = 1 c.
- 4 c. = 1 qt.
- 1 lb. butter = 2 c.
- 16 oz. = 1 lb.

Standard 3

Define a standardized recipe and identify components of a standardized recipe.

- Standardized recipe - A recipe that produces the same results and yield every time when the exact procedures are followed.

- Components of a recipe.
  - Title (name of the recipe)
  - Yield - how many servings the recipe will make.
  - List of ingredients and amounts, listed in order they appear in the recipe.
  - Step by step directions in order to be completed.
  - Equipment - container size and type.
  - Temperature and time
- Identify the importance/benefits of standardized recipes to a foodservice operation.
  - Customer Satisfaction
  - Consistent nutrient content
  - Food cost control

Standard 4

Correctly convert recipe yields.

- Formula for recipe conversion
  - Divide the new yield by the old yield to get the conversion factor:
    - New Yield ÷ Old Yield = Conversion factor
  - Multiply every recipe ingredient by the conversion factor to get the new quantity needed for the new yield:
    - Old ingredient quantity x Conversion factor = New quantity

Standard 5

Calculate the difference between AP/EP to determine amounts needed for recipe production.

- Define as purchased (AP), edible portion (EP), and percent yield
  - As Purchased (AP) is the product before any trimming, cutting, or cooking.
  - Edible Portion (EP) is the product after it has to be trimmed or cut.
  - Percent Yield is the percentage of the remaining food after cutting, trimming, or cooking.
    - Edible Portion (EP) ÷ As Purchased (AP) = Percentage Yield
    - Edible Portion (EP) ÷ Percentage Yield = As Purchased (AP)
    - As Purchased (AP) × Percentage Yield = Edible Portion (EP)

STRAND 6

Students will demonstrate the production of various stocks, soups and sauces. (Suggested 7 days)

Standard 1

Identify various types of stocks (i.e., white, brown, fish, vegetable).

- Mirepoix is a mix of coarsely chopped vegetables (onion, carrots, celery)
- To develop flavor, each needs to simmer for a minimum amount of time (do not boil).
  - White/poultry: 2-4 hours.
  - Brown/beef or veal: roast the bones for best color and flavor; 6-8 hours.
  - Fish: 20-45 minutes.
  - Vegetable: 30-60 minutes.

Standard 2

Compare soup types, including their ingredients and preparation methods.

- Clear/stock (broth, consommé, clear vegetable and noodle soups such as chicken noodle)
- Thick (creamed, pureed, bisque, chowder)
- Unusual/Regional (gazpacho, gumbo, borscht, and many more)

Standard 3

List potential thickeners for soups.

- Roux: Equal parts fat and flour heated into a paste.
- Slurry: Cornstarch and liquid
- Starchy foods: ex. Potatoes and pasta
- Beurre manie: Equal parts flour and butter kneaded to make a paste.

Standard 4

- Béchamel
  - Used in some cream soups; also in moussaka, lasagna, soufflé, croquettes, on a Croque Monsieur and with vegetable and pastas
  - Mornay/cheese sauce, crème sauce, and soubise
- Veloute
  - With fish or chicken, depending on the stock used; creamed soups
  - Allemande, supreme, poulette
- Espagnole
  - Serve with roasted beef or veal dishes
  - Bourguignonne, demi-glace, chasseur, and bordelaise
- Tomato
  - Serve with pasta, fish, vegetables, poultry, ground meats and sausages.
  - Marinara, creole sauce
- Hollandaise
  - Use with eggs, vegetables, light poultry, fish and beef dishes
  - Béarnaise, Dijon, Chantilly

STRAND 7

Students will explore salads, appetizers, and sandwiches. (Suggested 5 days)

Standard 1

Students will define and explore Garde mange

- Garde mange is cold dishes including salad, appetizers, hors d' oeuvres and canapes.

Standard 2

Students will recognize terminology and preparation methods of salads and dressings.

- Basic types/uses of salads:

- Appetizer: Small portion served prior to main dish.
- Accompaniment: Served with and compliments the main dish
- Main dish: This should have a variety of nutrients.
- Separate-course/intermezzo: A light salad served after the main course to refresh the palate.

- Salad greens
  - Choose your green based on season, salad structure, and flavor.
  - Select greens that are fresh and undamaged.
  - Ensure that greens have been thoroughly washed and dried.
  - Remove woody stems and cores.
- Salad dressings
  - Types:
    - Vinaigrette is made with oil and vinegar,
      - In a classically made vinaigrette the ratio will be 3 parts oil to 1 part vinegar.
      - An emulsified vinaigrette keeps the ingredients from separating.
        - Egg yolk and/or mustard are common emulsifiers.
    - A thick dressing is made by using mayonnaise and/or dairy products.
  - Match type of dressing with salad ingredients.
  - Dress greens just before serving.
  - Starchy salads, such as pasta, potato and rice, should be dressed and refrigerated to allow the flavors to blend and develop.

Standard 3

Identify and compose appetizers and hors d' oeuvres.

- Appetizers are served as the first course of a meal used to stimulate the appetite.
- Hors d'oeuvres are small bites served prior to a meal or at a separate event. Typically a finger food.
- Examples:
  - Brochettes: (Kabob) Food presented on a skewer
  - Filled Pastry Shells: Puff pastry or pastry shell with filling
  - Meatballs: Made from a variety of meat with a variety of sauces
  - Crudités: Raw vegetable tray
  - Canapes: Bread, toast or cracker topped with a savory spread and/or topping.
  - Bruschetta: Toasted bread topped with herbs, olive oil, and tomatoes.

Standard 4

Recognize the components and different types of sandwiches.

- Three components of a sandwich
  - Base: bread product or container for the sandwich. Traditional examples: loaf bread, rolls, and flat breads.
  - Spread: The three main purposes are to prevent bread from soaking up the filling, add moisture, and/or add flavor. Examples: Butter, mayonnaise, vegetable puree, mustards.
  - Filling: main component of the sandwich. Examples: meats, fish and shellfish, poultry, cheeses, eggs, vegetables, and fruits
- Types of sandwiches.
  - Closed: Filling is enclosed in the bread product, such as traditional sandwich, calzone, multi-decker, and wrap

    - Open: Filling is placed on top of the bread product
- Sandwich preparation
    - Hot Sandwiches:
        - Hot Opened Faced Sandwich: Hot filling covered with a hot topping such as gravy or cheese.
        - Grilled Sandwich: Cooked on a griddle.
        - Panini: Cooked in a press
        - Fried Sandwich: ie. Monte Cristo
        - Pizza: Crust with a variety of toppings.
    - Cold Sandwiches:
        - Sub: ie. hero, hoagie, grinder, poor boy
        - Wrap: Can be made with a variety of flat breads or leafy greens, filled and rolled.
        - Canape

STRAND 8

Students will explore the career opportunities and employability skills needed in the foodservice and hospitality industry. (Suggested 6 days)

Standard 1

Differentiate between front (service) and back (production) of the house.

Standard 2

Identify service jobs and duties

- Host/hostess: greets and seats customers and takes reservations
- Server: meets customer needs
- Bus person: clears and resets table covers and assists the server
- Cashier: responsible for processing payment
- Dining room manager or maître d'hôtel: oversees all service of food and resolves problems
- Sales representative

Standard 3

- Executive chef
- Sous chef
- Station/line cooks
    - pastry, garde mange,
- Dishwasher

Standard 4

Identify management duties.

- Communication
- Time Management
- Resource management
    - Employee selection
    - Employee training
        - Orientation – learning about policies and procedures
        - Cross training – learning others jobs so you can cover for them

        - On the job training – learning while you work
        - Equity, inclusion, and diversity training—understand diversity, stereotypes and prejudice.
    - Employee supervision and evaluation
        - Goal Setting
- Collaboration
- Motivation
- Critical Thinking/Problem Solving

Standard 5

Investigate employability skills.

- Positive Attitude
- Personal Appearance
- Communication skills (verbal and non-verbal)
- Ethical Behavior
- Collaboration
- Critical Thinking

Standard 6

Investigate the various steps necessary to gaining employment.

- Identify various ways to find employment
- Explore various tools used to apply for and obtain a job
    - Job Applications
    - Job Portfolio
    - Resume
    - Letter of request or cover letter
    - Job Interview
        - Thank you - follow-up

STRAND 9

Students will investigate the concepts of customer service and dining room management. (Suggested 3 days)

Standard 1

Discuss the importance of customer service

- Customer service is critical to an establishment's success.
    - Increases customer satisfaction, loyalty and employee moral
- Understand guest needs
    - age, families with children, first timers, special occasions, dietary needs, language barriers, dining alone

Standard 2

Explain the order of food and beverage service.

- Greet Customers

- Take the beverage order
- Sell the menu and take food order
- Serve the order
- Processing Payment

Standard 3

Categorize the main types of dining environments and service styles.

- Environment
  - Quick Service
    - Fast food. Limited menu, low prices and fast service
  - Fast Casual
    - An upscale quick service.
  - Casual Dining
    - Includes family style, neighborhood establishments, buffets and themed restaurants.
  - Fine dining
    - Expensive, great locations, fine food
- Service Styles
  - American Service: Plated in the kitchen
  - French Service: Tableside preparation, food is prepared in the kitchen and finished tableside. Requires skilled servers.
  - Russian Service: Food is prepared in kitchen and placed on platters. Servers serve food off the tray to the guest's plate.
  - English Service: is referred to as family style. Food is prepared in the kitchen and served in bowls or platters. Guest serve themselves from the bowls or platters.
  - Cafeteria/Counter Service: food selected and served at counter.
  - Buffet Service: food is displayed at a table where guests serve themselves.

Standard 4

Compare and contrast the various pieces of dining equipment and use.

- Dining and Service Equipment
  - Dining Equipment
    - Flatware
    - Glassware
    - Dinnerware
  - Service equipment—serving spoon, tongs, tureen, pitcher, platter
- Table setting
  - Center of table: center piece, salt and pepper, condiment holders
  - Napkin in the center of the place setting or to the left
  - Forks on the left, knives and spoons on the right
  - All knife blades turn in to plate
  - Flatware 1" from edge of table
  - Dessert forks and spoons at the top of the place setting
  - Bread plate on the left, butter knife on top of the bread plate, blade facing down toward the plate
  - Glassware above the knife

- Coffee cups to the right of the knives and spoons

STRAND 10

Students will explore and participate in bakery food production. (Suggested 10 days)

Standard 1

- Identify the functions and types of each ingredient used in bakery products.
- Flour
  - Flour provides structure.
  - Types
    - Bread, all purpose, pastry, whole wheat
    - Non-wheat (usually made to be gluten free). These come from other starchy plants, such as corn, barley, oats, potatoes, beans, and rice.
  - Sugar
    - Sugar provides flavor, color, food for yeast, tenderizer, and a stabilizer for egg whites.
    - Types
    - Syrups: honey, molasses, corn, maple
    - Sugars: brown, turbinado/raw, course/sanding, granulated, super fine/bakers/caster, confectioners/powdered
    - Fruit puree and juice
- Fats
  - Fats provide tenderness, flavor, moisture, browning, and flakiness.
    - Types
      - Shortening—made from vegetable oil that is hydrogenated.
      - Oil
      - Butter—it can be purchased salted or unsalted.
      - Margarine—made from hydrogenated vegetable oil with color, flavor and water added.
  - Leavening
    - Leavening agents are what make baked goods rise and have a light tender texture and good volume.
    - Types:
      - Yeast
      - Chemical
        - Baking soda/sodium bicarbonate: needs an acid to make a chemical reaction that produces carbon dioxide.
        - Baking powder: made of baking soda, a dry acid such as cream of tartar, and a mois-ture absorber such as corn starch. When mixed with a liquid the ingredients combine to produce carbon dioxide.
  - Physical
    - Eggs—air is introduced by creaming or whisking and is trapped in the protein then it ex-pands when it gets hot.
    - Steam—during baking water evaporates and expands.
  - Salt:
    - Adds flavor to food and brings out the flavor of the other ingredients.
  - Eggs

- Functions
  - Structure—contributes to the structure.
  - Emulsification—blends ingredients.
  - Leavening
  - Flavor—when used in large amounts, such as in pate' choux and challah bread.
  - Color
- Packaging types
  - Shell eggs—sold in flats that hold 30 eggs. If stored properly at 41°F or below, they will last up to four weeks beyond the packing date.
  - Egg products—eggs that have been removed from the shell and pasteurized.
- Liquids
  - Functions
    - form the gluten structure
    - activate leavening agents
    - some give flavor, tenderize, add moisture, and help with browning
  - Types
    - Water
    - Milk and cream
    - Eggs
    - Syrups
    - Fruits and juices
    - Butter, oil, and margarine
- Flavorings
  - Effects taste and color of the final baked product.
  - Types
    - Extracts—liquid flavorings
    - Spices—bark, roots, flower buds, berries or seeds of aromatic plants.
    - Nuts
  - Chocolate
    - Comes from cacao beans harvested from the pod, roasted, chopped into nibs, crushed into a paste called chocolate liquor, and possibly sweetened and flavored (called bittersweet chocolate), or pressed to separate into liquid called cocoa butter and solids that are ground into cocoa powder.
      - Types
        - Unsweetened—a mixture of chocolate liquor and cocoa butter
        - Semisweet—a mixture of chocolate liquor, cocoa butter and sugar
        - Milk chocolate—chocolate liquor, cocoa butter, sugar and powdered, sweetened condensed or liquid milk.
        - White—sweetened cocoa butter
        - Cocoa powder—ground solids
        - Dutch-processed cocoa powder—treated with alkali to reduce acidity

Standard 2

Identify the types and mixing methods of various bakery products, including cookies and quick breads.

- Cookies
  - Types:
    - Crisp—very little moisture and a high ration of sugar. Spread more than other cookies.
    - Soft—low amount of fat and sugar, high ratio of liquid such as eggs, corn syrup, molasses or honey is often used.
    - Chewy—high ration of eggs, sugar and liquid, but a low amount of fat. Use pastry flour for an ideal chewy cookie, and develop the gluten during mixing.
  - Most cookies are made using the creaming method of mixing.
  - Shaping/baking methods
    - Drop—chocolate chip and oatmeal
    - Rolled—sugar and gingerbread
    - Molded and pressed—spritz, almond crescents and lace
    - Icebox/refrigerator—dough is made ahead of time and stored in the refrigerator, then sliced and baked as needed
    - Sheet or pan—brownies and lemon bars
    - Bar cookies—biscotti and fruit bars (like fig newtons)
  - Discuss the proper storage of cookies.
    - Cool completely before storing
    - Keep in an airtight package
    - Can be frozen for up to three months
- Quick breads
  - Identify the types of quick breads:
    - Pour batter (1 part flour to 1 part liquid)—crepes and pancakes
    - Drop batter (2 parts flour to 1 part liquid)—muffins
    - Soft dough—(3 parts flour to 1 part liquid)—biscuits and scones.
    - Stiff dough
  - Identify the proper mixing methods of quick breads.
    - Biscuit method—cut the fat into the dry ingredients, then add the liquids.
    - Blending/muffin method—combines liquids, including fat and eggs, in one container and dry ingredient in a separate container and then combine the two mixtures.
    - Creaming method—cream solid fat and sugar until light and fluffy, add eggs one at a time, then add dry and liquid ingredients.
  - Discuss the proper storage of quick breads.
    - Most are best when served fresh. When storing, put in airtight packaging. Use within a few days or freeze for up to three months.

Performance Skills

PERFORMANCE OBJECTIVE 1
Demonstrate competency with all the knife cuts listed in Strand 1 Standard 4.
PERFORMANCE OBJECTIVE 2
Students will complete a sanitation and food safety training equivalent to or higher than that of a food handler's permit or certificate.
PERFORMANCE OBJECTIVE 3 Students will explore flavor profiles using herbs and spices and produce a food item using those herbs and spices and an appropriate cooking method.
PERFORMANCE OBJECTIVE 4 Students will create a short presentation explaining one culinary math concept in Strand 5. (CTSO competitive event co-curricular opportunity)

PERFORMANCE OBJECTIVE 5 Students will make a mother sauces or a derivative to be incorporated with a complementary food item.
Performance Objective 6 Students will prepare and plate a salad, appetizer, or sandwich.
PERFORMANCE OBJECTIVE 7 Students will research a specific hospitality or food service career creating a presentation of their findings. A resume/cover letter specific to that career must be included. Teachers might use STAR Event Career Investigation as a resource.
PERFORMANCE OBJECTIVE 8 Plan, calculate cost, prepare and present a cookie or quick bread item for a minimum of 30 people.

FCCLA Integration into Culinary 2:
STAR Events: Career Investigation, Entrepreneurship, Environmental Ambassador, Illustrated Talk, Interpersonal Communications, Job Interview, Leadership, Life Event Planning, Nutrition & Wellness, Advocacy, Chapter Service Project Display, Chapter Service Project Portfolio, National Programs in Action, Applied Math for Culinary Management, Culinary Arts, Food Innovations, Hospitality, Tourism and Recreation, Sports Nutrition.
Skill Demonstration Events: Culinary Chicken, Culinary Food Art, Culinary Knife Skills, Consumer Math, Culinary Math, Hospitality, Tourism and Recreation, Nutrition, Science in FACS.
National Programs: Career Connection, Leadership Service in Action, Power of One, Student Body

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS
CULINARY 3

Course Descrip

Students will receive additional training for career opportunities in Culinary Arts and the Hospitality Industry. Students will have the opportunity to learn and practice safety and sanitation procedures, and maintain food service equipment. Students will perform quantity food preparation as it relates to catering, bakery, restaurant, hospitality, and quick service business operations. Greater emphasis will be placed on employment skills, management operations, and business and marketing practices.

Intended Grade Level	11-12
Units of Credit	1.0
Core Code	34.01.00.00.172
Concurrent Enrollment Core Code	
Prerequisite	Foods and Nutrition; Culinary 1
Skill Certification Test Number	347
Test Weight	1.0
License Type	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family Consumer Sciences
Endorsement 2	Foods Services/Culinary Arts
Endorsement 3	NA

STRAND 1

Differentiate knives and food service equipment function, proper use and care. (Suggested 6 days)

Standard 1

Identify types of knives, understand their proper use and care, and demonstrate proper knife safety.

- Types of knives, including chef, boning, paring, serrated
- Correct holding technique, sharpening, wash and storage

Standard 2

Identify common small ware food preparation equipment, and how it is to be safely used and cleaned. (i.e. knives, mandolin, piping tools, parisian scoop, scales)

Standard 3

Identify common food preparation and service equipment and how it is to be safely used and cleaned (e.g., convection oven, conventional oven, commercial dishwasher/sanitizer, ice machine, stand mixer, deep fat fryer, proofer, steam table, hotel pans, sheet pans, chafing dishes).

Standard 4

Identify and demonstrate different knife cuts, including:

- Batonnet—1/4 x 1/4 x 2-3 inch
- Julienne—1/8 x 1/8 x 1-2 inch, fine julienne- 1/16 x 1/16 x 1-2 inch
- Brunoise—1/8 x 1/8 x 1/8 inch
- Dice, small—1/4 x 1/4 x 1/4 inch; medium—1/2 x 1/2 x 1/2 inch; large—3/4 x 3/4 x 3/4 inch
- Chiffonade—stack leaves, roll and slice into thin shreds
- Diagonal—cut on a 45 degree angle
- Rondelle—also called coin cut
- Mince - to cut or chop into very small pieces.
- Chop - to cut into uniform size when shape is not important.

Standard 5

Identify the process of mise en place.

- Mise en place (to put in place): organizing equipment and preparing ingredients (measuring, doing knife cuts) before you begin cooking.

STRAND 2

Connect workplace safety, food safety, and sanitation as applied to food production. (Suggested 5 days)

Standard 1

Apply established safety rules and guidelines in a work environment.

- Identify prevention, protocol and treatment for cuts.

- Prevention
  - Use sharp knives, dull knives are more dangerous
  - Hold knife correctly, using the claw hand position on guide hand.
  - Use a stabilized cutting board.
  - Hold onto the knife handle while cleaning, do not soak.
- Protocol
  - Clean and sanitize the affected area and equipment as soon as possible.
- Treatment
  - Minor cuts clean wound, apply bandage and wear glove.
  - Sever cuts apply pressure and seek medical attention.

- Identify prevention, protocol and treatment for fires, chemical and heat related incidents.
  - Prevention
    - Avoid flammable materials or clothing on or near the range.
    - Turn handles away from the front of the range.
    - Lift lids on hot foods away from you.
    - Use hot pads or oven mitts for handling hot baking pans.
    - Keep equipment clean.
    - Keep chemicals away from food.
  - Protocol
    - To extinguish a fire use the correct fire extinguisher. (A, B, C, or K)
    - To extinguish a grease fire, cover/smother the pan, pour baking soda/salt. Avoid water, flour or sugar on grease fires.
    - Follow manufactures directions for all chemical use and storage, do not mix chemicals.
    - Chemical incident see Safety Data Sheet (SDS) for medical treatment and fire suppression.
  - Treatment
    - First Degree Burn and Second Degree Burn: immerse burn in cool water or use cool compress for 10-15 minutes.
    - Third Degree Burn: seek medical treatment
    - For Chemical Burn: seek medical treatment or call poison control.
- Identify prevention, protocol and treatment for break, strains and sprains.
  - Prevention
    - Keep floors clean and dry.
    - Post caution signs for wet floors.
    - Store heavy items on lower shelves.
    - Use ladders or step stools appropriately.
    - Lift heavy items appropriately.
    - Wear non-slip shoes.
  - Treatment
    - Seek medical attention.

Standard 2

Identify health and hygiene requirements for food handling.

- Identify proper hand washing.
  - Wash hands with soap and warm water for a minimum of twenty seconds, and dry with single use paper towel.

- Water should be a minimum of 100 degrees.
- Wash hands before and after handling raw meat, poultry or eggs.
- Wash hands after using restroom, sneezing, coughing, changing diapers, etc.

- Identify appropriate clothing and hair restraints.
  - Appropriate clothing is clean and may include chef coat, apron, or other uniform.
  - Cover and tie back hair with appropriate hair restraints before working with food.
- When tasting foods, always use a clean spoon and use only once.
- Discuss appropriate use of gloves.
  - Single use gloves only.
  - Wash hands before putting on gloves.
  - Change gloves when they get dirty, torn, or changing task.
  - Wear gloves when handling ready-to-eat (RTE) foods.
  - Wear gloves and bandage for an open cut or wound.
- Any activity involving eating, drinking, smoking/vaping, or chewing gum needs to occur in a designated area away from food preparation areas.

Standard 3

Identify the steps in the flow of food, including purchasing, receiving, storage, preparation, cooking, holding (hot/cold), cooling, reheating, and serving.

- Explain the purpose of the Hazard Analysis Critical Control Point (HACCP) system (i.e., to ensure keeping food safe through a system of identifying and monitoring critical control points).
- Discuss methods of purchasing, receiving, and storage.
  - Purchase from an approved reputable vendor.
  - FIFO (first-in first-out) rule (i.e., the food that has been in the holding area the longest will be used first).
  - Store food and cleaning supplies separately.
- Refrigerator and freezer temperatures (refrigerator: 41°F or lower; freezer: 0°F or lower).

Standard 4

Identify the factors contributing to food-borne contamination, illness, and prevention strategies.

- Discuss general concepts of food-borne illness.
  - Food-borne illness results from eating foods contaminated with pathogens.
  - General conditions for bacterial growth include food, acidity, time, temperature, oxygen, moisture (FAT TOM).
  - Contaminated food does not always have an off odor or flavor, so it may look and smell normal.
- Three types of food contamination hazards.
  - Physical - hair, glass, metal shards, fingernails.
  - Chemical - cleaning supplies and pesticides.
  - Biological - harmful micro-organisms (pathogens)
- Identify the four types of pathogen contaminants
  - Bacteria - tiny single cell micro-organism including Salmonella and E-coli.
  - Viruses - simple organism responsible for majority of foodborne illness - Norovirus and Hepatitis A.
  - Parasites - organism that must live in or on a host to survive ie. Giardia
  - Fungi - spore producing organism including yeast and mold. Typically, visible on spoiled food.

- Food-borne illness symptoms that exclude a worker from handling food may include the following:
  - Sore throat with fever
  - Jaundice
    - Diarrhea
  - Vomiting
  - Open and infected sores
  - Food handlers need to be symptom-free for 24 hours before handling food.
- Discuss prevention strategies.
  - Controlling Time and Temperature
    - In cold storage, place ready-to-eat (RTE) foods on top and uncooked animal products toward the bottom according to cooking temperature.
    - All TCS (Time and Temperature Control for Safety) foods need to be covered and stored in the refrigerator with a label including a use-by date, store at 41°F or lower, if produced on site for no more than 7 days.
    - Food should not be in the Danger Zone (the temperature range of 41-135°F), for longer than 4 hours total from start of preparation.
    - Cooking to safe internal temperatures; be sure to use a clean and sanitized thermometer.
      - Seafood, pork, beef, veal, lamb—145°F (for a minimum of 15 seconds)
      - Ground meats (pork, beef, veal, lamb) and eggs—155°F (for a minimum of 15 seconds)
      - All Poultry (whole or ground)—165°F (for a minimum of 15 seconds)
      - Reheat temp—165°F (for a minimum of 15 seconds)
- Cooling and reheating foods to the correct temperature for the correct amount of time using proper equipment.
  - Keep hot foods hot and cold foods cold.
  - Hold hot 135°F and above.
  - Cold 41°F or lower.
- Food needs to be cooled below 70°F within two hours and below 41°F within four more hours.
  - Methods include ice water baths, ice paddles, blast chiller, and dividing large amounts of food in small, shallow, covered containers for quick cooling.
  - Store foods in the refrigerator and freezer so that the cool air can circulate to keep food safe. Don't cover shelves or overcrowd.
    - Bring sauces, soups etc. to a boil when reheating; heat other TCS leftovers to 165°F (for a minimum of 15 seconds).
  - Safely thaw foods, including in the refrigerator, under cold running water, in the microwave, or as part of the cooking process.
    - Never defrost at room temperature.
    - Cold running water should not exceed 70°F.
    - The product should not exceed 41°F internal temperature.
    - If thawing food in the microwave, cook immediately.
- Preventing cross contamination and cross contact.
  - Cross-contact happens when one food containing allergens comes in contact with a surface or food, thereby posing a hazard for persons having that allergy.
    - The big 8 allergens include: tree nuts, eggs, milk, soy, wheat, peanuts, fish, and shell fish
  - Cross-contamination is the unintentional transfer of pathogens from people, surfaces or food to another food.
    - Food Storage: food is 6 inches off the ground, label stored food correctly, store ready-to-eat (RTE) food separately or above raw food.

- Equipment Storage: Store service-ware and food containers upside down on a clean, sanitized surface, and store utensils with handles up.
- Food Preparation: clean and sanitize work area and equipment, wash hands between task, never place cooked food on a plate which has previously held raw meat, poultry or seafood.
    - When serving foods: no bare hand contact with RTE food.
- Identify proper sanitation techniques used with tools, equipment, and surfaces.
    - Discuss three-compartment sink dishwashing and the order used when washing and sanitizing dishes (i.e., rinse and scrape, wash, rinse, sanitize and air dry).
    - Frequently clean and sanitize work surfaces (i.e., counters).
    - Clean and sanitize cutting boards, dishes, tools, etc., after preparing each food item, or every four hours of continuous use.
    - Never place cooked food on a plate which has previously held raw meat, poultry or seafood without first cleaning and sanitizing the plate.

STRAND 3

Students will apply math concepts as they apply to controlling food costs, portion control, AP/EP, and menu costing. (Suggested 7 days)

Standard 1

Identify factors in controlling food costs.

- Monitor product through the flow of food to prevent loss.
- Employee training regarding food theft and waste.
- Forecasting sales.

Standard 2

Determine how portion control effects food costs.

- Portion cost
    - Total cost ÷ by the number of portions = cost per portion.
    - Serving tools used to control portion size.

Standard 3

Identify concepts of purchasing food to control expenses.

- Purchasing prepared and processed food items increases product costs.
- Purchasing raw increases labor costs.
    - As Purchased (AP) is the product before any trimming, cutting, or cooking.
    - Edible Portion (EP) is the product after it has to be trimmed or cut.
    - Percent Yield is percentage of the remaining food after cutting, trimming, or cooking.
        - Edible Portion (EP) ÷ As Purchased (AP) = Percentage Yield
        - Edible Portion (EP) ÷ Percentage Yield = As Purchased (AP)
        - As Purchased (AP) × Percentage Yield = Edible Portion (EP)

Standard 4

Calculate menu pricing.

- Food Cost Percentage: the percentage of sales an operation spends on food products.
  - The two main functions of menu pricing are:
    - Inform customers of cost.
    - Determine profitability of menu item.
  - If your food cost percentage is 30% of the menu price, the additional 70% covers profit and expenses such as labor, rent, utilities, equipment, and insurance.
  - Industry standard food cost percentage ranges 28-35%.
    - Cost Per Portion ÷ Food Cost Percentage = Menu Price
    - Cost Per Portion ÷ Menu Price = Food Cost Percentage
  - Menu item classification
    - A method to determine popularity and profitability of each menu item.
      - Star—high profit, high popularity
      - Plow Horse—low profit, high popularity
      - Dog—low profit, low popularity
      - Puzzle—high profit, low popularity

STRAND 4

Students will demonstrate menu planning principles. (Suggested 4 days)

Standard 1

Evaluate nutrition principles and specialized dietary plans.

- Food guidance programs as per the USDA.
  - Nutritional considerations: Carbohydrates, Protein, Fats, Vitamins, Minerals, Water
- Special Dietary Needs
  - Food allergies produce histamine when a particular food is eaten.
    - Common food allergens: eggs, milk, nuts, soy, wheat, and seafood
  - Intolerances is the body's inability to process or breakdown.
    - Common food intolerances: celiac, lactose
  - Modification may be needed for low sodium, low fat, vegan, etc.

Standard 2

Compare menu types.

- Types of menus
  - Static, fixed: Still or unchanging
  - Cycle: Non-commercial segment
  - Market: Food available in the market
  - Examples of menus from all categories
    - Table d' hote/Prix Fixe—Complete meal at one price
      - banquet, buffet
    - A la Carte—All items priced and ordered separately
    - California—All items offered all day
  - Menu design and construction:
    - Basic menu layout and organization
    - Food descriptions and photos

- Themes, colors and fonts
- Pricing psychology - odd cent, pricing by the ounce, and others

STRAND 5

Students will explore marketing and identify the applications of marketing strategies. (Suggested 2 days)

Standard 1

Define marketing.

- Marketing: the process of attracting and influencing potential customers.
  - Factors to consider when determining marketing strategies include location, population, and demographics
  - Marketing strategies:
    - Public relations—sponsorships, charity events
    - Sales Promotions –cost incentives like a 2 for 1, rewards or loyalty programs, samples
    - Advertising-- websites, television, radio; usually cost is involved
    - Direct Marketing—email, digital media, mailers
    - Personal Selling—training employees on how to sell the menu, influencers

STRAND 6

Students will integrate knowledge and skills as applied to preparation of eggs, milk and milk products. (Suggested 6 days)

Standard 1

Discuss the selection and preparation of eggs.

- Grade or quality, this decreases with age.
  - Grades: AA, A, B
- Size (is determined by weight per dozen)
  - Largest to smallest; Jumbo, Extra Large, Large, Medium, Small and Peewee.
  - Standard recipes use large eggs (approx. 2 oz. per egg).
- Purchase form
  - fresh- sold in shell, or pooled (in a container or bag)
  - frozen- high quality fresh, whole eggs that are pasteurized and frozen.
  - dried- used mostly for baked goods and commercial use
- Color- Shell color is determined by the breed of chicken that lays it. It is not an indicator of taste or nutrition.
  - Eggs can be prepared many ways.
    - Fried/sautéed- over medium heat
      - Sunny-side up: yolk is unbroken, egg is not flipped during cooking, the white is firm, yolk is runny
      - Basted: a type of sunny side up in which the white is cooked by spooning hot butter over the egg while frying, or adding a little water to the pan/grill and covering the egg to steam it.

- Over-easy, over-medium, over-hard: egg is turned over while cooking, named by yolk consistency.
- Scrambled: made with whole or egg whites, cooked over low/medium heat while gently stirring.

- Omelets—whisked eggs prior to cooking and can be filled with vegetables, cheese and/or meats
  - Frittata: open faced omelets of Spanish origin, the hearty fillings are mixed directly into the eggs, cooked on the stove and transferred to oven or broiler to finish cooking through, cut into wedges for serving.
- Poached: best to use very fresh eggs that will hold their shape, eggs are removed from the shell and cooked in gently simmering water, white should be firm and yolks runny
- Simmered in shell, to the desired doneness, cool quickly to avoid discoloration.
  - Soft: simmered 4-6 minutes
  - Hard: simmered for 12-15 minutes
- Baked
  - Shirred: prepared in individual ramekins. The whites should be set while the yolks are soft and creamy.
  - Quiche: an egg custard and fillings baked in a crust

Standard 2

Define and discuss milk and milk products.

- Processing prior to purchase
  - Pasteurization: the process of heating milk to destroy pathogens.
  - Homogenization: the process in which the fat particles in milk are reduced in size and dispersed throughout the liquid
- Milk is labeled and sold by fat content; skim, 1%, 2% and whole (4%)
- Cream is also labeled and sold by fat content
  - Half and half= 10-18% fat
  - Light cream= 18-30% fat
  - Regular whipping cream= 30-36% fat
  - Heavy cream: has at least 36% fat
- Cultured dairy is made by adding specific bacterial cultures to fluid dairy products. The bacteria convert the milk sugar to lactic acid. The acid slows growth of undesirable microorganisms. The lactic acid gives these product tang, body and unique flavors.
  - buttermilk, sour cream, creme fraiche, and yogurt
- Butter is produced by agitating cream. Regular composition is 80% fat, 16% water, 2-4% solids (protein, lactose etc.)
  - Sweet: no salt added
  - Salted: 1.7% the addition of salt increases the amount of time it can be stored and enhances flavor
  - Clarified: water and solids removed, to increase the smoking point
- Cheese
  - Fresh/unripened: cream cheese, marscarpone, mozzarella, queso oaxaca, ricotta
  - Soft: brie boursin, camembert, taleggio
  - Semi-soft: cabrales, fontina, gorgonzola, gouda, havarti, jack, provolone
  - Firm: cheddar, emmenthaler, gruyere, jarlsberg, manchego

- Hard: asiago, parmesan, romano
- Processed cheese: American, cheese spread, canned cheese

STRAND 7

Students will identify characteristics of produce including fruits, vegetables and garnishes while applying preparation principles. (Suggested 4 days)

Standard 1

Identify characteristics of produce (fruits and vegetables), appropriate selection of, storage and preparation methods.

- Selecting quality produce.
  - Produce can be purchased fresh, canned, frozen, dried, preserved
  - Fresh produce in season will be generally of a higher quality and lower cost.
- Proper storage of produce.
  - The temperature for storing produce varies.
    - To finish ripening produce, store at room temperature.
    - Produce that are already ripe should be chilled to slow ripening.
  - Starchy vegetables such as potatoes, winter squash and vegetables in the onion family, are best stored at 60-70°F. in a dry location.
  - In food service plan to keep fresh produce in inventory no longer than a week.
- Enzymatic browning is the process of food turning brown from exposure to oxygen and/or cell damage.
  - Foods prone to enzymatic browning include apples, potatoes, bananas, avocadoes, peaches, and pears.
  - A variety of methods can be used to prevent it.
    - Submerged in water.
    - Lemon juice and other acids that lower the pH.
    - Blanching or other forms of cooking denature the enzymes.
    - Lower temperatures can slow the speed of reactions.
  - Discuss various cooking techniques and their effect on nutrient preservation/loss.
    - Dry heat tends to preserve nutrients and flavors
      - Dry heat cooking methods include: grilling/broiling, roasting/baking, deep frying, sautéing/stir frying
    - Moist heat can result in significant nutrient loss.
      - To help prevent nutrient loss, cook for a minimum amount of time and use as little water as possible.
      - Moist heat cooking methods include: blanching/par boiling, steaming, simmering, braising, boiling

STRAND 8

Students will identify the characteristics of grains, pasta, potatoes and legumes and appropriate cooking methods. (suggested 6 days)

Standard 1

Identify the characteristics of and cooking methods for grains.

- Characteristics
  - Long grain rice—stays light and fluffy after cooking, commonly used in pilaf.
  - Medium grain rice—moist, tender, slightly chewy grains, commonly used in risotto and paella.
  - Short grain rice—sticky, commonly used in sushi.
  - Brown rice—the whole grain form of any length of rice.
  - Instant rice—precooked and dehydrated, cooks rapidly.
  - Converted rice—partially cooked with steam and fortified when dried.
  - Quinoa—high in protein and has all of the essential amino acids.
  - Barley, farro and spelt—types of wheat, commonly used in soups and salads.
  - Oats—can be rolled, cut, or used whole, commonly used as a cereal.
  - Corn—considered a grain when dried, it can be ground fine, medium or coarse.
- Storage
  - Store dry grains in a cool dry place.
  - After cooking, grains are a TCS food.
- Cooking techniques
  - Cooking methods
    - Boil: boiled in unmeasured amount of water, when cooked excess water is drained.
    - Steam: added to a measured amount of liquid, covered and cooked. This can take place in the oven, microwave or stove top.
    - Braise: sautéed, then a measured amount of liquid is added. Also known as pilaf.
    - Risotto: cooked while stirring in warm liquid a little at a time.

Standard 2

Identify the ingredients, types and cooking methods for pasta.

- Ingredients
  - Flour—most common is semolina wheat.
  - Liquid—water, eggs and oil
  - Other ingredients are often added to change texture, color, and flavor.
- Types and uses
  - The name of the pasta is determined by the shape.
  - The shape of the pasta determines what sauce to use.
- Cooking pasta
  - Pasta is usually added to boiling water and cooked until al dente.

Standard 3

Identify the characteristics of and cooking methods for potatoes.

- Characteristics
- Russet, yellow, red, white, blue/purple, fingerling, petite, and sweet potato
  - Cooking techniques—potatoes are very versatile they may be cooked using almost any dry or moist heat method.
- Cooking methods—potatoes are very versatile they may be cooked using almost any dry or moist heat method.
  - Different types of potatoes produce a better outcome for certain dishes.
- Receiving, storage and handling

- Store potatoes in a cool, dry, dark, well ventilated place – not the refrigerator.
- Before use, scrub and rinse well.
- After cutting potatoes, if you are not cooking them right away, cover with water to prevent browning.

Standard 4

Identify the types and storage of legumes.

- Types of legumes—Beans, Lentils, Peanuts, Peas, Soybeans
- Storage
  - Store dry legumes in a cool dry place.
  - After cooking, legumes are a TCS food.

STRAND 9

Students will identify sustainable practices in food service. (suggested 2 days)

Standard 1

Describe sustainable food practices.

- local sourcing—seasonal menus, personal production, shopping locally
- food production—organic, protecting marine resources, ecology, extending shelf life

Standard 2

Investigate methods of resource management.

- Water Conservation—energy star appliances, maintain and repair immediately, low flow toilets and faucet aerators
- Energy Conservation—lighting, programmable thermostats, energy star rated appliances
- Supplies and Building Materials
  - Supplies—paper products, reusable vs. disposable
  - Building—LEED certified (leadership in energy and environmental design)

Standard 3

Analyze waste management applications.

- Reduce—Monitoring purchasing, menu adjustments, portion size, packaging
- Reuse—repurposing food, food donations
- Recycle—environmental food packaging, biofuels, composting

STRAND 10

Students will recognize various types of poultry, meat and seafood and apply appropriate cooking techniques. (suggested 8 days)

Standard 1

Explain types, purchasing, preparation, and storage of poultry.

- Types—poultry include turkey, chicken, duck, goose, pheasant, quail, and other birds
- Purchasing—mandatory inspection and voluntary grading
- Storage—41 degrees or lower on the lowest shelf in the refrigerator
- Preparation—dry or moist cooking methods
  - Cooking temperatures: All poultry (whole or ground) must be cooked to a minimum temperature of 165°F.
  - Fabrication: the process of cutting or breaking down the meat/poultry into its usable parts.

Standard 2

Explain types, purchasing, preparation, and storage of meats.

- Types—beef, pork, veal, lamb
- Purchasing—mandatory inspection and voluntary grading
- Types—beef, pork, veal, lamb
- Purchasing—mandatory inspection and voluntary grading
- Storage—41 degrees or lower, below ready-to-eat foods and above raw poultry.
- Preparation
  - Fabrication
    - Wholesale cuts
      - More tender from support muscles
      - Less tender from movement muscles
    - Retail cuts—examples include roast, steak, chops, stew meat and ground.
  - Tenderizing methods:
    - Mechanical: grinding, needling, pounding, cutting thin
    - Chemical: marinating and meat tenderizers
    - Cooking: slow and dry (i.e., smoking), slow and moist (i.e., stewing, braising, cooking in a slowing cooker)
  - Cooking methods
    - Dry heat is commonly used with tender cuts.
    - Moist heat is commonly used with less tender cuts.
  - Cooking temperatures
    - Beef, veal, pork and lamb roasts, steaks and chops: minimum internal temperature is 145°F.
    - All ground red meats: minimum internal temperature of 155°F.

Standard 3

Explain types, purchasing, preparation, and storage of seafood.

- Types
  - Fin fish—Round fish, flat fish
  - Shellfish—Crustaceans, Mollusks, Cephalopods
- Purchasing—slight sea smell, eyes clear and full, gills bright red, flesh firm, shells closed
- Storage—41 degrees or lower, below ready-to-eat foods and above raw meat and poultry.
- Preparation
  - Fabrication for fin fish
    - Drawn, dressed, pan dressed, filet, steaks
  - Cooking methods depend on the size of portion and type of fish.
  - Cooking temperatures: fin fish are recommended to cook at 145°F. Shellfish need caution not to overcook

STRAND 11

Students will explore and participate in bakery food production. (Suggested 15 days)

Standard 1

- Identify the functions and types of each ingredient used in bakery products.
- Flour
  - Flour provides structure.
  - Types
    - Bread, all purpose, pastry, whole wheat
    - Non-wheat (usually made to be gluten free). These come from other starchy plants, such as corn, barley, oats, potatoes, beans, and rice.
- Sugar
  - Sugar provides flavor, color, food for yeast, tenderizer, and a stabilizer for egg whites.
  - Types
    - Syrups: honey, molasses, corn, maple
    - Sugars: brown, turbinado/raw, course/sanding, granulated, super fine/bakers/caster, confectioners/powdered
    - Fruit puree and juice
- Fats
  - Fats provide tenderness, flavor, moisture, browning, and flakiness.
  - Types
    - Shortening—made from vegetable oil that is hydrogenated.
    - Oil
    - Butter—it can be purchased salted or unsalted.
    - Margarine—made from hydrogenated vegetable oil with color, flavor and water added.
- Leavening
  - Leavening agents are what make baked goods rise and have a light tender texture and good volume.
  - Types:
    - Yeast
    - Chemical
      - Baking soda/sodium bicarbonate: needs an acid to make a chemical reaction that produces carbon dioxide.
      - Baking powder: made of baking soda, a dry acid such as cream of tartar, and a moisture absorber such as corn starch. When mixed with a liquid the ingredients combine to produce carbon dioxide.
    - Physical
      - Eggs—air is introduced by creaming or whisking and is trapped in the protein then it expands when it gets hot.
      - Steam—during baking water evaporates and expands.
- Salt:
  - Adds flavor to food and brings out the flavor of the other ingredients.
- Eggs
  - Functions
  - Structure—contributes to the structure.

- Emulsification—blends ingredients.
- Leavening
- Flavor—when used in large amounts, such as in pate' choux and challah bread.
- Color

- Packaging types
  - Shell eggs—sold in flats that hold 30 eggs. If stored properly at 41°F or below, they will last up to four weeks beyond the packing date.
  - Egg products—eggs that have been removed from the shell and pasteurized.
- Liquids
  - Functions
    - form the gluten structure
    - activate leavening agents
    - some give flavor, tenderize, add moisture, and help with browning
  - Types
    - Water
    - Milk and cream
    - Eggs
    - Syrups
    - Fruits and juices
    - Butter, oil, and margarine
- Flavorings
  - Effects taste and color of the final baked product.
  - Types
    - Extracts—liquid flavorings
    - Spices—bark, roots, flower buds, berries or seeds of aromatic plants.
    - Nuts
- Chocolate
  - Comes from cacao beans harvested from the pod, roasted, chopped into nibs, crushed into a paste called chocolate liquor, and possibly sweetened and flavored (called bittersweet chocolate), or pressed to separate into liquid called cocoa butter and solids that are ground into cocoa powder.
- Types
  - Unsweetened—a mixture of chocolate liquor and cocoa butter
  - Semisweet—a mixture of chocolate liquor, cocoa butter and sugar
  - Milk chocolate—chocolate liquor, cocoa butter, sugar and powdered, sweetened condensed or liquid milk.
  - White—sweetened cocoa butter
  - Cocoa powder—ground solids
    - Dutch-processed cocoa powder—treated with alkali to reduce acidity

Standard 2

Identify the types, preparation, and storage methods of yeast breads.

- Types:
  - Lean—very little or no sugar or fat—dry, chewy crumb and hard crust.
  - Rich—addition of shortening, butter, sugars, eggs, milk or cream—moist, with a soft structure and fine crumb

- Preparation methods
  - Straight-dough—mix all the ingredients together in one step.
  - Modified straight dough—yeast is activated before adding remaining ingredients.
  - Sponge method—First sponge (water, yeast, and flour) is made and allowed to ferment. Second, final ingredients are added.
  - Rolled in dough—dough that has layers of fat folded and rolled in, resulting in a rich, flakey texture.
- Packaging and storing
  - Cool completely before packaging.
  - Best if used within one day in a food service operation.
  - If keeping for more than one day, wrap tightly, and freeze to prevent from going stale.

Standard 3

Identify the types, preparation, and storage methods of pies and pastries.

- Types doughs and fillings:
  - Basic pie dough, 3-2-1 dough, referring to the ratio of flour to fat and water.
  - Crumb crust made from crackers or cookies.
  - Pate Choux—light pastry dough containing fat, liquid, flour, and eggs.
  - Puff Pastry—light pastry made from laminated dough.
  - Cream—sweet pastry cream filling. Examples are coconut, banana and chocolate silk.
  - Custard—made with eggs that set when baked. Examples are pumpkin and pecan.
  - Chiffon—an airy filling stabilized with gelatin. Beaten egg whites or whipped cream are folded in.
  - Fruit
  - Savory
- Preparation
  - Do not overmix or over-handle pie dough, it will result in a tough texture.
  - Shells that are baked empty before filling are known as baking blind.
- Storage
  - Baked fruit pies can be held at room temperature 1-2 days. Do not freeze.
  - Unbaked fruit pies or empty shells can be frozen for up to 2 months
  - Cream pies need to be refrigerated and used with 2-3 days. Do not freeze.
  - Pate choux shells can be baked, cooled, and frozen.

Standard 4

Identify the preparation and storage methods of cakes and types and functions of icings.

- Preparation methods for cakes
  - Creaming—Cream fat, sugar and salt, add the eggs and other liquids; add the sifted dry ingredients.
  - Sponge—Fold in the dry ingredients into the whipped whole eggs, then fold in the melted cooled butter.
  - Foam—Egg whites, liquid flavorings and part of the sugar are whipped to stiff peaks; remaining sugar and flour are folded in. Cooled upside down.
- Storage of cakes
  - Can be frozen for up to one month.

- Types of frosting/icings
  - Buttercream
  - Fondant
  - Ganache
  - Glaze
- Functions of frosting/icings.
  - Creates a protective coating for baked goods
  - Contributes to flavor and richness
  - Improves appearance

Performance Skills

PERFORMANCE OBJECTIVE 1
Demonstrate competency with all the knife cuts listed in Strand 1 Standard 4.
PERFORMANCE OBJECTIVE 2
Students will complete a sanitation and food safety training equivalent to or higher than that of a food han-dler's permit or certificate.
PERFORMANCE OBJECTIVE 3 Students will create a short presentation or portfolio explaining one culinary math concept from STRAND 3. See FCCLA Star Event Culinary Math Management.
PERFORMANCE OBJECTIVE 4 Students will create a menu including menu descriptions and price. PERFORMANCE OBJECTIVE 5 Students will prepare a dish that includes eggs, milk, or milk products. PERFORMANCE OBJECTIVE 6 Students will prepare and present a food item containing produce. PERFORMANCE OBJECTIVE 7 Students will prepare a product containing one of the following: grains, pasta, potatoes or legumes.
PERFORMANCE OBJECTIVE 8 Students will prepare meat, poultry or seafood using an appropriate cooking method.
PERFORMANCE OBJECTIVE 9 Plan, calculate cost, prepare and present a bakery item for a minimum of 30 people.

FCCLA Integration into Culinary 3:
STAR Events: Career Investigation, Entrepreneurship, Environmental Ambassador, Illustrated Talk, Interpersonal Communications, Job Interview, Leadership, Life Event Planning, Nutrition & Wellness, Advocacy, Chapter Ser-vice Project Display, Chapter Service Project Portfolio, National Programs in Action, Applied Math for Culinary Management, Culinary Arts, Food Innovations, Hospitality, Tourism and Recreation, Sports Nutrition.
Skill Demonstration Events: Culinary Chicken, Culinary Food Art, Culinary Knife Skills, Consumer Math, Culinary Math, Hospitality, Tourism and Recreation, Nutrition, Science in FACS.
National Programs: Career Connection, Leadership Service in Action, Power of One, Student Body

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS
BAKING & PASTRY

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Course Description

This course introduces Culinary Arts students to another aspect of the Culinary Arts industry, baking and pastry. Students will gain experience with baking terminology, equipment, formula conversions, and practice methods for creating yeast breads, pastries, fillings, cakes, and cookie production. Students will also have the opportunity to practice industry workplace skills, food safety and understand the opportunities for careers within the baking and pastry industry.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	
Concurrent Enrollment Core Code	
Prerequisite	Culinary Arts 1 & 2; Prostart 1 & 2
Skill Certification Test Number	
Test Weight	
License Type	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family and Consumer Sciences
Endorsement 2	Culinary Arts
Endorsement 3	

STRAND 1

Consistently demonstrate workplace safety, food safety, and sanitation techniques.

Standard 1

Review established safety rules and guidelines in a work environment. (Refer to Culinary 1 Strand 1 Standard 1)

Standard 2

Review health and hygiene requirements for food handling. (Refer to Culinary 1 Strand 1 Standard 2)

Standard 3

Review food-borne illness and prevention. (Refer to Culinary 1 Strand 1 Standard 3)

STRAND 2

Explore the baking and pastry industry, education and career opportunities.

Standard 1

Explore the baking and pastry educational opportunities.

Standard 2

Analyze the career opportunities available in the baking and pastry industry.

- Entrepreneurship
- Corporation

STRAND 3

Apply necessary skills for baking and pastry production.

Standard 1

Employ proper measuring techniques.

- Utilize weights and measures by demonstrating proper scaling and measurement.
- Compare and contrast volume and weight measurements.
- Select the appropriate tools for the task.
- Apply the baking formulas
  - Bakers' Percentage
- Examine the difference between standardized recipes and traditional recipes.

Standard 2

Define terms related to baking and pastry methods, processes, and techniques.

- Docking: Pricking a pie crust to allow steam to escape while baking.
- Blind Baking: baking a pie crust or pastry without the filling.
- Tempering: Bringing two liquids together to a similar temperature be combining them completely.
- Fold in: incorporating two mixtures together delicately. Mix by cutting down the center of the mix-

ture and sweeping to the side. Repeat until incorporated.

- Cut in: Using a solid fat worked into flour until the pieces of fat are very small.
- Cream: Using a solid fat beaten together with sugar to form a web of air between the fat and sugar. Lightens and leavens baked goods.
- Blooming: soften gelatin in cool liquid before using. Ensures a smooth texture in the final product.
- Caramelization: Browning of sugars by heat. Creating a complex flavor.
- Leavening: Process of baked goods rising. Three categories are, Chemical leaveners (Baking soda or powder), Organic leaveners (yeast), and Physical leavener (air).
- Gelatinization: Process by which starch granules absorb water and swell in size.
- Proof: Final rise of a yeast bread product.
- Oven Spring: Final burst of rising just after a yeast product is put in the oven before crust hardens.
- Gluten: Protein in wheat, barley, and rye. Found in the endosperm of the grain.
- Batter: Semi- liquid mixture containing a flour or other starch that provides structure.
- Dough: Thick, malleable, often elastic mixture that is stiff enough to knead or roll.
- Meringue: Delicate, frothy mixture made with beaten egg whites and sugar.
    - Swiss: Sugar and egg heated together, to 160F and then whipped to desired peaks.
    - Italian: Made with boiling sugar syrup.
    - French: Whisk the egg whites, then adding granulated sugar until the desired peaks are reached. Less stable than Swiss and Italian.
- Pasteurized: process of heating a food to a certain temperature for a certain amount of time to reduce or destroy pathogens.
- Streusel: Crumbly topping for baked goods made of flour, fat, sugar, and flavoring(s).
- Puree: Cooked food usually fruits or vegetables that have been ground, pressed, or blended to a paste or liquid.
- Review mise en place techniques (Culinary 2 Strand 1 Standard 5)
- Prepare a sequence and prioritized timeline.
- Discuss the importance of planning and preparation in baking and pastry.
    - Inventory (Ingredients, equipment)

Standard 3

Explore the equipment utilized by the baking and pastry industry.

- Explore oven types and benefits of use.
- Explore large production equipment utilized in baking and pastry.

STRAND 4

Demonstrate yeast bread preparation skills.

Standard 1

Discuss the types of flours and yeasts used in baking and pastry.

- Review common baking ingredients.
- Compare and contrast the variety of flours and uses for each.
    - Dietary needs
        - Celiac & Gluten intolerance
    - End Product
        - Crumb

- Compare and contrast types of yeasts used in baking
  - Dry yeast
    - Active & Instant
  - Cake Yeast (fresh)
  - Preferments

Standard 2

Analyze the difference between the types of yeast dough and mixing methods.

- Enriched Dough (challah, brioche, crescent, sweet dough)
  - Adding fat and/or sugar.
- Lean Dough (french bread, sandwich bread, pizza crust, bagels, pita).
- Practice the stages of proper mixing.
  - Pick up period
    - Blending of ingredients
  - Clean up
    - Dough begins to come together
  - Initial Development
    - Gluten beginning to develop
  - Final Period
    - Gluten developed, dough is smooth and elastic
- Straight Mixing Method
  - Ingredients added together all at once. As a result, the dough can lack flavor and shelf-life.
- Sponge Mixing Method
  - Yeast is mixed with a portion of the flour and water then allowed time to develop (sponge) prior to mixing the other ingredients.
- Brioche Mixing Method
  - Sponge method with butter added as the last ingredient.
- Completion of dough preparation.
  - Fermentation
  - Shaping
    - Panning
  - Proofing
  - Baking
  - Finishing

Standard 3

Discuss proper holding and storage of yeast breads.

- Cooling
- Packaging
  - Paper
  - Plastic
- Refrigeration vs. Freezing
- Sustainability
  - Usable waste (bread pudding, croutons)

STRAND 5

Explore and produce a variety of fillings.

Standard 1

Demonstrate the production and use of a cream filling.

- Stirred Custard/Pudding
  - Curd
    - Flavored custard that contains butter and acidic fruit.
  - Pastry cream
    - Explore the fillings that can be produced from a pastry cream.
  - Mousse
  - Bavarian Cream
  - Ice Cream
- Baked Custard
  - Pie filling
  - Bread Pudding
  - Crème Brulèe
  - Flan

Standard 2

Demonstrate the production and use of a fruit filling.

- Whole fruit filling
  - Apple Pie
- Macerated fruit filling
  - Compote
  - Jam/jelly

Standard 3

Demonstrate the production and use of baking and pastry finishes.

- Icing
- Glazes
- Sauces
- Ganache
- Marizpan

STRAND 6

Explore a variety of pastry doughs.

Standard 1

Differentiate between the four types of pastry doughs.

- Short Dough (tart crust, short bread)
  - High percentage of fat produces a tender and crumbly crust.

- Flaky Dough (traditional pie crust)
  - Cut in doughs using a solid fat, leaves flakes of visible fat.
- Pâte á Choux (eclairs, cream puff)
  - Cooked batter, that expands when baked. Liquid, fat, flour, and eggs.
- Laminate Dough (danish, puff pastry, croissant)
  - Layers of fat folded and rolled into dough.

STRAND 7

Explore a variety of cake preparations and finishes.

Standard 1

Explore the preparation techniques of cake batters.

- Mixing methods
  - Blending method
    - Combine the dry and wet ingredients separately then add wet to dry ingredients together.
  - Creaming method
    - Cream together sugar and fat, add eggs followed by the rest of the ingredients.
  - Two stage method (muffin method)
    - Dry ingredients mixed with the liquid added in stages.
  - Foaming method
    - Eggs whipped and beat to incorporate air before it is mixed into a batter. Eggs used as the leavening agent.

Standard 2

Explore assembling and finishing techniques of cakes.

- Layered
- Filled
- Glazed
- Iced/frosted/decorated

Standard 3

Discuss proper holding and storage of cakes.

- Cooling
- Packaging
  - Paper
  - Plastic
- Storage
- Sustainability
  - Reuses of cake (cake pops, trifle)

STRAND 8

Explore a variety of cookies

Standard 1

Differentiate between the six mixing methods for cookies

- Drop (chocolate chip, oatmeal)
  - Made from dough firm enough to be spooned or scooped onto a baking sheet.
- Bar/Sheet (lemon bar, brownie)
  - Baked in large sheets and portioned after baking.
- Rolled/Cut Out (sugar, gingerbread cookie)
  - Dough prepared, chilled and rolled then cut into desired shape before cooking.
- Molded (Spritz, almond crescent)
  - A dough stiff enough to be formed by hand, stamped, pressed or piped.
- Twice baked (biscotti)
  - Prepared in a log or loaf, baked then cooled, sliced and re-baked.
- Piped (Macarons)
  - Batter is placed in a piping bag and piped into shapes on a sheet pan.

Standard 2

Discuss proper holding and storage of cookies.

- Cooling
- Packaging
  - Paper
  - Plastic
- Storage

Performance Skills

- Students will properly weigh ingredients using a scale, to produce a baked good.
- Students will produce two yeast bread products, using a lean and an enriched dough.
- Students will produce a cream filling.
- Students will produce two pastries including a Pâte á Choux to produce a finished product.
- Students will prepare a filling and use it to produce complete a cake product, including a finish.
- Students will produce at least two different varieties of cookies.

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry. Determine the difference between hard skills and soft skills.

- Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
- Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Identify soft skills needed in the workplace

- Professionalism
- Respect Legal requirements/expectations
- Good communication skills
- Resourcefulness & creativity
- Work Ethic

STRANDS AND STANDARDS

BEHAVIORAL HEALTH, INTRODUCTION

Learning that works for Utah
CTE®

Course Description

This course is an introduction to the Behavioral Health industry. Topics that will be introduced in this foundational level course include understanding self-concept, effective communication, healthy relationships, addictive behaviors, mental health disorders, and protective laws and rights of patients and practitioners.

*This course is not designed for the student to diagnose themselves, friends, or family. It is an introduction to the behavioral health career field only.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.03.00.00.200
Concurrent Enrollment Core Code	
Prerequisite	None
Skill Certification Test Number	
Test Weight	
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Health Science Introduction
Endorsement 2	Family and Consumer Sciences
Endorsement 3	

ADA Compliant: October 2020

STRAND 1

Students will explore self-concept.
***Performance skill included – see below.**

Standard 1

Explain how self-concept and self-esteem are built and preserved and how it relates to the perception of individual strengths and weaknesses.

- Define Self-Concept & Self-Esteem
  - Self-Concept: how someone thinks about, evaluates or perceives themselves; the mental image or perception that one has of oneself
  - Self-Esteem: is the positive or negative evaluations of the self, as in how we feel about it.
- Self-concept cycle/progression/pattern.

- Describe the positive and negative development of self-concept and self-esteem.
  - Ways to build self-esteem.
  - Things that might hurt self-esteem.
- Define how personal values, goals, and decision making contribute to self-concept.
  - Define and discuss values and their impact on self-esteem.
    - Ideas, qualities, beliefs, and attitudes that guide the way you live.
    - Values can change with time/experiences.
    - Behaviors inconsistent with or lack of values can negatively impact self-esteem.
  - Describe the goal-setting process.
    - Goals: the result of something a person intends to acquire, achieve, do, reach, or accomplish sometime in the near or distant future.
    - SMART Goals: refers to goals that are Specific, Measurable, Achievable/Attainable, Realistic, and Time Framed.
    - Short-term and long-term goals that are consistent with personal values can improve self-esteem.
  - Decision making
    - Describe the decision-making process (i.e., identify the problem, brainstorm possible solutions, explore and evaluate, make a decision and act on it, evaluate and accept responsibility for results.
    - Describe the influence of social pressure on our decisions.
    - Evaluate the role of emotions, attitudes, and behavior in making decisions.

Standard 2

Identify the role of experiences that impact self-concept.

- Adverse Childhood Experiences (ACEs)
  - Adverse childhood experiences, or ACEs, are potentially traumatic events that occur in childhood (0-17 years). i.e. violence/abuse, death, divorce, substance misuse, etc.

    - ACEs are linked to chronic health problems, mental illness, and substance misuse in adulthood.
    - ACEs can also negatively impact education and job opportunities.
    - The effects of ACEs, with intervention, can be managed.
- Trauma: when a person feels intensely threated by an event that they are involved in or witness. The event is a trauma.
    - Acute – A single traumatic event that occurs in one's life.
    - Complex – Exposure to multiple trauma events often of an evasive, interpersonal nature and the wide ranging, long term effects of this exposure.
    - Chronic – Traumatic event that has occurred over and over in one's life.
- Bullying
    - Short-term effects
    - Long-term effects
    - Prevention and resources
- Positive feedback
    - Stable home life
    - Healthy relationships
    - Clear boundaries and expectations

Standard 3

Compare and contrast the reward circuit and prefrontal cortex development on behavior.

- Define the function of the Reward Circuit.
    - Impulsive, emotional, and reactive
    - Primary area of brain utilized during adolescence
    - Impacts risky behaviors and poor decision making
- Define the function of the Prefrontal Cortex Development.
    - Thoughtful, logical, reasoning, and higher-level thinking
    - Not fully developed until mid-20's.
    - Regulates emotions
    - Recognizes social cues and non-verbal communication
    - Promotes processing of the potential consequences of actions

Standard 4

Explore concepts that negatively affect self-concept.

- Stress – the body's and mind's reaction to everyday demands or threats. Can affect how you feel, think, and behave as well as how your body works.
    - Eustress – positive impact on physical and mental health. Creates challenge response motivating one to rise to the occasion and increase confidence.
    - Distress – negative impact on physical and mental health. Creates crippling response affecting productivity or ability to think clearly.
- Coping Skills – the method a person uses to deal with negative emotions.
    - Helpful – assists in thought processing to allow progression through negative emotion. i.e. Exercise, diet, journaling, hobbies
    - Hurtful – prevents progressing through the thought process of a negative emotion. i.e. self-harm, eating disorders, avoidance, substance abuse
    - Coping skills can vary for each individual.

Standard 5

Students will explore careers related to individual self-concept.

- Clinical or counseling psychologist
- Clinical social worker
- Psychiatric nurse practitioner
- Psychiatric registered nurse
- Mental health counselor

STRAND 2

Students will practice effective communication.

Standard 1

Identify effective verbal communication.

- Destructive communication: Methods that tear down communication. i.e. blaming, interrupting, endless fighting, character assassination, calling in reinforcements, withdrawal, need to be right.
- Constructive communication: Methods that promote and strengthen communication. i.e. "I" messages, clarity, timing, asking questions, reflective listening, respect and consideration, avoiding intense anger)
- Civil Discourse- An engagement in conversation intended to enhance understanding and respect of differing viewpoints.
- Communication Styles
  - Assertive- Confidently aggressive or self-assured.
  - Passive aggressive- Denoting or pertaining to a personality type or behavior marked by the expression of negative emotions in passive, indirect ways, as through manipulation or noncooperation.
  - Aggressive- Boldly assertive and forward; pushy.
  - Passive- Submissive, unresisting.
- Conflict Resolution – A process in which two or more parties work toward a peaceful solution.
  - Positive- Healthy Solution rather than individual interest focused.
    - The capacity to recognize and respond to the other parties perspective.
    - A readiness to forgive and forget
    - The ability to seek compromise and avoid punishing
    - A belief that resolution can support the interests and needs of both parties.
  - Negative- Unhealthy solution that is focused on individual interests.
    - An inability to recognize and respond to matters of great value to the other party.
    - Explosive, angry, hurtful, and resentful reactions
    - The withdrawal of love, resulting in rejection, isolation, shaming, and fear of abandonment.
    - The expectation of bad outcomes. (don't try, it will never get better etc..)
    - The fear and avoidance of conflict.
- Review situations in which refusal skills would/could be used.
  - Refusal skills: Set of skills to help avoid high risk behaviors.

Standard 2

Identify positive and negative nonverbal communication.

- Identify nonverbal behaviors and messages (Most communication is nonverbal)
  - Body Language
    - Gestures

        - Eye Contact
        - Posture
        - Dress
    - Demonstrate effective ways to communicate personal boundaries and show respect for the boundaries of others.
        - Zones of Personal Space in Communication
            - Intimate Space: From skin contract to 18" away. This zone is guarded closely and is reserved for close friends, relatives, and those we trust most.
            - Personal Space: Begins at 18" to 4'. This space is for those that we like. The closer someone is, more we like them.
            - Social Space: This zone is 4' to 12' used for friendly gathers and acquaintances.
            - Public Space: This zone is 12' and beyond. Used by speakers and audiences.

Standard 3

Examine the effect of technology on communication

- Discuss positive and negative ways that technology effects communication.
    - Identify the purpose of Social Media and the effect on communication.
        - Social Media (Facebook, Instagram, Twitter, Tik Tok, etc.)
        - Effect on Relationships (Friendships, Family, Romantic, Professional, etc.)
    - Negative effects
        - affect mental state: comparison culture, contentious culture, body image, depression, loneliness, anxiety, cyber bullying, privacy.
    - Positive effects
        - Maintain relationships with others, communicate easily, part of a peer/social network that can provide support, more social interaction, educational.
- Professional Interactions
    - Loss of jobs or job opportunities due to social media posts
- Loss of educational opportunities
- Social Etiquette

Standard 4

Explore careers related to effective communication in behavioral health.

- Speech Pathology
- Audiologist
- Communicative Disorders
- Behavioral Youth Counselor
- Outreach Specialist

STRAND 3

Students will explore the importance of healthy relationships.

Standard 1

Explore types of relationships and role responsibilities.

- Review the important functions of professional relationships (respect, communication, productivity, collaboration, cooperation)
- Identify appropriate role responsibilities in professional relationships (client/patient, teacher/student, employer/employee)

- List the types of personal relationships (family, friends, romantic relationships)
- Analyze the functions of personal relationships in growth and development (support, safety, guidance, etc.)
- Identify responsibilities in personal relationships (honesty, respect, setting boundaries, clear expectations, respecting privacy, trust, etc.).
- List types of community-based relationships (civic, religious, neighbor)
- Analyze the functions and benefits of participating in community-based relationships. (volunteer work, educational, networking, invested in community etc.)
- List virtual environments where relationships can develop (social media, professional affiliates, dating sites, gaming forums etc.).
- Identify the functions of virtual relationships (entertainment, networking, friendship, dating, professional etc.)
- Compare and contrast the functions of virtual relationship to professional, personal, and community relationships.
- Discuss the importance of awareness and safety when participating in virtual relationships.

Standard 2

Identify characteristics of unhealthy relationships and apply strategies to protect against unhealthy relationships.

- Define abuse and identify physical/social/emotional forms of abuse and violence.
  - Abuse:
    - Physical: Intentional use of physical force that can result in physical injury.
    - Emotional: Behaviors that harm one's self-worth or emotional well-being.
- Identify different types of abuse in relationships (dating, professional, family, peers, community)
- Identify characteristics and motivations of participants in the abuse/violence cycle
  - Stages of violence cycle: tension building, incident, reconciliation, calm.
  - Motivations: control, co-dependency, people pleaser, rescue mentality.
- Define the types of sexual violations (harassment, assault, rape, abuse)
  - Consent: explicit vs. implicit
    - Freely given, reversible, specific, silence is NOT consent
  - Force/coercion: Force does not always refer to physical pressure
    - Perpetrators may use: threats, emotional coercion, manipulation, intimidation tactics etc.
- Discuss the warning signs of abusive relationships. (jealousy, short temper, no privacy, raised in an abusive home, controlling, manipulation, isolation, reacts physically, lies)

Standard 3

Evaluate strategies to foster healthy relationships.

- Review components of communication skills practiced in relationships (verbal, non-verbal, compromise, conflict resolution).
- Demonstrate positive communication within each type of relationship. (personal, professional, community, virtual)
- List behaviors demonstrating trust (dependability, contribution, privacy, advocacy, accountability, transparency, commitment)
- Analyze the value of trust when developing relationships.
- Compare and contrast the characteristics of trust for each type of relationship. (personal, professional, community, virtual)
- Discuss the level of personal responsibility needed to form and participate in healthy relation-

ships.
- Assess resources that support and foster healthy relationships. (therapy, workshops, community courses, counselor etc.)
- Consent: explicit vs. implicit
  - Freely given, reversible, specific, silence is NOT consent
- Force/coercion: Force does not always refer to physical pressure
  - Perpetrators may use: threats, emotional coercion, manipulation, intimidation tactics etc.
- Discuss the warning signs of abusive relationships. (jealousy, short temper, no privacy, raised in an abusive home, controlling, manipulation, isolation, reacts physically, lies)

Standard 4

Explore careers related to healthy and unhealthy relationships.
- Any type of therapy can relate to healthy and unhealthy relationships.
- Specializations could be:
  - Domestic Violence
    - Domestic Violence Shelters
  - Marriage and family counselor
  - Psychologist
  - Abuse specialist
  - Victim advocate
  - Occupational therapist
  - Marriage and relationship educator
  - Sexual crisis counselors
  - Non-profit resource specialist
- Different agencies offer specific resources and opportunities within the industry.

STRAND 4

Students will identify patterns in addictive behaviors.

Standard 1

Review Strand 1 Standard 1, 3 & 4
Overview of Addiction
- Define addiction, tolerance, withdrawal symptoms, and cravings.
- Identify the two types of addiction (behavioral & substance) and examples of each
  - Behavioral addiction: the individual is addicted to the behavior or the feeling brought about by the relevant action.
  - Signs of behavioral addiction: craving, excessive behavior, psychological and physical withdrawal symptoms, loss of control, development of tolerance, whenever a habit changes into an obligation.
    - Examples: gambling, video game playing, eating disorders, sports and physical exercise, media use, sex addiction, pathological working, and compulsive criminal behavior.
  - Substance use disorder: chronic, relapsing disorder characterized by compulsive drug seeking, continued use despite harmful consequences, and long-lasting changes in the brain.
- Review that addiction can affect people of all ages, race or gender. (teens, adults, parents, babies)

Standard 1

Explore the function of brain chemistry on mental health.
- Healthy Brain Function

- Neurons (nerve cells) – sends and receives electrical signals to/from other parts of the brain, spinal cord and nerves in the rest of the body.
- Neurotransmitters – chemicals released into the gap (synapse) between neurons that causes changes in the receiving cell.
- Reward circuit –
  - Group of neurons in the brain (basal ganglia) that control behavior and memory.
  - Neurotransmitters help the brain make connections between an activity and pleasure. Certain neurotransmitters trigger either "go" or "stop" signals to pass along messages.
  - Example: food, hobbies, relationships, etc.

- Chemical changes within the brain
  - Substances that can modify neurotransmission.
    - Medications – over the counter and prescription
    - Alcohol
    - Nicotine
    - Illicit/illegal drugs
  - Mechanisms
    - Blocks transporters – prevents removal of chemical from synapse. Ex. Cocaine
    - Blocks receptors – drug gets stuck in synapse, creating greater amount or drug or the high. Ex. Marijuana
    - Excites neurons – so neurons release more neurotransmitters more often, creating a greater amount or high. Ex. Nicotine
  - Chemical changes that can lead to addiction
    - Repeatedly exposes the brain to a flood of neurotransmitters
    - With each repeated exposure, the brain slowly adjusts
    - Effects are
      - Diminished natural highs – what once brought joy/fulfillment does not
      - Higher tolerance – need to increase quantity, potency, and frequency of substance to have the same effect

Standard 3

Explore the addiction recovery process.

- Determine how the brain can reverse the effects of addiction.
  - Define Neuroplasticity: the ability of the brain to form new neural pathways. The more you use your brain in a specific way the stronger the brain and pathways become, but it can also work in reverse.
    - Explore the concept of Use it (to learn new things) or Lose it (the brain can change back through soberness)

- An addict's neural pathway is strong but with long periods of sobriety it can begin to heal chemically and physically.
- Treatment varies depending on the type of drug and the characteristics of the patients. Matching treatment settings, interventions, and services to an individual's particular problems and needs is critical to his or her ultimate success in returning to productive functioning in the family, workplace, and society.
    - A patient may require varying combinations of services and treatment components during the course of treatment and recovery:
        - counseling or psychotherapy
        - Family therapy
        - Parenting instruction
        - Vocational rehabilitation
        - Social and legal services.
        - Support groups
        - Reducing triggers
        - Mentor/Full disclosure
        - Medications

Standard 4

Identify the effects of addiction on family and friends of an addict.

- Trauma, abuse, neglect, violence, financial hardships, exposure to other drugs, poor school performance, strained relationships, loss of legal custody, reckless behavior.
- Discuss codependency and enabling in an addictive relationship.
    - Codependency: being overly concerned with the problems of another to the detriment of attending to one's own wants and needs.
    - Enabling: someone whose behavior allows a loved one to continue self-destructive patterns of behavior.

Standard 5

Explore careers related to addiction recovery.

- Marriage & Family therapy
- Group therapy
- Addiction recovery specialist
- Social Workers
- Medical Professionals

STRAND 5

Students will identify mental health disorders and the common signs, symptoms, and treatment.

Standard 1

Recognize mental health disorders

- Mental Health Disorder: Disorder that effects a person's thinking, feeling, and mood. Such conditions may affect someone's ability to relate to others and function each day. Each person will have different experiences, even people with the same diagnosis.
- Diagnosing a disorder
    - Conditional vs. diagnosed mental conditions
- Common causes
    - Organic: Caused by a physical illness or brain injury

    - Functional: Caused by stress, trauma or chemical imbalances.
- Common stigmas related to mental health disorders
    - Weakness of the individual
    - Attention seeking behavior
    - The individual is dangerous
    - A normal life is not possible
    - Only effects certain demographics
    - Therapy doesn't help/it won't work for me.
    - If I don't talk about it. It will go away.
- Mental Health disorders can happen at any age and will be a life-long journey.

Standard 2

Define and identify the signs and symptoms of common mental health disorder categories. (Anxiety and mood disorders are the most prevalent. Most likely mild and can be treated).

- Anxiety Disorders
    - OCD
    - PTSD
    - Phobias
    - Panic
- Mood Disorders
    - Depression
    - Bi-polar
- Psychotic Disorders
    - First psychotic episode:
        - First time someone experiences psychotic symptoms.
        - When identified early, an individual can better manage episodes.
    - Schizophrenia
- Eating Disorders: effect both genders.
    - Anorexia
    - Bulimia
- Personality Disorders: Not diagnosed until an individual is an adult.
    - Dissociative disorder
    - Paranoid disorder
    - Narcissistic disorder
- Other common mental health disorders
    - Autism
    - ADHD

Standard 3

Explore knowledge of risk factors, warning signs and resources for suicide prevention.

- Protective Factors
    - Connectedness
    - Reduced access to lethal means
    - Access to quality Healthcare
    - Having social supports
    - Having coping strategies
    - Being resilient
- Risk Factors of suicide

- Social isolation
- Mental disorder
- Individual experiencing crisis
- Substance abuse
- Being excluded from peer, social, family, groups etc…
- Recent traumatic event or loss
- Pressure of being a good student/athlete/child
- Suicide ideation-thinking about suicide, having suicidal thoughts, or considering attempting suicide.

- Warning Signs
  - Isolation from friends & family
  - Change in personality, hygiene and appearance
  - Impulsive, irrational, or unusual behavior
  - Giving away personal items
  - Substance abuse
  - Boredom and indifference
  - Violent actions rebellious behaviors
  - Running away
  - Writing poems, songs, diary etc., about death
  - Posts on social media about hopelessness, death, suicide, etc.
  - Serious illness or injury especially with consequences (i.e. can no longer play sports)

Identify suicide prevention resources

- Identify support for individuals in crisis
  - If you believe someone may be at risk
    - Question, Persuade, Refer (QPR) - Consider bringing in district or health department instructors as a guest speaker.
  - Ongoing support
    - HOPE Squad
- Resources for suicide prevention
  - Safe Utah App
  - Emergency 911
  - Statewide Crisis Line 1-800-273-TALK (8255)
  - Emergency Mental Health number being considered: 988

STRAND 6

Students will explore patient protection laws and rights and professional obligation

Standard 1

- Legal, Ethical and professional responsibilities
  - Abuse and neglect recognizing & reporting (based on Utah law)
  - Accurate documentation
    - Professional: Correct grammar and proper English
  - Law associated with Behavioral health (History)
    - Tarasoff Law Case
    - HIPAA Laws
    - Hitech

    - 42CFR Part 2
  - Ethical responsibility: Guided by Behavioral Health professional organizations

Performance Skills

- Identify and create short- and long-term goals.
  - Short-Term Goal: achieved quickly, usually in a year or less. They help a person achieve long term goals
  - Long-term goals: Take more than a year to achieve
- Explore individual application of various coping skills and identify those that are potentially helpful and potentially hurtful.
- Demonstrate refusal skill in a variety of situations. (e.g. professional, peer, relationships)

Workplace Skills

Students will develop professional and interpersonal skills needed for success in industry.

- Determine the difference between hard skills and soft skills.
  - Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
  - Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.
- Identify soft skills needed in the workplace
  - Professionalism
  - Respect Legal requirements/expectations
  - Good communication skills
  - Resourcefulness & creativity
  - Work Ethic

Course Changes 2020: Health Science; Personal Services;

Protective Services Pathways

The following CTE Courses were reviewed and changes summarized in the table below:

Course code	Course Name	Changes made
		Health Science
36.01.00.00.020	Dental Assisting	Added: • Equipment specific to procedures; expanded procedures • Modes of infection transmission; cross-contamination prevention • Digital radiological procedures • Clarified dental waste and disposal procedures • Digital filing systems • Diseases/conditions of the mouth • Tooth polishing and fluoride procedures • Common dental procedure billing codes • Expanded nitrous oxide use and procedures • Expanded and clarified prosthodontic devices Eliminated: • Dental history • Film based radiological procedures - outdated • Paper based filing systems - outdated • MyPlate diagram • Eating disorders (skill for the dentist, not the assistant) • Pharmacology (skill for the dentist, not the assistant) • Amalgam fillings – outdated Cleaned up and moved all performance skills to the end of the document.
36.01.00.00.120	Medical Assisting	Added: • Expanded list of billing codes • Expanded list of muscular disorders • Clarified blood vessels • Added COVID-19 to list of respiratory/immune system disorders • Clarified PPE/Standard precautions • "Rights" of medication administration • Expanded laboratory test and values • Workplace skills Eliminated: • Cell division • Eye installation as medical procedure – redundant to other area • First Aid certification requirement. Still taught, but industry not recognizing certification.

		• Converted some standards to Performance Skills Cleaned up and moved all performance skills to the end of the document.
36.01.00.00.085	Medical Forensics	No major changes. Moved Performance Skills to end of document. Added Workplace Skills.
36.01.00.00.150	Medical Math	Added: • Clarification within several standards regarding computing solutions to scenario-based problems. • Additional Health Science based math applications • Additional statistical data collection and analysis • Conditional probability of an event (false positive/false negative) • Performance skills: Presentation and project Eliminated: • Consolidated some standards for the purposes of weighting. • Solving systems of two linear equations Added Performance Skills to end of document. Added Workplace Skills to end of document.
Protective Services		
40.06.00.00.001	Law Enforcement	Combined, reorganized, and clarified some strands/standards. Very little change to actual content, just organization. Previous version had workplace skills within standards. Took those elements to create "Workplace Skills" list and "Performance Skills" list. Added some new performance skills.

STRANDS AND STANDARDS
DENTAL ASSISTANT

Course Description

An instructional program that prepares individuals to assist a dentist or dental hygienist performing the functions of a dental practice. Includes instruction in chairside assisting, patient preparation, front office functions, selected dental office laboratory procedures, and an introduction to radiology.

Intended Grade Level	12
Units of Credit	2.0
Core Code	36.01.00.00.020
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	720,721,722,723
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Dental Assistant Endorsement
Endorsement 2	N/A
Endorsement 3	N/A

DENTAL SCIENCE I-CORE STRANDS, STANDARDS, and INDICATORS

STRAND 1

Students will examine the field of dentistry.

Standard 1

Describe the following dental health team members (including educational requirements, professional organizations, responsibilities, and licensure):

- Dentist
- Dental Hygienist
- Dental Assistant
- Administrative Assistant
- Dental Laboratory Technician

Standard 2

Describe the following areas of specialization in dentistry:

- Dental Public Health
- Endodontics
- Oral & Maxillofacial Radiology
- Oral & Maxillofacial Surgery
- Oral Pathology
- Orthodontics
- Pediatric Dentistry
- Periodontics
- Prosthodontics

STRAND 2

Students will identify areas of the dental office and basic dental equipment.

Standard 1

Identify and describe the following areas of the dental office:

- Dental Operatory (treatment area)
- Reception area
- Administration/Business area
- Sterilization area
- Dental laboratory
- Dentist's private office
- Consultation room
- Dental staff lounge

Standard 2

Identify and describe proper use and maintenance of the following equipment:

- Operator stool

- Assistant stool
- Dental chair
- Operating light
- Air water syringe
- Oral evacuation system
- Curing light
- Tritruator
- Amalgamator
- Rheostat (foot control)
- X-ray systems
- Autoclave
- Ultrasonic cleaner

Standard 3

Outline basic morning and evening routines.

STRAND 3

Students will demonstrate an understanding of appropriate ethical and legal behavior in a dental setting.

Standard 1

Define the difference between ethics and laws including the importance of professional and personal ethics in the workplace.

Standard 2

Discuss ethical and legal responsibilities for the dental healthcare worker.

Standard 3

Identify standards of the Health Insurance Portability and Accountability Act/HIPAA and discuss the need to protect the patient's privacy.

Standard 4

Explain the purpose of the State Dental Practice Act and how it applies to the role of the dental assistant. List and understand the levels of supervision.

- Direct Supervision
- Indirect Supervision
- General Supervision

STRAND 4

Students will demonstrate personal safety procedures based on OSHA and CDC guidelines.

Standard 1

Explain the OSHA Bloodborne Pathogen Standard including:

- Training requirements
- Employee medical records
- Exposure protocol

Standard 2

Outline the OSHA Hazard Communication Standard including:

- Training program
- Chemical inventory
- Locate OSHA posters and SDS sheets on site

Standard 3

Compare and contrast the roles of government agencies.

- OSHA
- CDC
- NIOSH
- EPA
- FDA

Strand 4 Performance Evaluation included below

STRAND 5

Students will demonstrate infection control protocol.

Standard 1

Identify the components of the chain of infection.

- Virulence/infectious agent
- Number of microorganisms
- Susceptible host
- Portal of entry

Standard 2

Identify modes of infection transmission in the dental office.

- Direct transmission
- Indirect transmission
- Airborne transmission
- Parenteral transmission
- Bloodborne transmission

Standard 3

Outline standards for prevention of disease transmission.

- Prevent cross contamination
    - Patient to dental team
    - Dental team to patient

    - Patient to patient
    - Dental office to community
    - Community to dental office
- Maintain aseptic conditions

Standard 4

Compare the different types of dental waste and appropriate waste disposal.

- General waste
- Hazardous waste
- Contaminated waste
- Infectious waste
    - Blood/blood-soaked materials
    - Pathological waste
    - Sharps, needles, burs

Strand 5 Performance Evaluation included below

STRAND 6

Oral Anatomy. Students will identify intra-oral anatomy and surrounding structures.

Standard 1

Identify teeth by name, location, and permanent, primary, or mixed dentition.

Standard 2

Identify anatomical parts, tissues, and surfaces of a tooth.

Standard 3

Identify supporting structures.

- Periodontal ligaments
- Alveolar bones
- Gingiva
- Cementum

Standard 4

Identify primary and permanent teeth using the Universal Tooth Numbering System.

Standard 5

Identify major landmarks of the oral cavity and surrounding structures.

- Maxillary sinus
- Salivary glands and ducts
- Maxilla
- Mandible
- TMJ

- Incisive papilla
- Rugae
- Uvula
- Frenulum
- Soft palate
- Hard palate
- Tongue
- Teeth
- Oral mucosa
- Temporal bone
- Trigeminal nerve

Standard 6

Describe genetic and developmental factors that can affect dental development.

- Tori
- Supernumerary
- Enamel dysplasia
- Cleft palate
- Cleft lip
- Tongue-tied
- Anodontia
- Microdontia
- Macrodontia

STRAND 7

Students will identify the infectious process of dental caries and other diseases of the oral cavity.

Standard 1

Outline the dental caries process:

- Acids in plaque and saliva attack the tooth
- Calcium and phosphate are dissolved from the enamel (demineralization)
- Fluoride, calcium and phosphate are re-deposited into the tooth (remineralization)

Standard 2

Describe the clinical characteristics of periodontal disease:

- Gingivitis
  - Red tissues
  - Swollen tissues
  - Tissues bleed easily
- Periodontitis
  - Inflammation of periodontium
  - Mobility

- Pain
- Pus

Standard 3

Understand the diseases/conditions of the oral cavity and tongue including:

- Oral cancer
- Candidiasis (thrush)
- Cellulitis
- Fissured tongue
- Geographic tongue
- Glossitis
- Herpes
- "Meth Mouth"
- Eating Disorders

STRAND 8

Students will identify components of a comprehensive preventive dentistry program including patient education.

Standard 1

Explain the parts of a preventive dentistry program and their effects on oral conditions.

- Nutrition
  - Dental decay is directly linked to the presence of dietary sugars (sucrose) in the diet.
- Plaque control
  - Disclosing
  - Tooth brushing methods-Bass
  - Flossing
- Fluoride therapy
- Dental check-ups

Standard 2

Identify different products used for oral hygiene and their uses.

- Toothbrushes
- Dental floss/tape
- Interdental aids
- Toothpastes
- Mouth rinses

Strand 8 Performance Evaluation included below

STRAND 9

Students will be able to perform the skills and responsibilities of a dental assistant in the front office.

Standard 1

Identify the differences between verbal and nonverbal communications.

- Verbal-words spoken
  - Words
  - Listening skills
  - Voice inflection
- Non-verbal-body language
  - Facial expressions
  - Appearance
  - Gestures
  - Mannerisms
  - Attitudes
  - Actions

Standard 2

Describe good phone courtesy.

- Smile
- Don't chew gum or eat
- Speak directly into the receiver
- Speak clearly and slowly
- Answer promptly
- Greet patient-identify yourself and the practice
- Ask how you can help the caller

Standard 3

Outline the process of scheduling appointments.

- Guidelines for scheduling-units of time
- Confirmation of appointments
- Re-call

Standard 4

Discuss the functions of computerized practice management systems.

- Patient registration
- Scheduling
- Charting
- Progress notes
- Radiographs

Standard 5

Identify the data gathering process and prepare a patient record.

- Registration form
- Medical-dental health history form
- Clinical examination form
- Progress note form
- Treatment plan

Standard 6

Define terminology related to insurance.

- Assignment of benefits
- Carrier
- Co-insurance
- Deductible
- Dependent
- Eligibility
- Exclusions
- Maximum
- Provider

Standard 7

Learn the common dental procedure codes.

Diagnostic D0100–D0999

- Clinical oral evaluations
  - D0120 Periodic oral evaluation-established patient
  - D0150 Comprehensive oral evaluation-new or established patient
- Radiographs/diagnostic imaging (including interpretation)
  - D0220 Intraoral - periapical first film
  - D0272 bitewings-two films
  - D0274 bitewings-four films
  - D0330 Panoramic film
- Tests and examinations
- Oral pathology laboratory

Preventive D1000–D1999

- Dental prophylaxis
  - D1110 prophylaxis-adult
  - D1120 prophylaxis- child
- Topical fluoride treatment (office procedure)
  - D1206 topical fluoride varnish
- Other preventive services
  - D1351 sealant-per tooth

Restorative D2000–D2999

- Resin-based composite restorations—direct

D2330 composite-one surface, anterior
D2331 composite-two surface, anterior
D2332 composite-three surface, anterior
D2335 composite-four or more surface, anterior
D2391 composite-one surface, posterior
D2392 composite-two surface, posterior
D2393 composite-three surface, posterior
D2394 composite-four or more surfaces, posterior

- Gold foil restorations
- Inlay/onlay restorations
- Crowns—single restorations only
  D2740 crown-porcelain/ceramic
  D2751 crown-porcelain fused to metal
  D2792 crown-full cast noble metal
- Other restorative services
  D2930 crown-stainless steel, child
  D2952 post and core in addition to crown

Endodontics D3000–D3999

- Pulp capping
  D3120 pulp cap-indirect (dycal)
- Pulpotomy
  D3221 pulpal debridement
- Endodontic therapy on primary teeth
- Endodontic therapy (including treatment plan, clinical procedures, and follow-up care)
  D3310 anterior
  D3320 bicuspid
  D3330 molar
- Endodontic retreatment
- Apexification/recalcification procedures
- Apicoectomy/periradicular services
- Other endodontic procedures

Periodontics D4000–D4999

- Surgical services (including usual postoperative care)
- Non-Surgical periodontal service
- Other periodontal services

Removable Prosthodontics D5000–D5899

- Complete dentures
  D5110 complete denture-maxillary
  D5120 complete denture-mandibular
- Partial dentures (including routine post-delivery care)
- Adjustments to dentures
- Repairs to complete dentures

- Repairs to partial dentures
- Denture rebase procedures
- Denture reline procedures
- Interim prosthesis
- Other removable prosthetic services

Maxillofacial Prosthetics D5900–D5999

- Prosthetic replacements
- Radiation
- Surgical splinting

Implant Services D6000–D6199

- Pre-surgical services
- Surgical services
  - D6010 surgical placement of implant body: endosteal implant
- Implant supported prosthetics supporting structures
- Implant/abutment supported removable dentures
- Implant/abutment supported fixed dentures (hybrid prosthesis)
- Single crowns, abutment supported
  - D6060 abutment supported porcelain fused to base metal crown
- Single crowns, implant supported
- Fixed partial denture, abutment supported
- Fixed partial denture, implant supported
- Other implant services

Fixed Prosthodontics D6200–D6999

- Fixed partial denture pontics
  - D6241 pontic-porcelain fused to base metal
  - D6245 pontic-porcelain/ceramic
- Fixed partial denture retainers—inlays/onlays
- Fixed partial denture retainers—crowns
  - D6721 crown-resin with base metal
  - D6740 crown-porcelain/ceramic
- Other fixed partial denture services

Oral Surgery D7000–D7999

- Extractions (includes local anesthesia, suturing, if needed, and routine postoperative care)
  - D7140 extraction, erupted tooth or exposed root
- Surgical extractions (includes local anesthesia, suturing, if needed, and routine postoperative care)
  - D7220 removal of impacted tooth-soft tissue
  - D7230 removal of impacted tooth-partially bony
  - D7240 removal of impacted tooth-completely bony
  - D7241 removal of impacted tooth- completely bony, with unusual surgical complications
- Other surgical procedures

- Alveoloplasty—surgical preparation of ridge for dentures
- Vestibuloplasty
- Surgical excision of soft tissue lesions
- Surgical excision of intraosseous lesions
- Excision of bone tissue
- Surgical incision
- Treatment of fractures—simple
- Treatment of fractures—compound
- Reduction of dislocation and management of other temporomandibular joint dysfunctions
- Repair of traumatic wounds
- Complicated suturing (reconstruction requiring delicate handling of tissues and wide undermining for meticulous closure)
- Other repair procedures

Orthodontics D8000–D8999

- Limited orthodontic treatment
- Interceptive orthodontic treatment
- Comprehensive orthodontic
- Minor treatment to control harmful habits
- Other orthodontic services

Adjunctive General Services D9000–D9999

- Unclassified treatment
- Anesthesia
- Professional consultation
- Professional visits
- Drugs
- Miscellaneous services (bleaching, desensitizing, occlusal analysis)

Strand 9 Performance Evaluation included below

STRAND 10

Students will be able to perform basic life support skills.

Standard 1

Describe the signs and symptoms of common medical emergencies and describe how to respond to them.

- Symptom-what a patient tells you regarding how they feel
- Sign-what you observe in a patient
- Common emergencies include:
  - Airway obstruction/choking
  - Syncope/fainting
  - Postural hypotension
  - Angina/chest pain

- Acute myocardial infarction/heart attack
- Stroke/CVA
- Hyperventilation
- Asthma attack
- Allergic reaction
- Seizure
- Diabetic shock
- Hyperglycemia
- Hypoglycemia

Standard 2

Understand how to take, record, and monitor vital signs using automated systems:

- Blood pressure
- Pulse

Strand 10 Performance Evaluation included below

DENTAL SCIENCE II-CORE STRANDS, STANDARDS, and INDICATORS

STRAND 1

Students will be able to perform the skills and responsibilities expected of a dental assistant in a dental examination.

Standard 1

Describe the role of the dental assistant in the clinical examination.

- Receive and prepare patient for treatment
  - Seating
  - Positioning chair
  - Placing napkin
  - Positioning patient chart
- Take vital signs
- Take radiographs
- Chart as per dentist dictation
- Maintain the field of operation during dental procedures

Standard 2

Explain the importance of a treatment plan.

- Treatment plan is a compilation of clinical findings and oral diagnosis by a dentist, in an outlined format for presentation purposes.
- The treatment plan must be presented and accepted by the patient before treatment is rendered.

Standard 3

Maintain records in accordance with legal guidelines.

- Black ink
- Date
- Tooth number
- Surfaces of tooth
- Procedure performed
- All important information pertaining to treatment rendered
- Signature of individual who made the entry
- Understand how to correct an error on the patient chart.

STRAND 2

Students will be able to perform the skills and responsibilities expected of a dental assistant in a coronal polish and application of fluoride.

Standard 1

Explain the difference between an oral prophylaxis and coronal polishing.

- Oral prophylaxis-the complete removal of calculus, debris, stain, and plaque from the teeth.
- Coronal polish/rubber cup polish-a technique used to remove plaque and stains from the crown of the tooth.

Standard 2

Explain safety precautions to be followed during coronal polish.

- Operator and patient positioning
- Polishing/bristle cups
- Polishing paste
- Proper handpiece grasp/fulcrum
- Proper handpiece operation
- Polishing strokes

Standard 3

Outline the methods of fluoride therapy.

- Systemic
- Topical

Standard 4

Explain the set up and use of instruments for dental sealants.

- Protective eyewear for patient and operator
- Basic set up
- Cotton rolls or dental dam
- Etchant
- Sealant material

- Applicator brush
- HVE
- Curing light and shielding
- Low speed handpiece
- Articulating paper and holder
- Dental floss

STRAND 3

Students will demonstrate radiological protection and infection control as they expose, evaluate, and mount dental images.

Standard 1

Explain to a patient the benefits of dental imaging.

- Detect decay between the teeth in its early stages.
- Detect bone loss around the teeth.
- Detect periapical abscess.
- Detect impacted teeth.
- Evaluate patient growth and development.
- Document existing oral conditions.
- Obtain information during dental procedures.

Standard 2

Identify types and techniques of intraoral and extraoral radiographs/images and the purpose of each.

- Intraoral
    - Bitewing x-rays-shows crowns of both upper and lower teeth; for decay detection.
    - Periapical x-rays-used to show crown, root tip, and surrounding area to diagnose abscesses.
    - Occlusal x-rays-used to examine large areas of the jaws to identify impactions or pathological conditions.
- Extraoral
    - Panoramic x-rays-shows entire upper and lower jaw; used to locate impacted teeth, tooth eruption patterns, and lesions in the jaw.
    - Cephalometric x-rays-shows the bones and soft tissues of the facial profile; used in orthodontics.

Standard 3

Identify the components of the dental x-ray machine and their use including handheld devices.

- Tubehead
- Extension arm
- Control panel

Standard 4

Discuss methods of radiation protection for the patient during x-ray exposure.

- Take only those radiographs prescribed by the dentist.
- Use equipment that is properly maintained.
- Use the fastest speed of dental film or digital imaging to limit exposure time.
- Use proper film exposure techniques including use of film-holding devices.
- Use lead aprons and thyroid collars for all patients.

Standard 5

Discuss methods of radiation protection for the operator during x-ray exposure.

- Never stand directly in front of the x-ray tubehead.
- Always stand at least 6 feet from the x-ray unit, or behind a wall, during exposure.
- Use radiation monitoring to protect the operator.

Standard 6

Discuss infection control during x-ray procedures.

Standard 7

Evaluate x-rays for image quality.

- Contrast
- Density
- Image detail

Standard 8

Identify common exposure and technique error.

- Blurred images-movement during the exposure
- Cone cutting-x-ray beam did not cover the entire film
- Elongation-vertical angulation too flat
- Foreshortening-vertical angulation too steep
- Missing apical structures-film did not cover entire tooth
- Occlusal plane tilted-film not in proper position
- Overexposure-excessive exposure
- Overlapping-central ray not directed through interproximal space
- Underexposure-insufficient exposure

Standard 9

Identify radiographic landmarks for mounting intraoral films.

- Enamel
- Dentin
- Pulp
- Maxillary sinus
- Maxillary tuberosity
- Retromolar area

Strand 3 Performance Evaluation included below

STRAND 4

Students will examine pain control in the dental office setting.

Standard 1

Explain the set-up and protocol of a local anesthetic injection.

- Proper handling of the anesthetic syringe
- Proper handling of the anesthetic cartridge
- Proper handling of the disposable needle
- Application of a topical anesthetic

Standard 2

Compare local anesthetic agents with or without vasoconstrictors.

Standard 3

Identify the complications and precautions for dental anesthesia.

- Injection into a blood vessel-aspiration
- Toxic reaction-check patient's dental/medical history for previous reactions
- Temporary numbness-caution patient not to bite tongue, lips, and cheeks
- Paresthesia (temporary or permanent)-use only sterile solution and proper injection technique

Standard 4

Explain the use and procedure of nitrous oxide in dental treatment.

- Inhalation sedation
- Procedure
    - Dentist supervision
    - 100% oxygen to begin/end
    - Do not leave patient unattended – continual monitoring
    - Do not use with a pregnant patient
    - Not for recreational purposes

Standard 5

Describe the equipment used in nitrous oxide/oxygen analgesia.

- Cylinders
    - Blue – Nitrous
    - Green – Oxygen
- Control valve
- Flow meter
- Reservoir bag
- Gas hoses
- Mask

- Scavenger system

Strand 4 Performance Evaluation included below

STRAND 5

Students will identify components of operative procedures and assist in patient treatment.

Standard 1

Identify reasons for dental treatment.

- Treat caries, fractures, abrasions, erosion, defects in tooth structure
- Replace failed restorations
- Restore a tooth to normal function and appearance
- Improve appearance of teeth due to discoloration, developmental abnormalities, abnormal spacing, or trauma

Standard 2

Outline responsibilities of the dental assistant in operative dental procedures.

- Prepare treatment room.
- Know proper sequence of procedures in order to anticipate the dentist's needs during patient treatment.
- Mix materials.
- Prepare retainers.
- Assist in the following:
    - Administration of local anesthesia
    - Moisture control
    - Maintaining patient comfort
- Apply appropriate exposure control protocols.
- Perform only those expanded functions allowed by the State Dental Practice Act.

Standard 3

Identify handpieces and burs, their common uses in operative dentistry, and maintenance.

- Low-speed
- High-speed
- Fiber optic light
- Air abrasion
- Laser handpiece
- Burs: round, inverted cone, straight fissure plain and crosscut, pear, end cutting
- Diamonds
- Trimming and finishing burs
- Polishing disks and wheels
- Stones
- Rubber points

Standard 4

Outline treatment options for vital bleaching.

- In-office treatment
- At-home treatment
- Over-the-counter treatment

Standard 5

Explain the set up and use of instruments for a composite procedure.

- Instruments
  - Basic setup
  - Hand cutting instruments (spoon excavator)
  - Composite placement instruments
- Accessories
  - Local anesthetic setup
  - HVE tip
  - Saliva ejector
  - Three-way syringe tip
  - High and low speed handpieces with assortment of burs
  - Matrix setup including wedge
    - Mylar
    - Sectional
    - Tofflemire
  - Assortment of dental liners
  - Bases
  - Sealers and bonding agents
  - Composite materials
  - Curing light
  - Finishing burs
  - Dental floss
  - Articulating paper and holder
  - Cotton rolls
  - 2x2 gauze
  - Abrasive strips
  - Polishing kit and paste

Standard 6

Explain the steps for composite procedures.

- Prepare
- Etch
- Rinse
- Bond
- Cure

- Fill
- Cure
- Finish
- Record in the patient chart

Strand 5 Performance Evaluation included below

DENTAL SCIENCE III-CORE STRANDS, STANDARDS, and INDICATORS

STRAND 1

Students will perform skills and assist with indirect prosthodontic procedures.

Standard 1

Identify and explain the types of prosthetic appliances.

- Fixed
  - Crowns
  - Bridges
  - Veneers
  - Inlays/Onlays
  - Implants
- Removeable
  - Partial denture
  - Full denture

Standard 2

Explain the set up and use of instruments for crown and bridge procedures.

- Crown and Bridge prep tray
  - Instruments
    - Basic setup
    - Hand cutting instruments (spoon excavator)
    - Cord packing instrument
    - Crown and bridge scissors
    - Cement spatula
  - Accessories
    - Local anesthetic setup
    - HVE tip
    - Saliva ejector
    - Three-way syringe tip
    - High and low speed handpieces with assortment of burs
    - Retraction cord
    - Dental floss
    - Articulating paper and holder

        - Cotton rolls
        - 2x2 gauze
        - Final impression material and tray
        - Temporary crown material
        - Temporary cement
    - Crown and Bridge seat tray
        - Instruments
            - Basic setup
            - Hand cutting instruments (spoon excavator)
            - Cement spatula
            - Scaler
        - Accessories
            - Local anesthetic setup
            - HVE tip
            - Saliva ejector
            - Three-way syringe tip
            - High and low speed handpieces with assortment of burs
            - Dental floss
            - Articulating paper and holder
            - Cotton rolls
            - 2x2 gauze
            - Permanent cement/bonding
            - Bite stick

Standard 3

Complete laboratory authorization forms.

Standard 4

Explain how to mix cements.

- Permanent
    - Polycarboxylate
    - Glass ionomer
    - Zinc phosphate
- Temporary
    - Zinc oxide eugenol
- Liner
    - Calcium hydroxide

Standard 5

Explain the set up and use of instruments for the delivery of removable prosthodontics (partials and dentures).

- Basic set up

- Denture
- Hand mirror
- Articulating paper and holder
- Handpieces
- Pressure indicating paste
- Finishing burs
- Acrylic burs
- Pliers

STRAND 2

Students will demonstrate basic knowledge of and assist with common surgical procedures.

Standard 1

Explain the set up and use of instruments in a simple extraction set up.

- Local anesthetic
- Basic setup
- Periosteal elevator
- Elevator (dentist choice)
- Forceps (dentist choice – tooth dependent)
- Surgical curettes
- Sterile gauze
- Surgical aspirator tip

Standard 2

Explain the set up and use of instruments in a surgical extraction set up.

- Local anesthetic
- Basic setup
- Periosteal elevator
- Elevators (dentist choice)
- Forceps (dentist choice – tooth dependent)
- Surgical curettes
- Root tip picks
- Bone files
- Mallet and chisel
- Rongeur
- Sterile gauze
- Surgical aspirator tip
- Scalpel
- Suture
- Needle holders or hemostat

- Suture scissors
- Cheek/tissue retractor
- Handpiece and surgical bur
- Bite block

Standard 3

Discuss post-operative instructions following extractions to a patient.

- Control of swelling
- Causes and treatment of dry-socket
- Control of post-surgical bleeding
- Diet

Standard 4

Explain the set up and use of instruments used in suture removal.

- Basic setup
- Suture scissors
- Sterile gauze

STRAND 3

Students will demonstrate basic knowledge of and assist with procedures related to endodontics.

Standard 1

Explain the set up and use of instruments and accessories used in endodontic treatment.

- Basic setup
- Local anesthetic setup
- Dental dam setup
- Handpieces with burs
- Irrigating syringe
- Broaches and files
- Rubber stops
- Paper points
- Gutta-percha
- Sealer
- Lentulo spiral
- Endodontic spoon excavator
- Endodontic explorer
- Endodontic spreaders and pluggers
- Glick
- Mm ruler

- HVE tip
- Three-way syringe tip
- Irrigating solutions

Standard 2

Discuss steps in the endodontic exam including the methods of pulp testing.

- Subjective
  - Pain
  - Swelling
  - Sensitivity
- Objective
  - Medical and Dental history
  - Radiographs
- Pulp testing
  - Thermal
  - Electric
  - Percussion
  - Palpation

Standard 3

Explain the steps of a root canal procedure.

- Anesthetic
- Isolation
- Access pulp
- Debridement
- Obturation
- Post treatment instructions
- Add to patient chart

Standard 4

Explain the set up and use of instruments for a dental dam.

- Dental dam material
- Dental dam hole punch
- Dental dam frame
- Dental dam clamps
- Dental dam forceps
- Crown and bridge scissors
- Floss
- Beaver-tail burnisher

STRAND 4

Student will demonstrate basic knowledge related to orthodontics.

Standard 1

Identify primary and permanent teeth using the Palmer numbering system.

Standard 2

List the benefits of orthodontic treatment.

- Eliminate dental disease
- Improve function
- Decrease psycho-social issues

Standard 3

Explain proper care, oral hygiene and dietary instructions as it relates to orthodontic appliances.

STRAND 5

Students will utilize materials and demonstrate skills related to in-office laboratory procedures.

Standard 1

Explain the set up and use of equipment found in the laboratory.

- Model trimmer
- Vacuum former
- Impression vibrator
- Dental lathe
- Lab handpiece

Standard 2

List the three types of impressions taken in a dental office.

- Preliminary
- Final
- Bite registration

Standard 3

Explain the set up and use of preliminary impressions.

- Alginate impression
    - Alginate powder
    - Measuring scoop
    - Water and measuring cup

    - Rubber bowl
    - Mixing spatula
    - Upper and lower trays
    - Moist paper towels
- Alginate impression pour up
    - Rubber bowl
    - Mixing spatula
    - Upper and lower impressions
    - Gypsum product
    - Water
    - Impression vibrator

DENTAL SCIENCE IV-CORE STRANDS, STANDARDS, and INDICATORS

STRAND 1

Students will demonstrate their job seeking skills.

Standard 1

Determine personal career goals and employment opportunities.

Standard 2

Outline techniques for successful jobs.

- Interviewing
- Methods of negotiating salaries and benefits.
- Proper termination procedures

STRAND 2

Students must complete a minimum of 90 hours of clinical experience in a dental office.

Standard 1

Complete the Dental Assisting Clinical Application:

- Provide documentation of completion of skills competencies and fees and books paid
- Provide Hepatitis B vaccination or declination form

Standard 2

Complete a clinical work schedule calendar.

Standard 3

Provide weekly documentation of hours in attendance at clinical site and skills performed.

Standard 4

Upon completion of clinical hours, have clinical site complete evaluation, and return to the instructor.

Performance Skills

Benchmark 1- DENTAL SCIENCE I

1. Demonstrate proper use of PPE and correct handwashing technique.
2. Obtain Hepatitis B vaccination or provide signed declination form.
3. Demonstrate methods of sterilization and disinfection.
4. Instruct a patient in oral hygiene.
5. Prepare a patient record.
6. Obtain current CPR certification.
7. Seating and dismissing patients.

Benchmark 2- DENTAL SCIENCE II

8. Prepare room for treatment.
9. Chart existing restorations or conditions.
10. Maintain moisture control during dental procedures.
11. Demonstrate appropriate instrument transfer.
12. Perform coronal polish.
13. Apply topical fluoride.
14. Apply pit and fissure sealants.
15. Assemble the XCP instrument.
16. Demonstrate techniques for intraoral x-rays.
    - Paralleling technique
    - Bisecting angle technique
    - Bite-wing technique
    - Occlusal technique
17. Mount radiographs.
18. Prepare for a local anesthetic injection.
    - Proper handling of the anesthetic syringe
    - Proper handling of the anesthetic cartridge
    - Proper handling of the disposable needle
    - Application of a topical anesthetic
19. Assemble matrix systems

Benchmark 3- DENTAL SCIENCE III

20. Set up for a crown and bridge procedure.
21. Mix cements - both temporary and permanent.
22. Prepare a set up tray for removable prosthodontics (partials and dentures).
23. Set up for a basic extraction.
24. Place and remove post-extraction dressings (2x2 gauze).
25. Set up for a suture removal.

26. Set up for basic endodontic procedures.
27. Place and remove dental dam.
28. Take preliminary impressions.
29. Pour, trim, and evaluate the quality of models.
30. Fabricate a thermal plastic tray.

Benchmark 4- DENTAL SCIENCE IV

31. Prepare a target resume.
32. Using professional letter format, prepare a cover letter.
33. Complete a job application.
34. Mock interview and Thank you card/letter
35. Discuss student externship evaluation with instructor.

Workplace Skills

Describe the characteristics of a professional dental assistant.

- Professional appearance
- Teamwork
- Attitude
- Dedication
- Responsibility
- Initiative
- Legal requirements/confidentiality
- Personal qualities
- Courtesy and respect for patients and team members
- Attendance of work hours
- Professional communication (grammar)
- Problem solving
- Critical thinking
- Dependability
- Accountability

Skill Certificate Test Points by Strand

Example table below. Refer to instructions for specifics.

Test Name	Test #	Number of Test Points by Standard															Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Dental Assisting 1	720	3	4	3	6	9	16	3	4	4	1						68	53
Dental Assisting 2	721	3	6	9	7	10											44	35
Dental Assisting 3	722	9	9	5	3	4											36	30

STRANDS AND STANDARDS
MEDICAL ASSISTANT

Course Description

An instructional program that prepares individuals to support physicians by providing assistance during patient examinations, treatment administration and monitoring; by keeping patient and related health record information; and by performing clinical, administrative, and laboratory duties.

Intended Grade Level	12
Units of Credit	2.0
Core Code	36.0.00.00.120
Concurrent Enrollment Core Code	
Prerequisite	None
Skill Certification Test Number	710,712, 714, 716
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Medical Assisting
Endorsement 2	
Endorsement 3	

MEDICAL TERMINOLOGY-Benchmark 1

STRAND 1

Students will interpret and apply medical terminology.

Standard 1

Identify basic structure of medical words associated with Medical Assisting.

- Recognize word construction and dissection.
- Apply word building and definitions.

Standard 2

Identify and utilize anatomical positions, planes, and directional terms.

- Demonstrate what anatomical position is and how it is used to reference the body.
- Distinguish between the commonly used anatomical planes and recognize their individual views.
    - Sagittal/Midsagittal Plane
    - Frontal/Coronal Plane
    - Transverse/Horizontal Plane
- Apply directional terms to other locations on the human body.
    - Superior/Inferior
    - Anterior/Posterior
    - Medial/Lateral
    - Distal/Proximal
    - Superficial/Deep
    - Ventral/Dorsal
    - Prone/Supine
    - Unilateral/Bilateral

STRAND 2

Students will identify medical abbreviations in a healthcare setting.

Standard 1

Interpret and apply identified medical abbreviations.

- Interpret and extract information from realistic medical documents.
- Apply medical abbreviations to interpreting and writing prescriptions.

Standard 2

Interpret identified healthcare symbols.

- Identify pharmacological symbols.
- Identify medical symbols.

Strand 2 Performance Evaluation included below

MEDICAL OFFICE MANAGEMENT-Benchmark 2

STRAND 1

Students will explore the medical assisting profession and its role in the healthcare setting.

Standard 1

Describe the job responsibilities of a medical assistant.

- Describe the training required for a medical assistant.
    - Compare and contrast endorsed, certified, and registered medical assistants.
        - State
        - National
    - Describe the current Utah medical assistant job training requirements.
- Compare administrative and clinical skills.
    - Administrative skills, including office management and clerical functions.
    - Clinical skills, including therapeutic procedures and diagnostic procedures.

Strand 1 Performance Evaluation included below

Standard 2

Analyze characteristics needed for a quality medical assistant and apply the skills necessary for obtaining employment.

- Examine the following workplace skills:
    - Positive attitude
    - Teamwork
    - Adapt to change
    - Communication skills
    - Professional appearance
    - Confidentiality (verbal and written correspondence)
    - Exhibit initiative
    - Cultural competency
    - Integrity
    - Discretion
    - Organize and prioritize
    - Continuing education
    - Critical thinking
    - Dependability
    - Accountability
- Discuss professionalism.
- Apply job-seeking skills.

        - Prepare a resume
        - Write a cover letter
        - Practice job interviewing skills
        - Write a follow-up letter
    - Identify job opportunities available for Medical Assistants.
        - Inpatient setting
        - Ambulatory setting
        - Healthcare departments and specialties

Standard 3

Describe other healthcare professionals with whom medical assistants will work.

- Categorize medical practice specialties.
- Identify ancillary healthcare departments.

STRAND 2

Students will analyze the legal and ethical issues that impact the medical office.

Standard 1

Identify the legal guidelines/requirements for a medical office.

- Define a medical assistant's scope of practice and understand the principle of delegation.
- Apply risk management procedures.
- Define HIPAA regulations for the medical office.
- Discuss patient self-determination acts.
    - Medical (Durable) Power of Attorney
    - Living will/Advanced directives
    - Anatomical Gift Act (Organ donation)

Standard 2

Define classifications of law.

- Discuss criminal law.
- Discuss civil law.
    - Torts
        - Battery
        - Assault
        - Libel
        - Slander
        - False imprisonment
        - Defamation
        - Invasion of privacy
    - Contracts

Standard 3

Explain malpractice and the terms associated with malpractice litigation.

- Compare and contrast negligence and malpractice.
- Identify malpractice terms.
    - Informed consent
    - Patient rights
    - Good Samaritan Law
    - Statute of Limitations
    - Commission and Omission

Standard 4

Evaluate medical ethics and related issues.

- Differentiate between law, etiquette, and ethics.
- Discuss ethical situations.
- Apply ethical situations in personal and professional practice.

STRAND 3

Students will identify procedures that contribute to a professional and safe medical office environment.

Standard 1

Identify the elements important in the medical office.

- Discuss the environment appropriate to maintain comfort for patients.
    - Aesthetics
    - Temperature
    - Cleanliness
    - Compliance with ADA
- Describe the professional way of greeting and responding to patients.
    - Explain the process of collecting new and updated information from patients.
    - Describe the professional way of escorting and instructing patients.
    - Learn general techniques of how to resolve conflicts with patients.
        - Late appointment
        - Angry patient
        - Talkative patient
        - Missed appointment

Standard 2

Identify the duties of opening and closing the office.

- Discuss steps used in opening the medical office.
- Discuss steps used in closing the medical office.

Strand 3 Performance Evaluation included below

STRAND 4

Students will apply effective medical office communication principles in the healthcare setting.

Standard 1

Describe general guidelines for telephone communication.

- Describe the medical assistant's role in the triage of telephone calls.
- Explain the importance of documenting telephone calls.
- Demonstrate professionalism when answering telephone calls.
- Identify the process of obtaining and making referrals.
- Discuss the process of calling in prescription refills.

Standard 2

Describe scheduling techniques.

- Establish a matrix/master schedule.
- Describe different types of scheduling.
    - Double booking
    - Group/Cluster booking
    - Open office hours
- Describe how to document a no-show appointment and a cancellation.

STRAND 5

Students will apply effective interpersonal communication principles in a healthcare setting.

Standard 1

Differentiate between verbal and nonverbal communication.

- Describe the importance of body language and gestures during communication.
- Explain the importance of tone of voice, word choice, and silence during communication.
- Identify the parts of a communication model.

Standard 2

Identify effective listening skills/habits.

- Differentiate between active and passive listening.
- Identify types of questions to elicit patient information.
    - Open ended questions
    - Restating
    - Reflecting
    - Clarification
    - Leading

Standard 3

Identify communication barriers.

- Describe the following communication barriers:
  - Physical
  - Mental
  - Cultural
  - Maturity
  - Age
  - Stress
- Describe the following defense mechanisms.
  - Repression
  - Regression
  - Rationalization
  - Sarcasm
  - Denial
  - Compensation
  - Projection
  - Displacement
  - Physical avoidance
  - Apathy

Standard 4

Contrast sympathy and empathy.

- Describe appropriate body language to express empathy.
- Demonstrate appropriate expressions of empathy.

Standard 5

Describe the steps of the grieving process.

- Identify the psychological implications of disease to a patient.
- Describe the five psychological stages of grieving.
  - Denial
  - Anger
  - Bargaining
  - Depression
  - Acceptance

STRAND 6

Students will accurately maintain medical records.

Standard 1

Identify the contents of a medical record.

- Discuss the standard medical record and various types of reports.

- Patient's past records
- History and physical
- Insurance
- Office notes
- Progress notes
- Pathology results
- Medication
- Physician orders
- Diagnostic reports
- Laboratory reports
- Operative reports
- Consultation reports

- Describe common documentation approaches for medical records.
  - SOAP
  - POMR
- Describe how to initiate a new patient medical record.
  - Paper charting
  - Electronic Medical Record (EMR)

Strand 6 Performance Evaluation included below

Standard 2

Differentiate between subjective and objective information.

- Use subjective information to document patient complaints.
- Use objective information to document patient complaints.

Standard 3

Discuss the legalities associated with the medical record.

- Demonstrate how to correct errors in the patient chart.
- Explain the importance of documenting all interventions.

Standard 4

Demonstrate the correct method of filing patient information.

- Compare and contrast the benefits of alphabetic and numeric filing.
- Explain the steps for locating a missing file.

STRAND 7

Students will perform bookkeeping and financial functions in a medical office setting.

Standard 1

Differentiate between accounts receivable and accounts payable.

- Define bookkeeping terms.

- Credit
- Debit
- Adjustment
- Balance
- Asset
- Liability
- Collections

- Describe the following financial forms.
  - Bank deposit
  - Bank statement
  - Receipt
  - Petty cash
  - Day sheet

Strand 7 Performance Evaluation included below

Standard 2

Discuss the difference between various methods of payment.

- Differentiate between different types of checks.
  - Cashiers
  - Personal
  - Money order
  - Certified
  - Third party check (insurance company)
  - Electronic checks
- Define terms associated with a checking account.
  - Payee
  - Payer
  - Endorsement
- Describe differences between credit card and debit cards.
- Discuss flexible spending accounts.

Strand 7 Performance Evaluation included below

STRAND 8

Students will perform proper insurance, coding, and billing procedures.

Standard 1

Identify terms associated with medical insurance.

- Define the following terms associated with medical billing.
  - Birthday rule
  - Preauthorization/Precertification

- Premium
- Copayment/Coinsurance
- Deductible
- Explanation of Benefits (EOB)
- Fee Schedule
- Assignment of Benefits

- Define various insurance carriers.
  - HMO
  - PPO
  - Medicare
  - Medicaid
  - Fee for Service
  - Tricare
  - Workers Compensation
  - Affordable Care Act (ACA)
- Explain the process to prepare a healthcare claim.

Strand 8 Performance Evaluation included below

Standard 2

Explain how to determine procedural and diagnostic coding.

- Define the following terms associated with medical coding.
  - CPT codes
  - ICD-10 codes
  - HCPCS codes
  - HCFA/CMS 1500 form
  - Understand legalities associated with coding and billing in a medical office including fraudulent claims.

ANATOMY AND PHYSIOLOGY-Benchmark 3

STRAND 1

Students will identify the body cavities and quadrants and the organs they contain.

Standard 1

Locate the body cavities and their organs.

- Cranial: Brain
- Spinal/Vertebral: Spinal cord
- Thoracic: Heart and lungs
- Abdominal: Liver, most of the intestines, stomach, gallbladder, spleen, kidneys
- Pelvic: Urinary bladder, internal reproductive organs

Standard 2

Identify the four major abdominal quadrants and the organs in each quadrant.

- Right upper quadrant (RUQ): Liver, gallbladder, right kidney
- Left upper quadrant (LUQ): Stomach, spleen, pancreas, left kidney
- Right lower quadrant (RLQ): Appendix, right ovary
- Left lower quadrant (LLQ): Left ovary

STRAND 2

Students will identify the structures and functions of the cell and tissues.

Standard 1

Differentiate between cellular transport mechanisms.

- Describe diffusion.
- Describe osmosis.
- Describe filtration.

Standard 2

Identify the six levels of body organization.

- Describe the chemical level.
- Describe the cellular level.
- Describe the tissues.
- Describe the organs.
- Describe the organ systems.
- Describe the organism.

Standard 3

Distinguish between the four basic tissue types.

- Contrast the functions of the four tissue types.
    - Epithelial-covering and lining
    - Connective-support and structure
    - Muscular-movement
    - Nervous-interpretation and nerve impulse conduction
- Identify the locations of the four tissue types.
    - Epithelial-skin and mucous membranes
    - Connective-bones, blood, adipose, cartilage
    - Muscular-muscles
    - Nervous-nerves, brain, spinal cord

STRAND 3

Students will describe the anatomy and physiology of the Integumentary System.

Standard 1

Identify the layers of the skin.

- Epidermis
- Dermis
- Subcutaneous

Standard 2

Identify the appendages.

- Nails
- Sweat (sudoriferous) glands
- Oil (sebaceous) glands
- Hair

Standard 3

Describe the functions of the integumentary system.

- Protection against water loss
- Protection against infection
- Vitamin D production
- Sensory organ
- Absorption of medications
- Excretion of water, salts, and waste
- Temperature regulation
- Protection against UV light

Standard 4

Identify the signs and symptoms of disorders of the integumentary system.

- Athlete's foot
- Hives
- Herpes
- Melanoma
- Decubitus ulcers
- Warts
- Pediculosis
- Rash
- Ringworm
- Lesion

Standard 5

Describe the signs and symptoms of infection and inflammation.

- Recognize redness, swelling, heat, and pain.
- Identify how the inflammation process is initiated.
- Describe the effects of histamine in inflammation.

STRAND 4

Students will describe the anatomy and physiology of the Skeletal System

Standard 1

Identify the functions of the skeletal system.

- Hematopoiesis (blood cell production)
- Structure
- Support
- Muscle attachment and movement
- Mineral storage

Standard 2

Identify the basic bones of the skeleton.

- Cranium (frontal, parietal, occipital, temporal, maxillae, mandible)
- Vertebrae (cervical, thoracic, lumbar, sacral, coccyx)
- Rib cage (ribs, sternum, xiphoid process)
- Arm (humerus, radius, ulna, carpals, metacarpals, phalanges)
- Pelvis (ilium, ischium, pubis)
- Leg (femur, tibia, fibula, tarsals, metatarsals, phalanges)

Standard 3

Distinguish between the following fractures:

- Simple (closed)
- Compound (open)
- Greenstick
- Impacted (compression)
- Comminuted
- Spiral
- Colles

Standard 4

Identify the signs and symptoms of disorders of the skeletal system.

- Arthritis (osteoarthritis, rheumatoid arthritis, gouty arthritis)
- Osteoporosis
- Scoliosis, Lordosis, Kyphosis
- Herniated disc
- Carpal tunnel syndrome
- Bursitis
- Sprains

STRAND 5

Students will describe the anatomy and physiology of the Muscular System.

Standard 1

Identify the functions of the muscular system.

- Heat production
- Movement
- Structure
- Protection

Standard 2

Differentiate between the three types of muscle tissue.

- Locate cardiac muscle and describe the characteristics (striated, involuntary, found in the heart.)
- Locate smooth muscles and describe characteristics (non-striated, involuntary, found in hollow organs like the stomach.)
- Locate skeletal muscles and describe the characteristics (striated, voluntary, found attached to bones.)

Standard 3

Contrast the differences between tendons and ligaments.

- Tendons-connect muscles to bones
- Ligaments-connect bone to bone

Standard 4

Identify the basic muscles of the human body.

- Deltoid
- Gluteus (maximus, medius)
- Rectus femoris
- Vastus lateralis
- Diaphragm

Standard 5

Identify the signs and symptoms of disorders of the muscular system.

- Strains
- Atrophy
- Tendonitis
- Fibromyalgia
- Muscular Dystrophy

STRAND 6

Students will describe the anatomy and physiology of the Cardiovascular System.

Standard 1

Identify the components of the cardiovascular system.

- Blood
- Heart
- Blood vessels
    - Arteries
    - Veins
    - Capillaries

Standard 2

Identify the functions of the cardiovascular system.

- Transportation of nutrients and wastes
- Transportation of heat
- Transportation of oxygen and carbon dioxide
- Transportation of hormones, antibodies, and enzymes

Standard 3

Identify the structures of the heart.

- Aorta
- Coronary arteries
- Septum
- Myocardium
- Inferior and superior vena cava
- Right and left atrium
- Tricuspid valve, Bicuspid valve (mitral valve)
- Right and left ventricle
- Pulmonary semilunar valve, aortic semilunar valve
- Pulmonary arteries, pulmonary veins

Standard 4

Locate the major arteries and veins of the cardiovascular system.

- Identify appropriate arteries for taking an accurate blood pressure and pulse.
    - Apical
    - Carotid
    - Radial
    - Brachial
    - Femoral
- Identify appropriate veins for venipunctures.
    - Median cubital
    - Basilic
    - Cephalic

Standard 5

Describe the layers of and functions of blood vessels.

- Arteries
  - Take blood away from the heart.
  - Thicker to withstand the pressure from the heart.
- Veins
  - Take blood toward the heart.
  - Modified with valves to prevent backflow of blood.
- Capillaries
  - Gas and nutrient exchange between the blood and body cells.
  - Single layer of cells.

Standard 6

Identify the signs and symptoms of disorders of the cardiovascular system.

- Myocardial infarction
- Cerebrovascular accident (CVA-stroke)
- Hypertension
- Embolus/Thrombus
- Arteriosclerosis, Atherosclerosis
- Cardiac arrest
- Phlebitis
- Arrhythmia
- Congestive heart failure
- Aneurysm

STRAND 7

Students will describe the anatomy and physiology of the Lymphatic/Immune System.

Standard 1

List the functions of the lymphatic system.

- Transport excess tissue fluid to the blood vessels.
- Immunity

Standard 2

Describe the functions of the major structures of the immune system.

- Tonsils
  - Lymphatic tissue in the pharynx.
  - Helps to remove pathogens from food and air.
- Lymph nodes
  - Masses of lymphatic tissue.
  - Filters pathogens from lymph.

Standard 3

Describe the human body's lines of defense against disease.

- Discuss the physical and chemical barriers.
    - Mucous membranes (trap pathogens)
    - Cilia (propel pathogens out of respiratory tract)
    - Coughing and sneezing
    - Hydrochloric acid (stomach)
    - Tears in the eyes (contain bactericidal chemicals)
- Discuss non-specific immunity.
    - Fever
    - Inflammation (WBC's destroy pathogens)
- Discuss specific immunity.
    - Immune response
    - Production of antibodies
- Differentiate between active and passive immunity.
    - Vaccination
    - Delivery of antibodies
        - Through mother
        - Through injection (gamma globulin)

Standard 4

Identify the signs and symptoms of disorders of the lymphatic/immune systems.

- Influenza
- H1N1
- COVID-19
- HIV/AIDS
- Mononucleosis
- Autoimmune disorders (Lupus)

STRAND 8

Students will describe the anatomy and physiology of the Respiratory System.

Standard 1

Identify the structures of the respiratory system.

- Nose and nasal cavity
- Pharynx
- Larynx
    - Epiglottis
- Trachea
- Lungs
- Bronchi
- Bronchioles

- Alveoli

Standard 2

Describe the functions of the respiratory system.

- Warm, moisten, and filter air
- Sound production
- Carbon dioxide-oxygen gas exchange

Standard 3

Identify the signs and symptoms of disorders of the respiratory system.

- Asthma
- Tuberculosis (TB)
- Upper respiratory infection (URI)
- Pneumonia
- Respiratory Syncytial Virus (RSV)
- Chronic obstructive pulmonary disease (COPD)
- Bronchitis
- Epistaxis (bloody nose)

Standard 4

Identify the signs and symptoms of respiratory distress.

- Dyspnea (pursed lip breathing)
- Tachypnea
- Wheezing

STRAND 9

Students will describe the anatomy and physiology of the Digestive System.

Standard 1

Describe the functions of the digestive system.

- Ingestion
- Digestion
- Absorption
- Excretion

Standard 2

Identify the structures of the alimentary canal organs and their basic functions.

- Mouth-chemical and mechanical digestion
- Pharynx-passageway
- Esophagus –passageway to stomach
- Stomach-chemical and mechanical digestion
- Small intestine-nutrient absorption

- Large intestine-absorption of water, collects food residue for excretion

Standard 3

Identify the structures of the accessory organs and their basic functions.

- Salivary Glands – produce saliva to breakdown food
- Pancreas – release digestive enzymes in the small intestine
- Liver – produces bile to breakdown fats
- Gallbladder – storage of bile

Standard 4

Identify the signs and symptoms of disorders of the digestive system.

- Irritable bowel syndrome (IBS)
- Diverticulitis
- Hemorrhoids
- Celiac disease
- Appendicitis
- Hepatitis
- Ulcers
- Hernia
- Colon cancer

STRAND 10

Students will describe the anatomy and physiology of the Nervous System.

Standard 1

Describe the general functions of the nervous system.

- Detects and interprets sensory information
- Voluntary and involuntary integration of the stimulus
- Response to stimulus (movement or secretion)

Standard 2

Differentiate between the central nervous system (CNS) and the peripheral nervous system (PNS).

- CNS
    - Brain
    - Spinal cord
- PNS
    - Peripheral nerves
    - Sympathetic division
    - Parasympathetic division

Standard 3

Identify the structures of the nervous system and their major functions.

- Brain
  - Cerebrum
    - Frontal lobe-personality, reason, speech
    - Parietal lobe-taste, skin sensations
    - Occipital lobe-sight
    - Temporal lobe-hearing, memory
  - Cerebellum-balance and coordination
  - Midbrain-relay station for impulses
  - Brainstem-heart rate and respirations
    - Medulla oblongata
    - Pons
  - Hypothalamus-control of endocrine functions, blood pressure, and temperature regulation
  - Pituitary gland-secretes many hormones
- Spinal cord-reflex center, conduction of nerve impulses
- Cerebrospinal fluid (CSF)-shock absorption and provide nutrients to CNS
- Meninges (dura mater, arachnoid mater, pia mater)-protection of CNS
- Neurons (sensory, motor, and interneuron)-nerves

Standard 4

Identify the signs and symptoms of disorders of the nervous system.

- Alzheimer's disease
- Meningitis
- Headache
- Epilepsy
- Paralysis (Hemiplegia, Paraplegia, Quadriplegia)
- Herpes zoster
- Multiple sclerosis
- Sciatica

STRAND 11

Students will describe the anatomy and physiology of the Endocrine System.

Standard 1

Describe the general functions of the endocrine system.

- Regulates growth, development, and maturation.
- Regulates chemical balance by the production of hormones.

Standard 2

Describe what a hormone is and how it works.

- Chemicals secreted into the blood to have an effect on a target tissue
- Produced by endocrine glands

Standard 3

Describe the major locations, secretions (hormones), and functions of the following glands:

- Pituitary-growth hormone, ACTH, TSH, oxytocin
- Thyroid-thyroxine
- Pancreas-insulin
- Adrenal-cortisol, adrenaline
- Ovaries-estrogen, progesterone
- Testes-testosterone

Standard 4

Identify the signs and symptoms of disorders of the endocrine system.

- Diabetes mellitus (Types 1 and 2)
- Hypothyroidism/Hyperthyroidism
- Dwarfism/Gigantism

STRAND 12

Students will describe the anatomy and physiology of the Urinary System

Standard 1

Describe the functions of the urinary system.

- Excrete waste and water from the body
- Regulate fluid balance and blood composition

Standard 2

Identify the structures of the urinary system and their major functions.

- Kidneys-filter the blood and form urine
- Ureters-passageway for urine from the kidneys to the bladder
- Bladder-temporary storage of urine
- Urethra-passageway of urine to the outside of the body

Standard 3

Identify the signs and symptoms of disorders of the urinary system.

- Kidney stones
- Cystitis/UTI
- Pyelonephritis
- Incontinence
- Renal failure

STRAND 13

Students will describe the anatomy and physiology of the Reproductive System.

Standard 1

Describe the functions of the reproductive system.

- Production of gametes (egg and sperm) by the gonads
- Produces hormones to help in the maturation process

Standard 2

Identify the structures of the female reproductive system and their major functions.

- Breasts-lactation
- Ovaries-production of eggs, estrogen, and progesterone
- Uterine tubes-site of fertilization, passage between ovaries and uterus
- Uterus-nourishment and protection of the fetus
    - Cervix
    - Endometrium
- Vagina-birth canal, exit for menstrual flow

Standard 3

Identify the structures of the male reproductive system and their major functions.

- Penis-protects the urethra
- Testes-production of testosterone and sperm
- Scrotum-muscular sac containing the testicles
- Epididymis-storage and maturation of sperm
- Vas deferens-passageway of semen from the testicles meeting connection with the urethra
- Prostate gland-secretes fluids for sperm motility
- Urethra-passageway for urine and semen

Standard 4

Identify the signs and symptoms of disorders of the reproductive system.

- Female
    - Ovarian cyst
    - Premenstrual syndrome (PMS)
    - Menopause
    - Cancer
        - Cervical cancer
        - Ovarian cancer
        - Breast cancer
    - Endometriosis
    - Human Papillomavirus (HPV)
    - Pelvic Inflammatory Disease (PID)
- Male
    - Cancer
        - Prostate cancer

        - Testicular cancer
    - Epididymitis
    - Prostatitis
    - Benign Prostatic Hypertrophy (BPH)

Standard 5

Review the following self-examinations:

- Breast self-exam (BSE)
- Testicular self-exam (TSE)

CLINICAL AND LABORATORY PROCEDURES-Benchmark 4

STRAND 1

Students will examine basic concepts of asepsis.

Standard 1

Describe the infection control cycle.

- Review the five types of microorganisms.
    - Bacteria
    - Virus
    - Protozoa
    - Fungi
    - Rickettsiae
- Discuss the chain of infection.

Standard 2

Demonstrate disease prevention principles.

- Describe the three levels of infection control.
    - Sanitization
    - Disinfection
    - Sterilization
- Describe the common standard precautions of infection control.
    - Hand washing/Hand sanitizing
    - Personal protective equipment (PPE)
        - Gloving
        - Masks
        - Gowning
        - Eye protection
    - Coughing etiquette
    - Hygiene
    - Nutrition

Standard 3

Apply personal safety procedures based on OSHA and CDC regulations.

- List blood-borne pathogens.
  - Hepatitis B and C
  - HIV
- Describe techniques for preventing pathogen transmission.
  - Sharps containers
  - Biohazardous waste
- Discuss the use of safety devices.
- Discuss the use of Safety Data Sheets (SDS).
- Discuss the use of incident/injury reports.

Standard 4

Demonstrate procedures for the proper cleaning and sanitizing of instruments.

- Sanitizing instruments
- Chemical disinfecting (including bleach)
- Autoclaving

STRAND 2

Students will obtain baseline vital signs information and compare it to normal values.

Standard 1

Measure and obtain the five baseline vital signs.

- Temperature (tympanic, electronic, oral, temporal)
- Pulse (rate, rhythm, volume) (peripheral, apical)
- Respiration (rate, rhythm, depth)
- Blood pressure
- Oxygen saturation

Standard 2

Define terms which describe normal and abnormal vital signs values.

- Bradycardia/Tachycardia
- Hypotension/Hypertension
- Febrile/Afebrile
- Bounding/Thready pulse
- Shallow/Dyspnea/Stridor/Hyperventilation/Wheezing
- Hypoxia

Standard 3

Obtain body measurements for adults.

- Height
- Weight

Standard 4

Obtain body measurements for infants.

- Length
- Weight
- Head circumference (hydrocephalus, microcephaly)
- Chest circumference

Strand 2 Performance Evaluation included below

STRAND 3

Students will accurately obtain the patient history and assist with the physical examination.

Standard 1

Demonstrate the ability to obtain an accurate patient history.

- Chief complaint
- Use of open-ended questions to obtain information
- Pain scale
- Document allergies
- Relevant observations or information
- Differentiate between subjective and objective information

Standard 2

Prepare the patient and the examination room.

- Prepare and clean the examination room.
- Assemble all necessary equipment and supplies.
- Demonstrate patient positioning.
    - Supine
    - Prone
    - Lithotomy (pelvic exam)
    - Dorsal recumbent (abdominal exam)
    - Trendelenburg (shock)
    - Fowler's (respiratory)
    - Sims' (rectal)
- Demonstrate draping techniques.
- Assist the practitioner as necessary.
- Disinfect the examination table and replace supplies.

Standard 3

Describe common procedures in medical specialties.

- Sigmoidoscopy
- Prostate exam
- Pap test (smear)

- Snellen eye chart (distance visual acuity)
- Ishihara (color visual acuity)
- Jaeger (near vision acuity)
- Ear wax removal (irrigation)

Standard 4

Assist the patient with ambulatory devices

- Assist patient from a wheelchair to an exam table and back to the wheelchair.
- Instruct patient in using walkers, canes, and crutches.

Strand 3 Performance Evaluation included below

STRAND 4

Students will discuss pharmacology principles and demonstrate accurate medication administration.

Standard 1

Classify common medications.

- Antihypertensives
- Antihistamines
- Antidiuretics/Diuretics
- Antitussives
- Antidepressants
- Antianxiety
- Contraception
- Antipyretics
- Analgesics
- Antibiotics
- Laxatives
- Antidiabetic/Hypoglycemic
- Anticoagulants
- Hormones
- Anesthetics
- Anti-inflammatories
- Bronchodilators
- Narcotics

Standard 2

Describe the schedule for controlled substances.

- Schedule I-illegal, not prescribed
- Schedule II-high potential for addiction and abuse
- Schedule III-moderate to low potential for addiction and abuse

- Schedule IV-lower potential for addiction and abuse
- Schedule V-low potential for addiction and abuse

Standard 3

Demonstrate how to find medication information.

- Physician's Desk Reference (PDR)
- Nursing Drug Reference
- Internet

Standard 4

Document medication administration.

- Medication record
  - Medication
  - Dosage
  - Site
  - Patient reaction
- Immunization record
  - Lot number
  - Expiration date
  - Site

Strand 4 Performance Evaluation included below

Standard 5

Understand principles involved with prescription medication

- Describe the necessary components of a valid prescription.
- Compare and contrast prescription and over-the-counter medications.
- Explain the appropriate procedure for calling or faxing a prescription.

Standard 6

Perform accurate dosage calculations.

- Evaluate and simplify numerical expressions containing real numbers using the order of operations.
  - Addition, subtraction, multiplication, division
  - Fractions
  - Decimals
  - Ratios
  - Proportions
  - Metrics
  - Conversions
- Compute solutions to problems and determine the reasonableness of an answer by relating them to the problem.

Standard 7

Identify the following "rights" of medication administration

- Right patient
- Right medication
- Right time
- Right route
- Right dosage
- Right technique
- Right documentation

Standard 8

Demonstrate the procedures and describe the supplies for administering medications.

- Oral, including buccal and sublingual
- Transdermal (topical)
- Intradermal
- Subcutaneous
- Intramuscular, including Z track method
- Ear/Eye drops
- Ointments
- Inhalation
- Epi-pen

Standard 9

Describe the side effects of medications.

- Compare and contrast common side effects with adverse effects.
- Recognize signs and symptoms of anaphylactic shock and describe its treatment.

STRAND 5

Students will demonstrate the ability to assist with minor surgery.

Standard 1

Identify common instruments by name, use, and category.

- Cutting instruments
  - Scissor (bandage, suture)
  - Scalpel
- Grasping and clamping
  - Hemostat
  - Forceps
  - Towel clamp
- Probing and dilating
  - Scope
  - Speculum

    - Punch (biopsy)
- Suture materials
    - Sutures (absorbable, non-absorbable)
    - Suture needles
    - Needle holder
    - Steri-strips
    - Staples
    - Skin glue

Standard 2

Prepare the patient and the procedure room.

- Obtain a patient consent form.
- Explain pre- and post-procedure care and education to the patient.
- Demonstrate a surgical hand wash.
- Demonstrate applying sterile gloves.
- Demonstrate creating a sterile field and opening a sterile pack.
- Describe ways of maintaining the sterile field.
- Demonstrate the ability to assist with procedures, including skin preparation.
- Demonstrate sterile dressing changes.
- Demonstrate suture and staple removal techniques.

Strand 5 Performance Evaluation included below

STRAND 6

Students will demonstrate how to use the electrocardiograph machine.

Standard 1

Describe the electrical conduction system of the heart.

- Identify the SA node, AV node, AV bundle, bundle branches, and Purkinje fibers.
- Correlate the "PQRST" waves on an EKG (ECG) with the conduction system of the heart.

Standard 2

Prepare the patient for an EKG (ECG).

- Demonstrate electrode placement for a 12 lead EKG (ECG).
- Identify artifacts and describe ways to prevent them.
    - Somatic tremor
    - Wandering baseline
    - Current interference

Strand 6 Performance Evaluation included below

Standard 3

Identify other tests used to determine heart function.

- Holter monitor (24-48 hour)
- Stress test
- Event monitor (30 days)

STRAND 7

Students will learn skills necessary to work in a physician's office laboratory.

Standard 1

Describe procedures associated with urinalysis.

- Explain different types of urine collection.
    - Clean-catch midstream
    - Catheterization
- Explain the physical characteristics of urine (color, odor, appearance).
- Describe urine pregnancy testing.

Strand 7 Performance Evaluation included below

Standard 2

Describe terms and procedures associated with hematology.

- Identify the components of blood and the function of each.
    - White blood cells-fight infection
    - Red blood cells-carry oxygen
    - Platelets-clotting
    - Plasma-liquid portion of the blood
- Differentiate between plasma and serum.
- Describe the normal values for these tests:
    - Hematocrit (37-47% women; 40-54% men)
    - Hemoglobin (12-16 g women; 14-18 g men)
    - WBC count (5,000-10,000)
    - RBC count (4.2 million-6 million)
    - Platelet count (150,000-350,000)
    - ESR (1-13mm male; 1-20mm female)
    - Glucose (80-120)
    - A1c (4.0 -5.6 %; age dependent)
    - Total Cholesterol (<200)
- Locate capillary and common venipuncture sites.
- Describe the procedure for hemoccult testing (guaiac).
- Describe the procedure for obtaining a NBS (newborn screen).
- Describe common blood tests (FBS, GTT, blood typing).

Strand 7 Performance Evaluation included below

Standard 3

Describe terms and procedures associated with microbiology.

- Differentiate between gram positive and gram-negative bacteria.
- Differentiate between culturing bacteria and rapid testing.
- Identify the parts and use of the microscope.

STRAND 8

Students will be able to respond to emergencies.

Standard 1

Learn basic lifesaving skills.

- Adult, child, and infant CPR
- AED training

Standard 2

Learn basic first aid skills.

- Describe how to respond to bleeding, shock, and poisoning emergencies.
- Demonstrate bandaging techniques.

Strand 8 Performance Evaluation included below

EXTERNSHIP

STRAND 1

Students will successfully complete a clinical externship.

Standard 1

Complete a 160 hour minimum externship.

- Have clinical site complete evaluation and return to instructor.
- Discuss student externship evaluation with instructor.

Standard 2

Externship evaluations will indicate satisfactory or higher rating.

STRAND 2

Students will demonstrate professional attributes.

Standard 1

Demonstrate workplace skills.

Standard 2

Externship evaluations will indicate satisfactory or higher rating.

Performance Skills

Benchmark 1-MEDICAL TERMINOLOGY

1. Basic computer skills to generate a patient record.

Benchmark 2-MEDICAL OFFICE MANAGEMENT

2. Oral communication
   - Demonstrate methods of receiving, placing and recording calls.
   - Answer the office telephone.
   - Receive, evaluate, and record a phone message.
   - Make referrals by phone, schedule appointments by phone.
3. Patient reception
   - Collation of patient records.
   - Opening the office and closing the office.
   - Greeting the patient, responding to the patient, escorting and instructing the patient.
4. Medical records
   - Demonstrate filing: alphabetically and numerically.
5. Office Finance:
   - Prepare a bank deposit.
   - Post a payment to a patient account.
   - Enter patient account information.
6. Insurance: Complete a CMS 1500 insurance claim form.

Benchmark 4-CLINICAL AND LABORATORY PROCEDURES

7. Gather vital signs information.
8. Assist with a physical exam.
9. Perform the following vision test:
   - Snellen eye chart (distance visual acuity)
   - Ishihara (color visual acuity)
   - Jaeger (near vision acuity)
10. Document administration of medication.
11. Using sterile technique, set up a basic minor surgery tray.
12. Demonstrate a surgical hand wash.
13. Demonstrate applying sterile gloves.
14. Demonstrate creating a sterile field and opening a sterile pack.
15. Demonstrate the ability to assist with procedures, including skin preparation.
16. Demonstrate sterile dressing changes.
17. Demonstrate suture and staple removal techniques.
18. Perform a standard 12 lead EKG.
19. Perform a urinalysis.

20. Set up a microscopic urinalysis.
21. Demonstrate a capillary puncture with a sterile lancet/autolet.
22. Simulate venipuncture using vacuum method with multiple tubes.
23. Prepare a specimen for the laboratory.
24. Perform a throat swab.
25. Obtain CPR/BLS certification.

Workplace Skills

- Positive attitude
- Teamwork
- Adapt to change
- Communication skills
- Professional appearance
- Confidentiality (verbal and written correspondence)
- Exhibit initiative
- Cultural competency
- Integrity
- Discretion
- Organize and prioritize
- Continuing education
- Critical thinking
- Dependability
- Accountability

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Standard															Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Medical Terminology	710	63	16														79	79
Medical Office Management	712	2	8	1	6	6	7	8	13								51	51
Medical Anatomy/Physiology	714	1	2	6	11	4	10	4	8	6	7	7	3	6			76	75
Clinical & Lab Procedures	716	10	13	10	17	9	7	13									79	79

STRANDS AND STANDARDS
MEDICAL FORENSICS

Course Description

This year-long course is designed to create an awareness of the branch of health science relating to medical forensics. This course focuses on introductory skills and assessment in order to develop the ability to identify, analyze, and process logically using deductive reasoning and problem solving. Medical forensics involves many aspects of health science instruction including laboratory skills and safety, microscopy, toxicology, measurement, physical evidence identification, pathology, anthropology, entomology, psychology, blood spatter analysis, and career exploration.

Intended Grade Level	11-12
Units of Credit	1.0
Core Code	36.01.00.00.085
Concurrent Enrollment Core Code	36.01.00.13.085
Prerequisite	Biology
Skill Certification Test Number	730
Test Weight	10.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Medical Forensics
Endorsement 2	
Endorsement 3	

STRAND 1

Introduction to Medical Forensics-Students will explore the fundamental aspects of Medical Forensics.

Standard 1

Detail the history and development of medical forensics.

- Create a historical timeline.
- Explore a variety of careers associated with medical forensics professions.
    - Crime laboratory analyst
    - Clinical laboratory technician
    - Microbiologist
    - Fingerprint analyst
    - Criminalist
    - Crime scene photographer
    - Phlebotomist
    - Forensic serology DNA criminalist
    - Serology technician
    - Forensic psychologist
    - Mental health counselor
    - Toxicologist
    - Biochemist
    - Pharmacologist
    - Geneticist
    - Medical examiner

Standard 2

Discuss the organization of the crime laboratory and detail the functions it serves.

- Discuss the federal programs established in the United States to investigate crimes.
    - ATF
    - FBI
    - Post Office
    - DEA
- Describe the organization of the Utah Crime Lab.
- Compare and contrast the Utah Crime Lab with a crime lab from another state and an international crime lab.

Standard 3

Describe the importance of physical evidence and observation.

- List the types of evidence.
    - Eyewitness
    - Class evidence
    - Physical evidence
        - Trace

        - Circumstantial
        - Individual
        - Class
    - Discuss how evidence is used to convince a jury of guilt.
    - Review and practice the steps of becoming an accurate observer.
        - Observe systematically
        - Turn off filters
        - Interpret information later
        - Documentation
            - Written
            - Photographs

STRAND 2

Fundamental Laboratory Skills-Students will explore essential laboratory safety skills and fundamental skills related to microscopy and measurement.

Standard 1

Demonstrate appropriate use of personal protective devices.

- Describe how personal protective devices protect the evidence and the lab worker.
- Demonstrate how to properly use personal protective devices (e.g., lab coats, gloves, safety glasses.
- Demonstrate safe removal of gloves.

Standard 2

Exhibit appropriate behavior in the lab.

- Explain the dangers of evidence contamination through food, drink, cosmetics, lotion, eye drops, and contact lenses.
- Follow proper disposal and clean-up procedures with respect to chemicals and laboratory equipment.
- Demonstrate proper hand washing technique.

Standard 3

Use laboratory equipment correctly and safely.

- Demonstrate the proper use of equipment.
    - Micropipette
    - Centrifuge
    - Spectrophotometer
    - Electrophoresis apparatus-DNA
    - Thermocycler
    - Microscope
    - Balance
    - Water bath
    - Vernier calipers

    - Glassware (metric units)
    - Rulers/Measuring tapes
- Demonstrate proper use, handling, and components of a compound microscope and a stereoscope.
- Demonstrate the ability to create a wet mount slide.

Standard 4

Follow laboratory procedures.

- Understand the purpose of individual steps within a protocol.
- Perform the steps of laboratory protocols accurately and in sequence.

Standard 5

Comply with policies and requirements for maintaining a lab manual.

- Follow standard operating procedures for maintaining a lab manual.
- Document laboratory work following the steps of the Scientific Method.
    - Objectives
    - Material
    - Procedures
    - Data/Results
    - Conclusion

Standard 6

Demonstrate proper handling of chemicals.

- Communicate the rationale for laboratory labeling procedures.
- Recognize and comply with the labeling of chemicals used in a laboratory setting for safe handling and storage (flammability, corrosiveness, biohazards, toxicity, etc.).
- Reference and interpret the guidelines in Safety Data Sheets (SDS).

Strand 2 Performance Evaluation included below:

STRAND 3

Medical Forensics Investigation-Students will describe techniques used to process a homicide crime scene and preserve the evidentiary value of the scene.

Standard 1

Describe how various medical forensics professionals process a crime scene.

- Responding officer
- Crime Scene Investigator
- Crime Scene Photographer
- Medical Examiner

Standard 2

Demonstrate or describe proper procedures of evidence collection.

- Trace (demonstrate)

- Biological (describe)
- Drugs, Plants, and Drug Paraphernalia (Describe)
- Weapons (describe)
- Fingerprint (demonstrate)

Standard 3

Identify how a crime scene and evidence may be compromised.

- Contamination (family, law enforcement, crime scene workers, etc.)
- Chain of custody (evidence lost, etc.)
- Environmental conditions (temperature, moisture, etc.)
- Preservation of the crime scene (value of evidence, etc.)
- Processing at the lab

Strand 3 Performance Evaluation included below:

STRAND 4

Students will identify and analyze trace evidence, emphasizing hair and fiber.

Standard 1

Examine trace evidence using a microscope, chromatography, and other techniques.

- Define and list examples of trace evidence.
- Collect and analyze various types of trace evidence (dust, pollen, fiberglass, etc.)
- Define and identify a variety of microbes.
- Use a compound microscope to identify microbes.

Standard 2

Examine and analyze the forensic aspects of hair.

- Describe the microscopic structure of hair.
    - Shaft
        - Cortex
        - Cuticle
        - Medulla
    - Root
    - Follicle
- Describe the location of nuclear and mitochondrial DNA associated with hair.
    - Shaft
    - Root
- Describe the hair growth cycle and how it relates to trace evidence.
    - Anagen, catagen, telogen
    - Chemical absorption
- Describe how to differentiate between animal hair and human hair.

Standard 3

Examine and analyze the forensic aspects of fibers by using physical (microscopic) and chemical (burn, acid, base, acetone) testing methods.

- Natural fibers
  - Wool
  - Silk
  - Cotton
  - Cashmere
  - Hemp
  - Etc.
- Synthetic
  - Polyester
  - Spandex
  - Acrylic
  - Nylon
  - Etc.

STRAND 5

Fingerprint Identification-Students will explore fingerprint identification.

Standard 1

Describe fingerprint classification.

- Describe the 3 fundamental principles of fingerprinting.
  - First degree
  - Second degree
  - Third degree
- Identify the degrees of fingerprinting
  - First degree
  - Second degree
    - Bifurcation
    - Ridge ending
    - Short ridge
    - Island/Dot
    - Double bifurcation
    - Crossover
    - Enclosure
  - Third degree

Standard 2

Identify and classify fingerprint and ridge patterns.

- Classify fingerprints into 3 basic patterns.
  - Loops
    - Right

        - Left
    - Whorls
        - Double
        - Plain
        - Central
        - Accidental
    - Arches
        - Tented
        - Plain
- Identify individualization of fingerprints.
    - Ridge characteristics
    - Ridge count
- Describe the IAFIS System of fingerprint identification.

Standard 3

Compare and contrast latent, plastic, and visible fingerprints.

- Develop latent fingerprints using dusting, staining, and chemical fuming.
- Develop a plastic fingerprint using a mold (wax, soap, putty, etc.)
- Create and document visible fingerprints using digital photography.

Strand 5 Performance Evaluation included below.

STRAND 6

Students will investigate the characteristics of blood, blood testing, and bloodstain analysis.

Standard 1

Identify the components and chemical properties of blood.

- List the components of blood.
    - Plasma
    - Erythrocytes (red blood cells)
    - Leukocytes (white blood cells)
    - Thrombocytes (platelets)
- Identify the antigens and antibodies that determine ABO blood types and the Rh factor.

Standard 2

Determine genetic probabilities using blood types.

- Use a Punnett Square to determine blood type probabilities.
- Apply the use of a Punnett Square to solve paternity questions.

Standard 3

Examine and analyze blood spatter.

- Illustrate size, shape, and directionality of blood spatter in a laboratory experiment.

- Compare and contrast low, medium, and high velocity blood spatter.
- Examine different types of blood spatter patterns.
    - Drip
    - Castoff
    - Transfer
    - Swipe
    - Wipe
    - Arterial
    - Expirated
    - Misting
    - Void

Standard 4

Describe proper procedures for blood stain evidence collection, presumptive testing (Kastle-Meyer), and preservation.

- Describe how to collect a wet stain and a dry stain.
- Demonstrate how to collect a large object in reference to blood evidence collection (i.e. sheets, blankets, clothing, etc.)
- Using residual blood from a mammal, perform and explain a presumptive blood test.
    - i.e. Absorption pads from ground beef

Strand 6 Performance Evaluation included below.

STRAND 7

Students will investigate various aspects of death.

Standard 1

Describe correct anatomical position and the role it plays in death investigation.

- Describe anatomical position.
- Apply directional terms related to autopsy.
    - Superior
    - Inferior
    - Anterior
    - Posterior
    - Dorsal
    - Ventral
    - Medial
    - Lateral
    - Proximal
    - Distal
    - Deep Superficial
    - Supine
    - Prone

Standard 2

Locate the body cavities and body regions and identify the major organs within each.

- Dorsal cavity
  - Cranial
  - Spinal
- Ventral cavity
  - Thoracic
  - Abdominal
  - Pelvic
- Body regions
  - Right hypochondriac
  - Left hypochondriac
  - Epigastric
  - Right lumbar
  - Left lumbar
  - Umbilical
  - Right inguinal
  - Left inguinal
  - Hypogastric

Standard 3

Identify the following organs and their location.

- Lungs
- Heart
- Diaphragm
- Esophagus
- Trachea
- Stomach
- Spleen
- Pancreas
- Liver
- Gallbladder
- Small Intestine
- Large intestine
- Kidney
- Bladder

Standard 4

Compare and contrast the manner and method of death.

- Define and list manners of death.
- Define and list methods/causes of death.
- Define and list mechanisms of death.

Standard 5

Identify the steps of an autopsy procedure and discuss the role an autopsy report may play in a death investigation.

- List the steps of an external examination.
- Describe the proper technique to perform a Y-shaped incision
- List the steps of an internal examination.

Standard 6

Identify the stages of decomposition to determine the approximate time of death.

- Define taphonomy and describe the stages of decomposition.
    - Fresh
    - Putrefaction
    - Black putrefaction
    - Butyric
    - Dry
- Compare and contrast the following:
    - Algor mortis
    - Rigor mortis
    - Livor mortis
- Identify common insects associated with decomposition (i.e. blow fly, carrion beetle, etc.) and diagram their life cycles.
    - Egg
    - Larva
    - Pupa
    - Adult
- Identify various environmental factors related to time of death (temperature, humidity, cause of death, etc.)

Strand 7 Performance Evaluation included below.

STRAND 8

Students will explore aspects of the criminal mind.

Standard 1

Locate and identify the major organs of the nervous system.

- Brain
    - Cerebral cortex
    - Cerebellum
- Spinal cord

Standard 2

Identify and describe offender profiling procedures.

- Profiling input

- Decision process models
- Crime assessment
- Criminal profile
- Investigation
- Apprehension

Standard 3

Identify psychological testing processes and procedures and other factors that affect the criminal mind.

- Describe the tests used to determine the cognitive and personality types of offenders.
- Discuss the problems with psychometric tests.
- Describe brain abnormalities, genetics, and environmental factors related to the criminal mind.
- Describe the physiological functions measured by a polygraph machine.

Standard 4

Compare and contrast neurobiological brain abnormalities and mental conditions related to abnormal psychology and the criminal brain and technical instrumentation used to diagnose these abnormalities.

- Describe brain abnormalities, genetics, and environmental factors related to the criminal mind.

Standard 5

Explore the psychological aspects of serial killers and mass murderers.

- Define serial killer.
- Define mass murderer.
- Explore the motives of a serial killer.
- Compare and contrast the types of serial killers.
- Explore the motives of a mass murder.

STRAND 9

Students will explore characteristics of physical evidence and remains.

Standard 1

Identify the basic bones of the skeleton and distinguish the differences between long and short bones.

- Cranium
- Vertebrae
- Sternum
- Xiphoid process
- Ribs
- Hyoid
- Humerus

- Radius
- Ulna
- Carpals
- Metacarpals
- Phalanges
- Pelvis
- Femur
- Patella
- Tibia
- Fibula
- Tarsals
- Metatarsals
- Phalanges

Standard 2

Use skeletal remains to determine the physical characteristics of an individual.

- Determine the sex of an individual based on skull, jaw, brow ridge, pelvis, and femur.
- Determine the ancestry of an individual.
- Estimate the age of an individual.
- Estimate the height, build, and handedness of an individual.

Standard 3

Identify injuries, bone diseases, and possible causes/methods of death using bone characteristics.

- Compare and contrast pre and postmortem bone injuries (i.e. fractures).
- Identify bone patterns indicating disease (i.e. arthritis).
- Identify bone markings that could indicate cause of death (i.e. stab wound, bullet hole, blunt force trauma, etc.)

Standard 4

Describe how teeth are used in forensic identification.

- Name and number deciduous (baby) and permanent teeth.
- Employ dentition patterns as a means for bite mark identification.
- Describe the use of forensic dentistry in regard to mass disasters and body identification.

Strand 9 Performance Evaluation included below.

STRAND 10

Students will develop an understanding of the adverse effects of drugs and be acquainted with the laboratory investigation of the most common poisonings.

Standard 1

Identify the five schedules of drug types and classify according to the effects that they have on the body.

- Describe the five schedules of drug types.
    - Schedules 1-5
- Classify the Categories of drugs based on the physiological effects on the body and the chemical composition.
    - Stimulants (i.e. Amphetamines, Cocaine, Crack, Methamphetamines, Adderall, other mental disorder medications)
    - Depressants (i.e. Alcohol, Sedatives, Xanax, Marijuana, All narcotics, other mental disorder medication)
    - Narcotics/Opioids (i.e. Heroin, Codeine, Methadone, Oxycodone)
    - Hallucinogens (i.e. Ecstasy (MDMA), Bath salts, Mushrooms, GHB, other "date rape" drugs)

Standard 2

Describe how individual body systems are affected by drug intake.

- Integumentary
- Skeletal
- Muscular
- Nervous
- Cardiovascular
- Respiratory
- Endocrine
- Digestive
- Urinary
- Reproductive

Standard 3

Identify signs and symptoms of an overdose.

- Stimulants
- Depressants
- Narcotics/Opioids
- Hallucinogens

Standard 4

Describe current field and laboratory procedures used for measuring the concentration of alcohol in the bloodstream.

- Describe techniques used to measure the blood alcohol content (BAC).
    - Through blood
    - Through the breath
- Anabolic steroids
- Depressants (including alcohol)

- Bacterial toxins
  - Botulism
  - Tetanus
- Heavy metals and pesticides
  - Lead
  - Mercury
  - Arsenic
  - Cyanide
  - Strychnine

Standard 5

Discuss other chemical and biological agents that have high mortality rates with exposure.

- Bacterial toxins
  - Botulism (clostridium botulinum)
  - Tetanus (clostridium tetani) lockjaw
- Bioterrorism
  - Ricin (castor beans)
  - Anthrax (Bacillus anthracis)

Standard 6

Compare and contrast methods used to collect and package drug evidence.

- Identify procedures used to collect and package plant substances.
- Identify procedures used to collect and package liquids.
- Identify procedures used to collect and package biohazards.

STRAND 11

Students will investigate the importance of DNA evidence.

Standard 1

Identify the structure and function of a DNA molecule.

- Describe the structure of DNA.
- Describe the function of DNA.
- Compare and contrast nuclear DNA and mitochondrial DNA

Standard 2

Describe advancements in technology used to obtain a DNA fingerprint.

- Describe the purpose of PCR.
- Define RFLP and discuss how it relates to forensic identification.
- Define STR and discuss how it relates to forensic identification.
- Describe the CODIS System of DNA identification.
- Processing at the lab.

Performance Skills

STRAND 2

Maintain an accurate lab manual.

- Follow standard operating procedures for maintaining a lab manual.
- Document laboratory work following the steps of the Scientific Method.

STRAND 3

Collect and properly label evidence.

STRAND 5

Develop a latent fingerprint and identify 10 ridge characteristics.

STRAND 6

Classify blood spatter by velocity.

- High
- Medium
- Low

STRAND 7

Identify the steps of an autopsy procedure by animal dissection.

- Steps of an external examination
- Proper Y-shaped incision technique
- Steps of an internal examination

STRAND 9

Identify the sex of an individual based on skeletal markers.

- Skull
- Jaw
- Brow ridge
- Pelvis
- Femur

Match a bite mark from a victim to the perpetrator.

Workplace Skills

- Communication
- Problem solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certificate Test Points by Strand

Example table below. Refer to instructions for specifics.

Test Name	Test #	Number of Test Points by Standard											Total Points	Total Question
		1	2	3	4	5	6	7	8	9	10	11		
Medical Forensics	730	3	2	3	7	10	10	11	5	8	4	5	68	65

STRANDS AND STANDARDS
MEDICAL MATH

Learning that works for Utah
CTE®

Course Description

An instructional program that prepares students with skills to compute mathematical equations related to healthcare. The course integrates medical-physiological concepts and mathematics. Students will engage in math activities including problem solving, reasoning and proof, communication, connections, and representations.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	36.01.00.00.150
Concurrent Enrollment Core Code	N/A
Prerequisite	Secondary Math 2 PLUS a Health Science Course
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Medical Math
Endorsement 2	
Endorsement 3	

STRAND 1

Uses of Mathematics in Healthcare

Standard 1

Analyze the use of medical mathematics in the healthcare system.

- Explore different healthcare careers and the math used within the career.
- Compare and contrast at least two different careers.

Strand 1 Performance Skill listed below

STRAND 2

Common Mathematical Operations as used in Healthcare

Standard 1

Compute fluently and make reasonable estimates.

- Evaluate and simplify numerical expressions containing rational numbers using the order of operations.
- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios
- Whole numbers
  - Supplies and inventories
  - Intake and output
  - Cholesterol
  - Quantities
  - Nutrition
  - Vital signs labs
  - Lever systems
  - Laboratory Values

Standard 2

Represent rational numbers in a variety of ways.

- Choose appropriate and convenient forms of rational numbers for solving problems and representing answers (e.g., decimal, fraction, or percent).
- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios.
- Decimals:
  - Tools, instruments
  - Nutrition
  - Weights
  - Rounding
  - Temperature
  - EKG's
  - Medications
  - Laboratory values

Standard 3

Identify relationships among rational numbers and operations involving these numbers.

- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios.
- Fractions
  - Tools, instruments
  - Weights
  - Estimation
  - EKG's
  - Medications
  - Laboratory values
  - Conversions (Fahrenheit/Celsius)

Standard 4

Calculate percentages.

- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios.
- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios.
  - Chemical solutions
  - Laboratory values
  - Growth charts
  - Medications
  - Nutrition
  - Intake/output
  - Target heart rate
  - Stroke volume
  - Cardiac output
  - Blood loss
  - Body surface area, burns
  - Oxygen saturation

STRAND 3

Ratios and Proportions

Standard 1

Evaluate, solve, and analyze mathematical situations using algebraic properties and symbols.

- Solve proportions that include algebraic first-degree expressions (solve for x or use dimensional analysis).
  - Nutrition
  - Chemical solutions
  - Dosage conversions

Standard 2

Use ratios to compare data.

- Laboratory values
- Medications
- Diseases (statistics)

STRAND 4

Gathering Data (Use of Medical Instruments)

Standard 1

Use patterns, relations, and functions to represent mathematical situations.

- Compute solutions to problems and determine the reasonableness of an answer by relating them to applied scenarios.
  - Conversions
  - Metric units
  - Time (12/24)
  - Roman numerals (Arabic/Roman)
  - Temperature (Celsius/Fahrenheit)
  - Pre/Post workout weight analysis
  - Body composition
  - Pharmacology

Standard 2

Represent quantitative relationships using mathematical models and symbols.

- Find and interpret rates of change by analyzing graphical and numerical data.
- Understand measurable attributes of objects and the units, systems, and processes of measurement.
- Solve problems using visualization and spatial reasoning.
- Instruments
  - IV flow rates
  - Macro/micro drops (tubing)
  - Syringes
  - Rulers, tape measures
  - Scales
  - Goniometry, ROM
  - Centrifuges
  - Sphygmomanometer gauges (blood pressure)
  - Pulse oximeters
  - Oxygen flow rates
  - Thermometers

STRAND 5

Interpreting Data

Standard 1

Formulate and answer questions by collecting, organizing, and analyzing statistical data.

- Collect, record, organize, and display a set of statistical data.
- Determine whether the pattern of the data is linear or nonlinear when given in a list, table, or graph.
- Interpret the correlation between two variables as positive, negative, or having no correlation.
- Find a line of best fit by estimation, choosing two points, or using technology for a given set of statistical data.

- Analyze the meaning of the slope and y-intercept of a line of best fit as it relates to the statistical data.
- Find mean, median, mode, and range for a statistical data set.
- Analyze the meaning of the maximum or minimum and intercepts of the regression equation as they relate to a given set of bivariate data.
- Make predictions and estimations and determine their reasonableness using a regression equation (line of best fit).
- Graphs and charts
  - Interpreting charts and graphs
  - Temperature, pulse, respiration graphs
  - Intake and output charts
  - Height, weight, measurement graphs
  - Cardiac output
  - Medication errors
  - Census
  - Acuities
  - Disease, mortality rates
  - Job outlook, projections
  - Treatment prognosis
  - Clinical trials
  - Healthcare costs
  - Effectiveness (facilities, providers)
  - Wellness indicators
  - Reliability and validity
  - Body mass index (BMI)
  - Body composition
  - Epidemiology

Standard 2

Apply basic concepts of probability.

- Determine and express the probability of an event as a fraction, percent, ratio, or decimal.
- Determine the conditional probability of an event (false positive/false negative).

STRAND 6

Math for Medications

Standard 1

Compute fluently and make reasonable estimates.

- Reading drug labels
- Interpreting prescriptions/Patient instructions

Standard 2

Evaluate, solve, and analyze mathematical situations using algebraic properties and symbols.

- Simplify and evaluate numerical expressions (including integer exponents and square roots), algebraic expressions, formulas, and equations.
- Using medical reference materials to determine if calculated dosages are safe.

Standard 3

Represent quantitative relationships using mathematical models and symbols.

- Dosing
- Dosage conversions

STRAND 7

Medical Accounting and Business

Standard 1

Apply systems of order.

- Numerical filing
- Appointment scheduling

Standard 2

Evaluate, solve, and analyze mathematical situations using algebraic properties and symbols.

- Maintaining accounts
- Checks, deposit slips, and receipts
- Calculating cash transactions/Payroll
- Budgeting
- Depreciation, amortization
- Insurance

STRAND 8

Exponents and Logarithms

Standard 1

Use properties of exponentials to solve equations.

- Radiation exposure
- Half life

Standard 2

Use properties of logarithms to solve equations.

- pH

Performance Skills

- Oral presentation on chosen healthcare career mathematics.
- Use healthcare career choice to create a business model.

Workplace Skills

- Critical thinking
- Collaboration
- Communication (Oral/Written)
- Organization
- Technical skills
- Consumer awareness

- Commercial awareness
- Legal requirements/expectations
- Interpersonal relationships

STRANDS AND STANDARDS
LAW ENFORCEMENT

Course Description

This course prepares individuals to perform the duties of police and public security officers, including patrol and investigative activities, traffic control, crowd control, public relations, witness interviewing, evidence collection and management, court procedures and the law in general. Basic crime prevention methods, weapon and equipment operation, equipment maintenance, and other routine law enforcement responsibilities are also included.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.06.00.00.001
Concurrent Enrollment Core Code	40.06.00.13.001
Prerequisite	None
Skill Certification Test Number	570
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Law Enforcement
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will be able to understand law enforcement history, crime awareness, and causes of crime.

Standard 1

Explain the history of law enforcement in relation to (Chapter 1)

- Police role in society.
- Philosophy of law enforcement
- Reformers of law enforcement

Standard 2

Describe Peace Officer authority in the United States. (Chapter 1)

- Federal
- State

Standard 3

Explain the Bill of Rights. (Chapter 1)

- History of the Bill of Rights
- Reasons for the Bill of Rights
- Rights for citizens and police

Standard 4

Describe different methods of crime data collection and reporting. (Chapter2)

- Uniform Crime Reports (UCR)
- National incident-based reporting systems (NIBRS)
- Persons arrested
- Clearance rates
- Why crime rates fluctuate

Standard 5

Identify possible causes of crime. (Chapter 3)

- Psychological explanations
- Sociological explanation
- Biological theory
- Integration of theories
- Typological theory
- Mental Illness and crime
- Crisis intervention training (CIT)
- Suicide prevention

STRAND 2

Students will be able to understand the law, criminal justice system, and trial proceedings.

Standard 1

Examine Utah law. (Chapter 4)

- Title 76 Chapter 1, General Provisions
- Title 76 Chapter 2, Principles of Criminal Responsibilities
- Elements of crime
- Title 76 Chapter 3, Punishment
- Title 76 Chapter 4, Inchoate Offenses
- Title 76 Chapter 5, Crime Against Persons
- Title 76 Chapter 6, Crimes Against Property
- Title 76 Chapter 7, Offenses Against the Family
- Title 76 Chapter 8, Offenses Against Administration of Government
- Title 76 Chapter 9, Offenses Against Public Order and Decency
- Title 76 Chapter 10, Offenses Against Public Health, Safety, Welfare, and Morals
- Controlled Substances
- Alcohol-related Offences
- Local Law and Ordinances
- Expungement

Standard 2

Describe the components of the criminal justice system. (Chapter 5)

- Police
    1. Citation arrest
    2. Citizen arrest
- Courts
    1. Judge selection and retention
    2. Appellate courts
    3. Trial courts
    4. Pre-trial proceedings
    5. Indeterminate sentence
    6. Forfeiture
    7. Summons
- Corrections
    1. Corrections history
    2. Diversion
    3. Recidivism
    4. Furlough

Standard 3

Describe the trials process. (Chapter 6)

- Principles of criminal responsibility

- Roles of the judge
- Roles of the prosecutor and defense attorney
- Plea bargaining
- The jury
- Who must testify
- Rules of evidence
- Costs of conviction
- Appeal

STRAND 3

Students will be able to understand the corrections system and juvenile justice.

Standard 1

Identify the need and purpose of corrections. (Chapter 7)

- Goals of corrections
- Corrections mission
- State Prison
- County Jails
- Prisoner rights
- Trends in corrections
- The death penalty (Capital Punishment)

Standard 2

Explain the juvenile justice system. (Chapter 8)

- Jurisdiction
- Delinquent Act
    1. Criminal offense
    2. Status offense
- Diversion
- Juvenile rights
- Commissioners
- Interstate compact
- Serious youth offender law
- Certification hearing
- Division of Youth Services
- Detention center
- Expungement

STRAND 4

Students will be able to understand the arrest procedures, policies, and ethics of law enforcement officers.

Standard 1

Outline the laws of arrest. (Chapter 9)

- Arrest with a warrant
- Arrest without a warrant
- Arrest elements
    1. Intent
    2. Authority
    3. Subjection
    4. Understanding
- Summons
- Use of force in making an arrest
- Use of deadly force by a peace officer

Standard 2

Explain search and seizure. (Chapter 9)

- Probable cause
- Search warrant
- Search without a warrant
    1. Consent search
    2. Plain view
- Search of a person
- Search of a vehicle
- Stop and frisk law
- Exclusionary rule

Standard 3

Define agency policies and professional ethics. (Chapter 10)

- Law, policy, and ethics
- The Law Enforcement Code of Ethics
- Law enforcement disciplinary action

STRAND 5

Students will be able to understand procedures relating to traffic investigations and patrol functions.

Standard 1

Explore basic law enforcement activities. (Chapter 11)

- Report writing
- Use of emergency equipment
- Pursuit driving
- Command structure
- Radio procedure
- Use of force
- Use of firearms

Standard 2

Illustrate traffic investigations. (Chapter 12)

- Traffic laws
- Traffic stop procedures
- Accident investigations
- Driving under the influence (DUI)
    1. Utah DUI law
    2. DUI procedures

Standard 3

Describe patrol functions. (Chapter 14)

- Goals of patrolling
- Field interviews
- Domestic disturbances
- Civil problems

STRAND 6

Students will be able to understand investigative work, evidence collecting and handling.

Standard 1

Explore investigative techniques. (Chapter 15)

- Developing leads
- Interviews
- Interrogations
- Miranda warning

Standard 2

Identify proper evidence handling. (Chapter 13)

- Physical evidence
- Chain of evidence
- Locating and collecting evidence
- Evidence analysis
- Autopsy

- Fingerprinting
- DNA

STRAND 7

Students will be able to understand law enforcement as an occupation.

Standard 1

Explore career paths in Law Enforcement. (Chapter 17)

- Job Opportunities
- Minimum qualifications and testing
- Application process

Standard 2

Describe different specialized units. (Chapter 16)

- Special Weapons and Tactics (SWAT)
- Gang unit
- Narcotics unit
- Vice squad
- K-9 unit
- Community-oriented policing unit (COP)
- School resource officer (SRO)
- Major accident team
- Court services
- Training unit
- Criminal intelligence unit (CIU)
- Chaplain corps
- Reserve corps
- Search and rescue

Standard 3

Recognize rewards and challenges of law enforcement careers. (Chapter 17)

- Rewards
    1. Public recognition
    2. Community Services
    3. Job promotion
    4. Variety
- Challenges
    1. Shift schedules
    2. Societal influences
    3. Emotional/Physical challenges
- Work/Life Balance

Performance Skills

- Insert crime statistics into a graphic representation (such as a crime clock, graph or other tool) and evaluate the crime trend illustrated.
- Write a proper probable cause statement based on a given scenario.
- Correctly label a traffic accident diagram.
- Apply team skills to a group project.
- Complete a job application.

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Conflict Resolution
- Legal Requirements/ Expectation

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Standard							Total Points	Total Questions
		1	2	3	4	5	6	7		
Law Enforcement	570	9	24	11	7	13	7	5	76	75

Course Changes 2020: Information Technology Pathways

A+ (Old Name) – New Name: Computer Systems 1 and Computer Systems 2 This course went through an entire change.

- We changed the course name to take out the assumption that a student would receive their A+ Certification. Students still have the option to take the exam, but due to the cost of the exam, many do not take it.
- The Strand & Standards were completely re-written to match the updated A+ industry exam. The old Strands & Standards were aligned to the industry exam that had been written three exams ago.
- Everything on these current Strands & Standards for both Computer Systems 1 and Computer Systems 2 are completely new. Nothing remains from the old Strands & Standards.

Cloud Computing – This course will no longer exist as it is written now.

- Forms have been submitted to change the title from Cloud Computing to Cloud Computing 1.
- A new course will be created and titled Cloud Computing 2.
- The Strands & Standards for Cloud Computing been completely re-written and called Cloud Computing 1. Nothing remains from the current course.
- The Strands & Standards for Cloud Computing 2 have been written.

Network Fundamentals

- All Strands & Standards have been updated to match the industry exam. Very few terms are the same from the old to the new Strands & Standards.

STRANDS AND STANDARDS
COMPUTER SYSTEMS 1

Course Description

Students will learn necessary competencies for an entry-level IT professional including installing, building, upgrading, repairing, configuring, troubleshooting, optimizing, diagnosing, and performing preventive maintenance of basic personal computer hardware.

Relationship to the CompTIA Certification

To receive CompTIA A+ certification a candidate must pass two exams. The first exam is the CompTIA A+ Certification Exam: Core 1 (220-1001) as of 09/2020. The Strands & Standards for Computer Systems 1 match to this certification. The candidate must also pass the CompTIA A+ Certification Exam: Core 2 (220-1002) as of 09/2020. This is the second exam required for CompTIA A+ certification candidates to complete their certification. The Strands & Standards for Computer Systems 2 match to this certification.

ADA Compliant: XXXXXX 2020

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	35.01.00.00.040
Concurrent Enrollment Core Code	35.01.00.13.040
Prerequisite	Suggested Information Technology, Intro OR Teacher Approval
Skill Certification Test Number	State Skills Exam #884 CompTIA IT Fundamentals (FC0- U61), CompTIA A+ Core 1 (220-1001), CompTIA A+ Core 2 (220-1002), TestOut PC Pro, HP ATA – connected Devices (HP4-A01), MTA Windows OS Fundamentals (#98-349), MTA Networking Fundamentals (#98-366), MTA Security Fundamentals (#98-367)
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	A+ Computer Maintenance and Repair (old)
OR Endorsement 2	OR Cybersecurity
OR Endorsement 3	OR Information Technology System

CompTIA A+ Certification Exam: Core 1 Objectives

The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA A+ Core 1 exam is based on these objectives.

Doman A+ (220-1001)	Percentage of Exam
1.0 Mobile Devices	14%
2.0 Networking	20%
3.0 Hardware	27%
4.0 Virtualization and Cloud Computing	12%
5.0 Hardware and Network Troubleshooting	27%
Total	**100%**

These Strand & Standards align with the CompTIA A+ Certification Exam: Core 1. These Strands & Standards also align with the TestOut PC Pro (Chapters 1 – 7).

**Note: The bulleted lists below each objective are not exhaustive lists. Even though they are not included in this document, other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam.

STRAND 1

Mobile Devices

Standard 1: Recognize laptop hardware and components.

- Hardware:
  - Keyboard
  - Hard drive
    - SSD vs. Hybrid vs. Magnetic disk
    - 1.8in vs. 2.5in
  - Memory
  - Smart card reader
  - Optical drive
  - Wireless card/Bluetooth module
  - Cellular card
  - Video card
  - Mini PCIe
  - Screen
  - DC Jack
  - Battery
  - Touchpad
  - Plastics/frame
  - Speaker
  - System Board
  - CPU
  - Webcam
  - Microphone
  - WiFi antenna connector
  - Inverter
- Features and types:
  - Special function keys
  - Docking station
  - Port replicator
  - Rotating/removeable screens
  - Tablets
  - Smartphones
  - Wearable technology devices
  - GPS
  - E-readers
  - Wired and wireless

Standard 2: Cloud storage connection and configuration.

- Synchronization methods:
  - Synchronize to the cloud
  - Synchronize to the desktop
  - Synchronize to the automobile
- Types of data to synchronize:
  - Contacts
  - Applications
  - Email
  - Pictures
  - Music
  - Etc.

STRAND 2

Networking

Standard 1: Define protocols and their purposes.

- Ports and protocols:
  - 21 – FTP
  - 22 – SSH
  - 23 – Telnet
  - 25 – SMTP
  - 53 – DNS
  - 80 – HTTP
  - 110 – POP3
  - 143 – IMAP
  - 3389 – RDP
  - 538 – AFP
  - 67/68 – DHCP
  - 389 – LDAP
- TCP vs. UDP

Standard 2: Compare and contract common networking hardware devices.

- Routers
- Switches
  - Managed
  - Unmanaged
- Access points
- Cloud-based network controller
- Firewall
- Network interface card

- Repeater
- Hub
- Cable/DSL modem
- Bridge
- Patch Panel
- Power over Ethernet (PoE)
    - Injectors
    - Switch
- Ethernet over Power

Standard 3: Understand basic wired/wireless SOHO networks and installation standards.

- Router/switch functionality
- Access point settings
- IP addressing
- NIC Configuration
    - Wired
    - Wireless
- End-user device configuration
- IoT device configuration
    - Thermostat
    - Light switches
    - Security cameras
    - Door locks
    - Voice-enabled, smart speaker/digital assistant
- Cable/DSL modem configuration
- Firewall settings
    - DMZ
    - Port forwarding
    - NAT
    - UPnP
    - Whitelist/backlist
    - MAC filtering
- QoS
- Wireless settings
    - Encryption
    - Channels
    - Qos

Standard 4: Compare and contrast wireless networking protocols.

- 802.11a
- 802.11b
- 802.11g
- 802.11n
- 802.11ac
- Frequencies
  - 2.4 GHz
  - 5 GHz
- Channels
  - 1-11
- Bluetooth
- NFC
- RFID
- Z-Wave
- 4G
- 5G
- LTE

Standard 5: Identify common networks, their purpose, and benefits.

- Server roles
  - Web server
  - File server
  - Print server
  - DHCP server
  - DNS server
  - Proxy server
  - Mail server
  - Authentication server
  - syslog
- Internet appliance
  - UTM
  - IDS
  - IPS
  - End-point management server
- Network types
  - LAN
  - WAN
  - PAN
  - MAN
  - WMN

Standard 6: Explain common network configuration concepts.

- IP addressing
  - Static
  - Dynamic
  - APIPA
  - Link local
- DNS
- DHCP
  - Reservations
- IPv4 vs. IPv6
- Subnet mask
- Gateway
- VPN
- VLAN
- NAT

Standard 7: Compare and contract Internet connection types.

- Internet connection types
  - Cable
  - DSL
  - Dial-up
  - Fiber
  - Satellite
- ISDN
- Cellular
  - Tethering
  - Mobile hotspot
- Line-of-sight wireless internet service

Standard 8: Understand appropriate use of networking tools.

- Crimper
- Cable stripper
- Multimeter
- Tone generator and probe
- Cable tester
- Loopback plug
- Punchdown tool
- WiFi analyzer

STRAND 3

Hardware

Standard 1: Explain basic cable types, features, and their purposes.

- Network cables
  - Ethernet
    - Cat 5
    - Cat 5e
    - Cat 6
    - Plenum
    - Shielded twisted pair
    - Unshielded twisted pair
    - 568A/B
  - Fiber
  - Coaxial
  - Speed and transmission limitations
- Video cables
  - VGA
  - HDMI
  - Mini-HDMI
  - DisplayPort
  - DVI (DVI-D/DVI-I)
- Multipurpose cables
  - Lightning
  - Thunderbolt
  - USB
  - USB-C
  - USB 2.0
  - USB 3.0
- Peripheral cables
  - Serial
- Hard drive cables
  - SATA
  - IDE
- Adapters
  - DVI to HDMI
  - USB to Ethernet
  - DVI to VGA

Standard 2: Identify common connector types.

- RJ-11
- RJ-45
- RS-232
- RG-59
- RG-6
- USB
- Micro-USB
- Mini-USB
- USB-C
- Lightning
- eSATA
- Molex

Standard 3: Compare, contrast, and install RAM types.

- RAM Types
    - SODIMM
    - DDR2
    - DDR3
    - DDR4
- Single channel
- Dual channel
- Triple channel
- Error correcting
- Parity vs. non-parity

Standard 4: Understand how to install and configure storage devices.

- Identify optical drives
- Solid-state drives
    - M2 drives
    - NVME
    - SATA 2.5
- Magnetic hard drives
    - 5,400rpm
    - 7,200rpm
    - 10,000rpm
    - 15,000rpm
    - Sizes:
        - 2.5
        - 3.5
- Hybrid drives

- Flash
    - SD card
    - Micro-SD card
    - Mini-SD card
    - xD
- Configurations
    - RAID 0, 1, 5, 10
        - Hardware vs. software raids (benefits)
    - Hot-swappable

Standard 5: Install and configure motherboards, CPU's, and expansion cards.

- Motherboard form factor
    - ATX
    - mATX
    - ITX
    - mITX
- Motherboard connectors types
    - PCI
    - PCIe
    - Riser card
    - Socket types
    - SATA
    - IDE
    - Front panel connector
    - Internal USB connector
- BIOS/UEFI settings
    - Boot options
    - Firmware updates
    - Security settings
    - Interface configurations
    - Security
        - Passwords
        - Drive encryption
            - TPM
            - Secure boot
- CMOS battery

- CPU features
  - Single-core
  - Multicore
  - Virtualization
  - Hyperthreading
  - Speeds (Hertz)
  - Overclocking
  - Integrated GPU
- Compatibility
  - AMD
  - Intel
- Cooling mechanism
  - Fans
  - Heat sink
  - Liquid
  - Thermal paste
- Expansion cards
  - Video cards
    - Onboard
    - Expansion cards
  - Sound cards
  - Network interface card
  - USB expansion card
  - eSATA card

Standard 6: Understand the use of various peripherals.

- Printer
- ADF/flatbed scanner
- Barcode scanner/QR scanner
- Monitors
- VR/AR headset
- Optical drive types
- Mouse
- Keyboard
- Touchpad
- Signature pad
- Game controllers
- Camera/webcam
- Microphone
- Speakers
- Headset

- Projector
    - Lumens/brightness
- External storage drives
- KVM
- Magnetic reader/chip reader
- NFC/tap pay device
- Smart card reader

Standard 7: Understand power supply installation types and features.

- Input 115V vs. 220V
- Output 5V v. 12V
- 24-pin motherboard adapter
- Wattage rating
- Number of devices/types of devices to be powered

Standard 8: Understand the appropriate components needed for a custom PC configuration.

- Graphic/CAD/CAM design workstation
    - SSD
    - High-end video
    - Maximum RAM
- Audio/video editing workstation
    - Specialized audio and video card
    - Large, fast hard drive
    - Dual monitors
- Virtualization workstation
    - Maximum RAM and CPU cores
- Gaming PC
    - SSD
    - High-end video/specialized GPU
    - High-definition sound card
    - High-end cooling
- Network attached storage device
    - Media streaming
    - File sharing
    - Gigabit NIC
    - RAID array (0, 1, 5, 1+0)
    - Hard drive
    - JBOD
- Standard thick client
    - Desktop applications
    - Meets recommended requirements for selection OS

- Thin client
    - Basic applications
    - Meets minimum requirements for selected OS
    - Network connectivity

Standard 9: Understand printer types and installation.

- Use appropriate drivers for a given operating system
    - Configuration settings
        - Duplex
        - Collate
        - Orientation
        - Quality
- Device sharing
    - Wired
        - USB
        - Serial
        - Ethernet
    - Wireless
        - Bluetooth
        - 802.11(a, b, g, n, ac)
        - Infrastructure vs. ad hoc
    - Integrated print server (hardware)
    - Cloud printing/remote printing
- Public/shared devices
    - Sharing local/networked device via operating system settings
        - TCP/Bonjour/AirPrint/Google Print
    - Data privacy
        - User authentication on the device
        - Hard drive caching
- Print technologies
    - Laser
        - Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
        - Imaging process: processing, charging, exposing, developing, transferring fusing, and cleaning
        - Maintenance Replace toner, apply maintenance kit, calibrate, clean
    - Inkjet
        - Ink cartridge, print head, roller, feeder, duplexing assembly, carriage, and belt
        - Calibrate
        - Maintenance: Clean heads, replace cartridges, calibrate, clear jams

- Thermal
  - Feed assembly, heating element
  - Special thermal paper
  - Maintenance: Replace paper, clean heating element, remove debris
- Impact
  - Print head, ribbon, tractor feed
  - Impact paper
  - Maintenance: Replace ribbon, replace print head, replace paper
- Virtual
  - Print to file
  - Print to PDF
  - Print to XPS
  - Print image
- 3D printers
  - Plastic filament

STRAND 4

Hardware and Network Troubleshooting

Standard 1: Use the best practice methodology to resolve problems.

- Always consider corporate policies, procedures, and impacts before implementing changes.
  1. Identify the problem
     - Question the user and identify user changes to computer and perform backups before making changes
     - Inquire regarding environmental of infrastructure changes
     - Review system and application logs
  2. Establish a theory of probable cause (question the obvious)
     - If necessary, conduct external or internal research based on symptoms
  3. Test the theory to determine cause
     - Once the theory is confirmed, determine the next steps to resolve problem
     - If theory is not confirmed re-establish new theory or escalate
  4. Establish a plan of action to resolve the problem and implement the solution
  5. Verity full system functionality and, if applicable, implement preventive measures
  6. Document findings, actions, and outcomes

Standard 2: Understand the trouble shooting process relating to motherboards, RAM, CPU's, and power.

- Common symptoms
  - Unexpected shutdowns
  - System lockups
  - POST code beeps
  - Blank screen on bootup
  - BIOS time and setting resets
  - Attempts to boot to incorrect device
  - Continuous reboots
  - No power
  - Overheating
  - Loud noise
  - Intermittent device failures
  - Fans pain- no power to other devices
  - Indicator lights
  - Smoke
  - Burning smell
  - Proprietary crash screens (BSOD/pin wheel)
  - Distended capacitors
  - Log entries and error messages

Standard 3: Troubleshooting storages devices.

- Common symptoms
  - Read/write failure
  - Slow performance
  - Loud clicking noise
  - Failure to boot
  - Drive not recognized
  - OS not found
  - RAID not found
  - RAID stops working
  - Proprietary crash screens (BSOD/pin wheel)
  - S.M.A.R.T. errors

Standard 4: Troubleshooting multimedia components.

- Common systems
  - VGA mode
  - No image on screen
  - Overheat shutdown
  - Dead pixels

- Artifacts
- Incorrect color patterns
- Dim image
- Flickering image
- Distorted image
- Distorted geometry
- Burn-in
- Oversized images and icons

Standard 5: Troubleshoot common network problems.

- Common symptoms
  - Limited connectivity
  - Unavailable resources
    - Internet
    - Local resources
      - Shares
      - Printers
      - Email
  - No connectivity
  - APIPA/link local address
  - Intermittent connectivity
  - IP conflict
  - Slow transfer speeds
  - Low RF signal
  - SSID not found

STRAND 5

Operational Procedures

Standard 1: Understand proper communication techniques and professionalism.

- Use proper language and avoid jargon, acronyms, and slang, when applicable
- Maintain a positive attitude/ project confidence
- Actively listen (taking notes) and avoid interrupting the customer
- Be culturally sensitive
  - Use appropriate professional titles, when applicable
- Be on time (if late, contact the customer)

- Avoid distractions
    - Personal calls
    - Texting/social media sites
    - Talking to coworkers while interacting with customers
    - Personal interruptions
- Dealing with difficult customers or situations
    - Do not argue with customers and/or be defensive
    - Avoid dismissing customer problems
    - Avoid being judgmental
    - Clarify customer statements (ask open-ended questions to narrow the
    - scope of the problem, restate the issue, or question to verify understanding)
    - Do not disclose experiences via social media outlets
- Set and meet expectations/timeline and communicate status with the customer
    - Offer different repair/ replacement options, if applicable
    - Provide proper documentation on the services provided
    - Follow up with customer/user at a later date to verify satisfaction
- Deal appropriately with customers' confidential and private materials
    - Located on a computer, desktop, printer, etc.

Performance Skills

- Remote support from an external location.
- Assisting with software and hardware, including troubleshooting.
- Ask client/customer various questions about the installed computer systems, run diagnostic, handle software security.
- Highlight customer service and listening skills to understand a customer's problem so that student can help them, even when they are frustrated.
- Problem-solving skills are paramount so that you can figure out exactly what is causing the tricky hardware and software issues.

Workplace Skills

- Communication
- Problem Solving
- Teamwork,
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certificate Test Points by Strand

I will replace this picture once we finalize the state skills exam.

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Computer Maintenance & Repair (A+)	884	23	7	10	17	3	6					66	61

STRANDS AND STANDARDS
COMPUTER SYSTEMS 2

Course Description

Students will learn necessary competencies for an entry-level IT professional including troubleshooting, optimizing, diagnosing, and performing preventive maintenance of basic personal computer hardware and operating systems.

Relationship to the CompTIA Certification

To receive CompTIA A+ certification a candidate must pass two exams. The first exam is the CompTIA A+ Certification Exam: Core 1 (220-1001) as of 09/2020. The Strands & Standards for Computer Systems 1 match to this certification. The candidate must also pass the CompTIA A+ Certification Exam: Core 2 (220-1002) as of 09/2020. This is the second exam required for CompTIA A+ certification candidates to complete their certification. The Strand & Standards for Computer Systems 2 match to this certification.

ADA Compliant: XXXXXX 2020

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	35.01.00.00.040
Concurrent Enrollment Core Code	35.01.00.13.040
Prerequisite	Computer Systems 1
Skill Certification Test Number	State Skills Exam #XXX CompTIA IT Fundamentals (FC0- U61), CompTIA A+ Core 1 (220-1001), CompTIA A+ Core 2 (220-1002), TestOut PC Pro, HP ATA – connected Devices (HP4-A01), MTA Windows OS Fundamentals (#98-349), MTA Networking Fundamentals (#98-366), MTA Security Fundamentals (#98-367)
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	A+ Computer Maintenance and Repair (old)
OR Endorsement 2	OR Cybersecurity
OR Endorsement 3	OR Information Technology Systems

CompTIA A+ Certification Exam: Core 2 Objectives

The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA A+ Core 2 exam is based on these objectives.

Doman A+ 220-1001	Percentage of Exam
1.0 Operating Systems	27%
2.0 Security	24%
3.0 Software Troubleshooting	26%
4.0 Operational Procedures	23%
Total	**100%**

These Strand & Standards align with the CompTIA A+ Certification Exam: Core 2. These Strands & Standards also align with the TestOut PC Pro (Chapters 8 – 14).

**Note: The bulleted lists below each objective are not exhaustive lists. Even though they are not included in this document, other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam.

STRAND 1

Operating Systems

Standard 1: Understand common operating systems and their purposes.

- Software compaibility
- Workstation operating systems
    - Microsoft Windows
    - Apple Macintosh OS
    - Linux Distributions
- Cell Phone/tablet operating systems
    - Microsoft Windows
    - Android
    - iOS
    - Chrome OS
- Vendor specific limitations

Standard 2: Understand general OS installation considerations and upgrade methods.

- Boot Methods
    - Optical disc (CD-ROM, DVD, Blu-ray)
    - External drive/flash drive (USB/eSATA)
    - Network boot (PXE)
    - Internal fixed disk (HDD/SSD)
    - Internal hard drive (partition)
- Type of installations
    - Unattended installation
    - In-place upgrade
    - Clean install
    - Repair installation
    - Multiboot
    - Remote network installation
    - Image deployment
    - Recovery partition
    - Refresh/restore
- Partitioning
    - Dynamic
    - Basic
    - Primary
    - Extended
    - Logical
    - GPT

- File system types/formatting
    - ExFAT
    - FAT32
    - NTFS
    - CDFS
    - NFS
    - XFS
    - ext3, ext4, ext4 journaling
    - HFS
    - Swap partition
    - Quick format vs. full format
- Load alternate third-party drivers when necessary
- Workgroup vs. Domain setup
- Time/date/region/language settings
- Driver installation, software, and Windows updates
- Factory recovery partition
- Properly formatted boot drive with the correct partitions/format
- Prerequisites/hardware compatibility
- Application compatibility
- OS compatibility/upgrade path

Standard 3: Demonstrate the use of Microsoft command line tools.

- Navigation
    - dir
    - cd
    - ..
- ipconfig
- ping
- tracert
- netstat
- nslookup
- shutdown
- dism
- sfc
- chkdsk
- diskpart
- taskkill
- gpupdate
- gpresult
- format
- copy

- xcopy
- robocopy
- net use
- net user
- [command name] /?
- Commands available with standard privileges vs. administrative privileges

Standard 4: Demonstrate the use of Microsoft operating system features and tools.

- Administrative
    - Computer Management
    - Device Manager
    - Local Users and Groups
    - Local Security Policy
    - Performance Monitor
    - Services
    - System Configuration
    - Task Scheduler
    - Component Services
    - Data Sources
    - Print Management
    - Windows Memory Diagnostics
    - Windows Firewall
    - Advanced Security
    - Event Viewer
    - User Account Management
- MSConfig
    - General
    - Boot
    - Services
    - Startup
    - Tools
- Task Manager
    - Applications
    - Processes
    - Performance
    - Networking
    - Users

- Disk Management
    - Drive status
    - Mounting
    - Initializing
    - Extending partitions
    - Splitting partitions
    - Shrink partitions
    - Assigning/changing drive letters
    - Adding drives
    - Adding arrays
    - Storage spaces
- System Utilities
    - Regedit
    - Command
    - Services.msc
    - MMC
    - MSTSC
    - Notepad
    - Explorer
    - Msinfo32
    - DxDiag
    - Disk Defragmenter
    - System Restore
    - Windows Update

Standard 5: Demonstrate the use of Microsoft Windows Control Panel utilities.

- Internet Options
    - Connections
    - Security
    - General
    - Privacy
    - Programs
    - Advanced
- Display/Display Settings
    - Resolution
    - Color depth
    - Refresh rate

- User Accounts
- Folder Options
    - View hidden files
    - Hide extensions
    - General options
    - View options
- System
    - Performance (virtual memory)
    - Remote settings
    - System protection
- Windows Firewall
- Power Options
    - Hibernate
    - Power plans
    - Sleep/suspend
    - Standby
- Credential Manager
- Programs and features
- HomeGroup
- Devices and Printers
- Sound
- Troubleshooting
- Network and Sharing Center
- Device Manager
- BitLocker
- Sync Center

Standard 6: Demonstrate Microsoft Windows networking installation on a client/desktop.

- HomeGroup vs. Workgroup
- Domain setup
- Network shares/administrative shares/mapping drives
- Printer sharing vs. network printer mapping
- Establish networking connections
    - VPN
    - Dial-ups
    - Wireless
    - Wired
    - WWAN (Cellular)
- Proxy settings
- Remote Desktop Connection

- Remote Assistance
- Home vs. Work vs. Public network settings
- Firewall settings
    - Exceptions
    - Configuration
    - Enabling/disabling Windows Firewall
- Configuring an alternative
- IP address in Windows
    - IP addressing
    - Subnet mask
    - DNS
    - Gateway
- Network card properties
    - Half duplex/full duplex/auto
    - Speed
    - Wake-on-LAN
    - QoS
    - BIOS (on-board NIC)

Standard 7: Demonstrate the use of features and tools of Mac OS and Linux based systems.

- Best practices
    - Scheduled backups
    - Scheduled disk maintenance
    - System updates/App Store
    - Patch management
    - Driver/firmware updates
    - Antivirus/Anti-malware updates
- Tools
    - Backup/Time Machine
    - Restore/Snapshot
    - Image recovery
    - Disk maintenance utilities
    - Shell/Terminal
    - Screen sharing
    - Force Quit
- Features
    - Multiple desktops/Mission Control
    - Key Chain
    - Spot Light
    - iCloud

  - Gestures
  - Finder
  - Remote Disc
  - Dock
  - Boot Camp
- Basic Linux commands
  - ls
  - grep
  - cd
  - shutdown
  - pwd vs. passwd
  - mv
  - cp
  - rm
  - chmod
  - chown
  - iwconfig/ifconfig
  - ps
  - su/sudo
  - apt-get
  - vi
  - dd
  - kill

STRAND 2

Security

Standard 1: Understand the importance of physical security measures.

- Mantrap
- Badge reader
- Smart card
- Security guard
- Door lock
- Biometric locks
- Hardware tokens
- Cable locks
- Server locks
- USB locks
- Privacy screen
- Key fobs
- Entry control roster

Standard 2: Understand logical security concepts.

- Active Directory
  - Login script
  - Domain
  - Group Policy/Updates
  - Organizational Units
  - Home Folder
  - Folder redirection
- Software tokens
- MDM policies
- Port security
- MAC address filtering
- Certificates
- Antivirus/Anti-malware
- Firewalls
- User authentication/strong passwords
- Multifactor authentication
- Directory permissions
- VPN
- DLP
- Access control lists
- Smart card
- Email filtering
- Trusted/untrusted software sources
- Principle of least privilege

Standard 3: Understand wireless security protocols and authentication methods.

- Protocols and encryption
  - WEP
  - WPA
  - WPA2
  - TKIP
  - AES
- Authentication
  - Single-factor
  - Multifactor
  - RADIUS
  - TACACS

Standard 4: Demonstrate detection, removal, and prevention of malware using appropriate tools and methods.

- Malware
  - Ransomware
  - Trojan
  - Keylogger
  - Rootkit
  - Virus
  - Botnet
  - Worm
  - Spyware
  - Adware
  - Rootkits
  - Rogue Security Software
- Tools and methods
  - Antivirus
  - Anti-malware
  - Recovery console
  - Backup/restore
  - End user education
  - Software firewalls
  - DNS configuration

Standard 5: Understand social engineering, threats, and vulnerabilities.

- Social engineering
  - Phishing
  - Pharming
  - Spear phishing
  - Impersonation
  - Shoulder surfing
  - Tailgating
  - Dumpster diving
- DDoS
- DoS
- Zero-day
- Man-in-the-middle
- Brute force
- Dictionary
- Rainbow table
- Spoofing
- Non-compliant systems
- Zombie

Standard 6: Understand the basic Microsoft Windows OS security settings.

- User and groups
  - Administrator
  - Power user
  - Guest
  - Standard user
- NTFS vs. share permissions
  - Allow vs. deny
  - Moving vs. copying folders and files
  - File attributes
- Shared files and folders
  - Administrative shares vs. local shares
  - Permission propagation
  - Inheritance
- System files and folders
- User authentication
  - Single sign-on (SSO)
- Run as administrator vs. standard user
- BitLocker
- BitLocker To Go
- EFS

Standard 7: Demonstrate best practices in securing devices.

- Password best practices
  - Password Entropy and Complexity
  - Password expiration
  - Screensaver required password
  - BIOS/UEFI passwords
  - Requiring passwords
- Account management
  - Restricting user permissions
  - Logon time restrictions
  - Disabling guest account
  - Failed attempts lockout
  - Timeout/screen lock
  - Change default admin user account/password
  - Basic Active Directory functions
    - Account creation
    - Account deletion
    - Password reset / unlock account
    - Disable account

- Disable autorun
- Data encryption
- Patch/update management
- Screen locks
    - Fingerprint lock
    - Face lock
    - Swipe lock
    - Passcode lock
- Remote wipes
- Locator applications
- Remote backup applications
- Failed login attempts restrictions
- Antivirus/Anti-malware
- Patching/OS updates
- Biometric authentication
- Full device encryption
- Multifactor authentication
- Authenticator applications
- Trusted sources vs. untrusted sources
- Firewalls
- Policies and procedures
    - BYOD vs. corporate-owned
    - Profile security requirements

Standard 8: Understand appropriate data destruction and disposal methods.

- Physical destruction
    - Shredder
    - Drill/hammer
    - Electromagnetic (Degaussing)
    - Incineration
    - Certificate of destruction
- Recycling or repurposing best practices
    - Low-level format vs. standard format
    - Overwrite
    - Drive wipe

Standard 9: Understand security configuration protocols on networks.

- Wireless-specific
  - Changing default SSID
  - Setting encryption
  - Disabling SSID broadcast
  - Antenna and access point placement
  - Radio power levels
  - WPS
- Change default usernames and passwords
- Enable MAC filtering
- Assign static IP addresses
- Firewall settings
- Port forwarding/mapping
- Disabling ports
- Content filtering/parental controls
- Update firmware
- Physical security

STRAND 3

Software Troubleshooting

Standard 1: Demonstrate the ability to troubleshoot Microsoft Windows OS problems.

- Common symptoms
  - Slow performance
  - Limited connectivity
  - Failure to boot
  - No OS found
  - Application crashes
  - Blue screens
  - Black screens
  - Printing issues
  - Services fail to start
  - Slow bootup
  - Slow profile load
- Common solutions
  - Defragment the hard drive
  - Reboot
  - Kill tasks
  - Restart services
  - Update network settings

- Reimage/reload OS
- Roll back updates
- Roll back device drivers
- Apply updates
- Repair application
- Update boot order
- Disable Windows services/applications
- Disable application startup
- Safe boot
- Rebuild Windows profiles

Standard 2: Understand problems that stem from PC security issues.

- Common symptoms
  - Pop-ups
  - Browser redirection
  - Security alerts
  - Slow performance
  - Internet connectivity issues
  - PC/OS lockup
  - Application crash
  - OS updates failures
  - Rogue antivirus
  - Spam
  - Renamed system files
  - Disappearing files
  - File permission changes
  - Hijacked email
    - Responses from users regarding email
    - Automated replies from unknown sent email
  - Access denied
  - Invalid certificate (trusted root CA)
  - System/application log errors

Standard 3: Understand tools and best practices for malware removal.

1. Identify and research malware symptoms.
2. Quarantine the infected systems.
3. Disable System Restore (in Windows).
4. Remediate the infected systems.
   a. Update the anti-malware software.
   b. Scan and use removal techniques (safe mode, pre-installation environment).

5. Schedule scans and run updates.
6. Enable System Restore and create a restore point (in Windows).
7. Educate the end user.

STRAND 4

Operational Procedures

Standard 1: Understand best practices of documenting asset management and enterprise policies.

- Network topology diagrams
- Knowledge base/articles
- Incident documentation
- Regulatory and compliance policy
- Acceptable use policy
- Password policy
- Inventory management
    - Asset tags
    - Barcodes
- Documented business processes
- Purpose of the change
- Scope the change
- Risk analysis
- Plan for change
- End-user acceptance
- Change board
    - Approvals
- Backout plan
- Document changes
- Incident response
    - First response
        - Identify
        - Report through proper channels
        - Data/device preservation
    - Use of documentation/ documentation changes
    - Chain of custody
        - Tracking of evidence/documenting process

- Licensing/DRM/EULA
  - Open-source vs. commercial license
  - Personal license vs. enterprise licenses
  - Public domain
  - Permissive
  - LGPL
  - Copyleft
  - Proprietary
- Regulated data
  - PII
  - PCI
  - GDPR
  - PHI
- Follow all policies and security best practices

Standard 2: Understand safety procedures and environmental concerns.

- Backup and recovery
  - Image level
  - File level
  - Critical applications
- Backup testing
- UPS
- Surge protector
- Cloud storage vs. local storage backups
- Account recovery options
- Equipment grounding
- Proper component handling and storage
  - Antistatic bags
  - ESD straps
  - ESD mats
  - Self-grounding
- Toxic waste handling
  - Batteries
  - Toner
  - CRT
  - Cell phones
  - Tablets

- Personal safety
    - Disconnect power before repairing PC
    - Remove jewelry
    - Lifting techniques
    - Weight limitations
    - Electrical fire safety
    - Cable management
    - Safety goggles
    - Air filter mask
- MSDS documentation for handling and disposal
- Temperature, humidity level awareness, and proper ventilation
- Power surges, brownouts, and blackouts
    - Battery backup
    - Surge suppressor
- Protection from airborne particles
    - Enclosures
    - Air filters/mask
- Dust and debris
    - Compressed air
    - Vacuums
- Compliance with all government regulations

Standard 3: Understand proper communication techniques and professionalism.

- Use proper language and avoid jargon, acronyms, and slang, when applicable
- Maintain a positive attitude/ project confidence
- Actively listen (taking notes) and avoid interrupting the customer
- Be culturally sensitive
    - Use appropriate professional titles, when applicable
- Be on time (if late, contact the customer)
- Avoid distractions
    - Personal calls
    - Texting/social media sites
    - Talking to coworkers while interacting with customers
    - Personal interruptions
- Dealing with difficult customers or situations
    - Do not argue with customers and/or be defensive
    - Avoid dismissing customer problems
    - Avoid being judgmental
    - Clarify customer statements (ask open-ended questions to narrow the
    - scope of the problem, restate the issue, or question to verify understanding)
    - Do not disclose experiences via social media outlets

- Set and meet expectations/timeline and communicate status with the customer
    - Offer different repair/ replacement options, if applicable
    - Provide proper documentation on the services provided
    - Follow up with customer/user at a later date to verify satisfaction
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Performance Skills

- Remote support from an external location.
- Assisting with software, hardware, and operating systems installations, including troubleshooting.
- Ask client/customer various questions about the installed computer systems, run diagnostic, handle software security.
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- Problem Solving
- Teamwork,
- Critical Thinking
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Skill Certificate Test Points by Strand

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Computer Maintenance & Repair (A+)	884	23	7	10	17	3	6					66	61

I will replace this picture once we finalize the state skills exam. *Need new test number for 2*

STRANDS AND STANDARDS
CLOUD COMPUTING 1

Course Description

The Cloud Computing 1 course is an exploration of cloud computing. Students will begin to prepare themselves to sit for cloud computing professional certifications. In this course, students explore cloud computing services, applications, technologies and use cases (Case-Base Learning). Students dive deeply into cloud computing best practices and learn how cloud computing helps users develop a global infrastructure while also developing and inventing innovative technologies.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	35.02.00.00.042
Concurrent Enrollment Core Code	35.02.00.13.042
Prerequisite	Any basic computer science or information technology course.
Skill Certification Test Number	000 – coming soon!
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Information Technology Systems
OR Endorsement 2	OR Cybersecurity
OR Endorsement 2	OR Cloud Computing

STRAND 1

Cloud Structure and Features

The student defines cloud computing and its impacts and benefits and compares the major services offered by cloud computing providers.

Standard 1: Global Infrastructure

Students will review the basics of cloud computing. Including the impacts and benefits of computing in the cloud. The student will be introduced to services offered by cloud computing providers.

- Define cloud computing and its impacts
- Benefits of cloud computing vs. on-premise computing
    - Pay less to start up, pay more as business grows
    - Computing power and storage scales fit current needs
    - Adding new resources is fast and easy
    - Cloud providers maintain, secure, and run the computers and facilities for cloud services
    - Ease of use
- Introduction to types of cloud computing
    - IaaS
    - PaaS
    - SaaS
- History of cloud computing

Standard 2: Structures of the Cloud

Students will dive deep into the three different types of cloud services, the geographical layout of cloud services through regions, availability zones, and edge locations.

- Recognize and compare the types of cloud computing
    - IaaS (Infrastructure as a Service)
    - PaaS (Platform as a Service)
    - SaaS (Software as a Service)
- Explain the purpose of regions, availability zones, and edge locations
    - Regions
        - 20 public and 5 non-public
    - Availability zones
        - Independent data centers
    - Edge locations
        - Nearest point to the consumer

Performance Skills

- Students will be able to generate a cloud service usage plan for a business case study; describing how each of the services could be used to improve the business.
- Students will be able to explain the purpose of a region, availability zone, and edge locations.

STRAND 2

Storing and Sharing Content in the Cloud
The student demonstrates how to store and share content in the cloud.

Standard 1: Cloud Computing Services/Consoles

Students will be introduced to common features and functions of commonly used cloud services. They will access and navigate commonly used services in cloud computing consoles.

- Data storage services
  - S3
  - EBS
- Database systems
  - RDS
  - Redshift
  - DynamoDB
- Cloud monitoring services
  - CloudTrail
  - CloudWatch

Standard 2: Virtual Servers

Students will understand an EC2 instance and how to use it to host a website and the purpose of access keys, Domain Name Systems, and Virtual Private Clouds.

- Explain how a S3 bucket and EC2 instance interact to allow for website hosting
- Types of websites
  - Static
  - Dynamic
- Functions of a domain name system (DNS)
- Understand a virtual private cloud and its uses

Standard 3: Content Delivery

Students will learn about content delivery networks and understand why it is important to have one.

- Benefits and uses of a content delivery network, such as CloudFront
- Understand edge locations

Standard 4: Virtual Storage

Students will understand Elastic Block Storage (EBS) and compare it to S3. Storage tiers will be introduced.

- EBS volume types:
  - General Purpose SSD
  - Provisioned IOPS SSD
  - Throughput Optimized HDD
  - Cold HDD

- Categories of volume types
    - SSD
    - HDD
- Benefits and features of EBS
    - Data Availability
    - Date Persistence
    - Data Encryption
    - Snapshots

Performance Skills

- Students will configure web content distributed via edge locations and attach it to a website.
- Students will create a block storage volume and attach it to a virtual computing instance that hosts a simple website.

STRAND 3

Securing and Monitoring in the Cloud

Apply cloud security best practices in relation to identity and access management (IAM), including best practices, roles, users, policies, and security groups.

Standard 1: Security I

Students will get an overview of cloud security in relation to Identity and Access Management (IAM). They will understand basic information on best practices, roles/users/policies, and security groups.

- Understand identity and access management (IAM) and its best practices.
    - Lock away your account root user access keys
    - Create individual IAM users
    - Use groups to assign permissions to IAM users
    - Grant least privilege
    - Review IAM permissions
    - Configure a strong password policy for your users
    - Enable multi-factor authentication (MFA)
    - Use roles to delegate permissions
    - Do not share access keys
    - Rotate credentials regularly
    - Remove unnecessary credentials
    - Use policy conditions for extra security
    - Monitor activity in your account
- Analyze the cultural and societal impacts of cloud security
- Differentiate among a role, user, groups, and policy in cloud security
- Use a process to resolve vulnerabilities in a web server

Standard 2: Security II

The student will analyze the cultural and societal impacts of cloud security and be able to determine whether security best practices are being followed.

- Understand the areas of security that must be addressed for cloud computing:
  - Data
  - Privileges
  - Infrastructure
  - Assessment
- Understand the difference between infrastructure and assessment
  - Attacks on infrastructure and network access
- Recognize types of attacks and prevention techniques
  - DDoS
  - AWS Web Application Firewall, AWS Inspector, etc. for prevention
- Understand the process to resolve vulnerabilities in a web server
- Understand how security can impact society, determine best practiced, and make recommendations to fix security lapses.

Standard 3: Monitoring the Cloud

Students will explore the tools used to keep track of activities in the cloud and their relation to costs. Monitoring, logging, and reporting will be reviewed.

- A monitoring and observability service that provides data and insights to monitor applications
- A service that logs, continuously monitors, and retains account activity related to actions across infrastructure
- A service that monitors and records resource configurations
- A managed messaging service for system-to-system and app-to-person communication

Performance Skills

- Students will determine whether security best practices are being followed and recommend steps to fix any security lapses.
- Students will be able to compare monitoring services and identify the best cloud security for any given scenario.
- Students will write a compliance program for an organization.

STRAND 4

Data Management

The student will understand the differences in databases and when to use them, the benefits of caching data, and how to build a virtual cloud (VPC).

Standard 1: Elastic Load Balancers and Databases

Students will learn about Relational Database Service (RDS) and data warehousing.

- Database Warehousing
- Database and Database Systems
    - Types of Relational Database Systems (ex: Amazon Aurora)
    - Types of Non-Relational Database Systems (ex: DynamoDB)
- Processing
    - Online transactional processing
    - Online analytical processing

Standard 2: Databases

Students will learn the purpose of elasticache services and benefits of caching data.

- Understand Elastic Load Balancing: performance, features, and benefits.
- Data Caching Services (ex: AWS Elasticache)
    - Explain the benefits of caching data

Standard 3: Elastic Beanstalk and Cloud Formation

Students will understand the purpose of Elastic Beanstalk and Cloud Formation.

- Elastic Beanstalk (EBS) – its uses and benefits.
- Understand the benefits of using a cloud formation service

Performance Skills

- Students will create an application using a Platform as a Service (PaaS) and
- Students will us a template Infrastructure as code (IaC) tool to build a virtual private cloud (VPC).

STRAND 5

Managing and Optimizing Cloud Features

The student describes the landscape of emerging technologies in the cloud.

Standard 1: Emerging Technologies in the Cloud

Students will research emerging technologies in the cloud with a focus on machine learning and its impacts on society, business, and technology.

- Supervised Machine Learning
    - Classification
    - Regression
- Unsupervised Machine Learning

- Semisupervised Machine Learning
- Reinforcement Machine Learning
- The impacts of machine learning on society, business, and technology
- Examine the range of emerging technologies in society and in the cloud computing environment.

Standard 2: Billing and Support

Students will assess value propositions of using cloud technology using calculator tools.

- Understand the tiered support services and prices of a cloud calculating service
- Identify cloud services that can analyze and protect data and manage networks

Standard 3: Key Cloud Features

Students will explore services related to protecting data and managing networks. Blockchains will also be explored.

- A serverless, interactive query service to query data and analyze big data using standard SQL (ex: Amazon Athena)
- A fully managed data security and privacy service (ex: Amazon Macie)
- Blockchains – what are they, how are they used, and its benefits

Standard 4 Optimizing The Cloud with Kits

- Explain the infrastructure of cloud development kits or services
- Explain the benefits and constructs

Performance Skills

- Student will use a software development framework to model and provision a cloud application.

STRAND 6

Skills for Career Development

Standard 1

Students will demonstrate positive workplace behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work.

Standard 2

Students will demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills.

Standard 3

Students will employ effective reading and writing skills; solve problems and think critically; and demonstrate leadership skills and function effectively as a team member.

Workplace Skills

- Communication
- Problem Solving
- Teamwork,
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certificate Test Points by Strand

No current State Skills Exam. Coming soon!

Relationship to the AWS Certified Cloud Practitioner Exam

If a candidate completes Cloud Computing 1 and Cloud Computing 2, they will be prepared to take the AWS Certified Cloud Practitioner Exam. These Strands & Standards align with a portion of the industry certification.

STRANDS AND STANDARDS
CLOUD COMPUTING 2

Course Description

The Cloud Computing 2 course is a natural extension of the concepts learned in Cloud Computing 1. Students will continue to prepare themselves to sit for cloud computing professional certifications. This course expands on basic cloud computing principles and concepts including programming, networking, cybersecurity, hardware, software, data storage, data collection, and the impacts of computing. This advanced course will take students from conceptual understanding of these principles to real-world cloud applications across multiple industries.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	35.02.00.00.043
Concurrent Enrollment Core Code	35.032.00.13.043
Prerequisite	Cloud Computing 1
Skill Certification Test Number	9405 - AWS Cloud Practitioner #9405
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Information Technology Systems
OR Endorsement 2	OR Cybersecurity
OR Endorsement 3	OR Cloud Computing

STRAND 1

Managing Efficiency and Security

The student resolves common security alerts, diagrams instance states and transitions, and explains how to choose the most cost-efficient instance type

Standard 1: Security Models

This module will give students an introduction to the shared security model as it relates to the three main cloud services. They will understand the responsibilities of the client and cloud service for patching, Operating System updates, and data security using the Shared Responsibility Model.

- Understand the Shared Responsibility Security Model
  - Responsibilities of the customer
  - Responsibilities of the cloud service provider
- Determine the security responsibility for cloud services
  - Prioritize a company's security needs, evaluate the risk, and understand the vulnerabilities
  - Understand the Principle of Least Privilege (PoLP)
    - Where it can be applied
    - To whom does it apply to
- Analyze how the shared security model accounts for common threats to the cloud computing model.

Standard 2: Shared Security

Students will be introduced to security assessment services and how to resolve any alerts.

- Understand the use of a security assessment service
- Understand the results of a security assessment service
- List the steps required to resolve an automated security alert

Standard 3: Cloud Services and Instance States

Students will manage instances from launch through termination. Instance lifecycle and transition between states will be introduced.

- Describe the six instance states
  - Pending
  - Running
  - Stopping
  - Stopped
  - Shutting down
  - Terminated
- Indicate instance usage billing for each instance state
  - On-Demand Instances
  - Reserved Instances
  - Spot Instances

- Understand the differences between rebooting, stopping, hibernating, and terminating your instance

Performance Skills

- List the steps required to resolve an automated security alert
- Determine the most optimal billing option for instances for a company
- Diagram the transitions between instance states from launch to termination. Insert performance skills text
- Determine the most appropriate instance state for a given situation.

STRAND 2

Creating Cloud Environments to Scale

The student will differentiate between dynamic and static websites.

Standard 1: Dynamic Web Servers I

Students will compare static and dynamic websites

- Compare static and dynamic website
  - Understand the features of each
- Understand the process of setting up a static website
- Types of dynamic websites
  - Built on Content Management Software (CMS)
  - Built from scratch
-

Standard 2: Dynamic Web Servers II

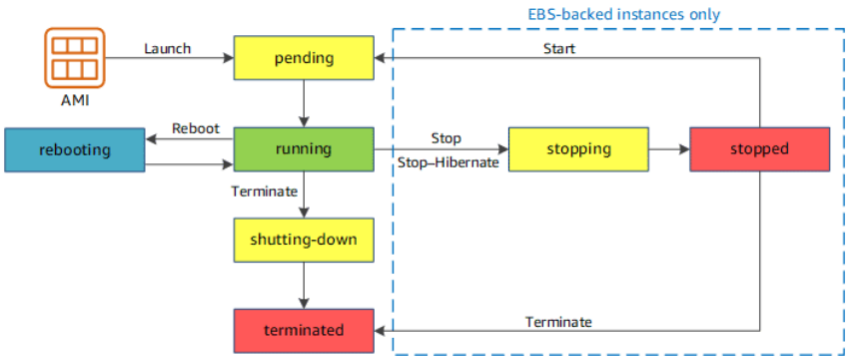
Students will launch and create a dynamic server

- Understand the purpose of a content delivery network (CDN)
- Understand how a CDN relates to speed of a website and edge locations
- Insert indicator text

Standard 3: Serverless Computing

A cloud service that runs code in response to events and automatically manages the computing resources required by that code.

- Understand how to create a serverless compute function using a serverless compute console
- Know the instance lifecycle
- Understand purchasing options for instances
- Understand the transitions between instance states:



Standard 4: Auto Scaling in Cloud Environments

Student will learn about the functions of auto scaling and create an auto scaling group.

- Describe the three main functions of auto scaling
  - Monitor the health of running instances
  - Replace impaired instances automatically
  - Balance capacity across availability zones
- Understand a launch template
- Understand an auto scaling group
- Know how to create a plan for monitoring an auto scaling instance or group

Performance Skills

- Create a content delivery network distribution to increase the speed of a website
- Students will launch a dynamic web server
- Create a launch template and an auto scaling group
- Develop a plan for monitoring an auto scaling instance or group

STRAND 3

Managing Cloud Resources: Big Data and Crytocurrency
Students will learn the benefits and risks of using big data.

Standard 1: Big Data

Introduce the student to the concept of big data and the difference from traditional types of data.

- Define big data and the "three V's"
  - Volume
  - Variety
  - Velocity
  - Veracity and Value (other commonly used "V" descriptors)
- Evaluate the pros and cons of big data
- Ethical and legal issues related to big data

Standard 2: Big Data Processing Cycle

Students will learn the big data processing cycle, its activities and challenges of each phase.

- Understand various types of data
- Understand various types of processing methods
- Understand various types of quality challenges
- Understand various types of analysis techniques
- Big Data Processing Cycle phases
  - Collect
  - Store
  - Process & Analyze
  - Consume & Visualize

- Understand the types of data storage
  - Big data storage
  - Nonrelational databases
  - Data warehouses
  - Data lake

Standard 3: Blockchain and Cryptocurrency

Students will learn how blockchains are created and maintained to support immutability and validity. They will also be introduced to cryptocurrency technologies.

- Understand blockchain and how they function in the cloud
- Explain how blockchain ensures the validity an immutability of transactions in the cloud
- Understand the pros and cons of blockchain busines applications
- Understand cryptographic hash
- Understand cryptocurrencies

Performance Skills

- Student will be access and manage big data from the cloud
- Student will understand the complete big data ecosystem

STRAND 4

Emerging Technology

Standard 1: Artificial Intelligence Capabilities and Impacts

Students will learn about the back end of artificial intelligence (AI).

- Recognize capabilities of artificial intelligence
- Understand how AI can enhance the customer experience
- Analyze the ethical implementation of artificial intelligence

Standard 2: Machine Learning

Students will learn how machine learning can be applied to solving problems.

- Explain machine learning and how it can help address a need or problem
- Understand procedures in machine learning and applications used to create ML programming
- Machine leaning capabilities:
    - Recommendations
    - Forecasting
    - Recognition

Standard 3: Internet of Things

Students will learn how cloud technology facilitates the Internet of Things (IoT)

- Understand the Internet of Things
- Types of IoT
    - Industrial
    - Home/consumer
    - Commercial/municipal
- Explain the relationship between cloud technology and the Internet of Things
- Evaluate security and privacy concerns with the increasing IoT usage

Performance Skills

- Student will explore AI services and determine which type of AI product would be address a particular issue.
- Students will create a machine learning algorithm
- Student will create a connection to IoT devices

STRAND 5

Skills for Career Development

Standard 1

Students will demonstrate positive workplace behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work.

Standard 2

Students will demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills.

Standard 3

Students will employ effective reading and writing skills; solve problems and think critically; and demonstrate leadership skills and function effectively as a team member.

Workplace Skills

- Communication
- Problem Solving
- Teamwork,
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certificate Test Points by Strand

No State Skills Exam.

Relationship to the AWS Certified Cloud Practitioner Exam

(Approved as a third-party industry exam #9405)

If a candidate completes Cloud Computing 1 and Cloud Computing 2, they will be prepared to take the AWS Certified Cloud Practitioner Exam. These Strands & Standards align with the industry certification.

AWS Certified Cloud Practitioner Exam (CLF-C01) Objectives:

Domain	% of Exam
Domain 1: Cloud Concepts	26%
Domain 2: Security and Compliance	25%
Domain 3: Technology	33%
Domain 4: Billing and Practice	16%
Total	**100%**

STRANDS AND STANDARDS
NETWORK FUNDAMENTALS

Course Description

Utah's Network Fundamentals are based on CompTIA Exam Number N10-007 Network+ Objectives. The CompTIA Network+ certification is an internationally recognized validation of the technical knowledge required of foundation-level IT network practitioners.

This exam will certify that the successful candidate has the knowledge and skills required to implement a defined network architecture with basic network security. Furthermore, a successful candidate will be able to configure, maintain, and troubleshoot network devices using appropriate network tools and understand the features and purpose of network technologies. Candidates will be able to make basic solution recommendations, analyze network traffic and be familiar with common protocols and media types.

It is recommended for CompTIA Network+ candidates to have the following: CompTIA A+ certification or equivalent knowledge and at least 9 to 12 months of work experience in IT networking.

Intended Grade Level	10-12
Units of Credit	0.5 or 1.0
Core Code	35.01.00.00.030
Concurrent Enrollment Core Code	35.01.00.13.030
Prerequisite	Suggested – Computer Systems 1 and 2, Cisco Certified Networking Associate (CCNA), or Teacher Approval
Skill Certification Test Number	State Skills Exam #888 981 - MTA Networking Fundamentals (98-366) 982 – CompTIA Network+ (N10-007) 9821 – TestOut Network Pro
Test Weight	0.5 or 1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Network+ (Old)
OR Endorsement 2	OR Microsoft Certified Professional (Old)
OR Endorsement 3	OR CISCO Certified Networking Associate (Old)
OR Endorsement 5	OR Cybersecurity
OR Endorsement 6	OR Information Technology Systems

CompTIA Network+ Certification Exam Objectives:

The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA Network+ exam is based on these objectives.

Doman Network+ (N10-007)	Percentage of Exam
1.0 Networking Concepts	23%
2.0 Infrastructure	18%
3.0 Network Operations	17%
4.0 Network Security	20%
5.0 Network Troubleshooting and Tools	22%
Total	**100%**

**Note: The bulleted lists below each objective are not exhaustive lists. Even though they are not included in this document, other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam.

STRAND 1

Networking Concepts

Standard 1: Understand the purposes and uses of ports and protocols.

- Protocols and ports
  - SSH 22
  - DNS 53
  - SMTP 25
  - SFTP 22
  - FTP 20, 21
  - TFTP 69
  - TELNET 23
  - DHCP 67, 68
  - HTTP 80
  - HTTPS 443
  - SNMP 161
  - RDP 3389
  - NTP 123
  - SIP 5060, 5061
  - SMB 445
  - POP 110
  - IMAP 143
  - LDAP 389
  - LDAPS 636
  - H.323 1720
- Protocol types
  - ICMP
  - UDP
  - TCP
  - IP
- Connection-oriented vs. connectionless

Standard 2: Identify devices, applications, protocols and services and which layer of the OSI model they operate at.

- Layer 1 – Physical
- Layer 2 – Data link
- Layer 3 – Network
- Layer 4 – Transport
- Layer 5 – Session
- Layer 6 – Presentation
- Layer 7 – Application

Standard 3: Identify the characteristics of routing and switching.

- Properties of network traffic
  - Broadcast domains
  - CSMA/CD
  - CSMA/CA
  - Collision domains
  - Protocol data units
  - MTU
  - Broadcast
  - Multicast
  - Unicast

- Segmentation and interface properties
  - VLANs
  - Trunking (802.1q)
  - Tagging and untagging ports
  - Port mirroring
  - Switching loops/spanning tree
  - PoE and PoE+ (802.3af, 802.3at)
  - DMZ
  - MAC Table
  - ARP table
- Routing
  - Routing protocols (IPv4 and IPv6)
    - Distance-vector routing protocols
      - RIP
      - EIGRP
    - Link-state routing protocols
      - OSPF
    - Hybrid
      - BGP
  - Routing types
    - Static
    - Dynamic
    - Default
- IPv6 concepts
  - Addressing
  - Tunneling
  - Dual stack
  - Router advertisement
  - Neighbor discovery

- Performance concepts
    - Traffic shaping
    - QoS
    - Diffserv
    - CoS
- NAT/PAT
- Port Forwarding
- Access control list
- Distributed switching
- Packet-switched vs. circuit-switched network
- Software-defined networking

Standard 4: Demonstrate the configuration of appropriate IP addressing components.

- Private vs. public
- Loopback and reserved
- Default gateway
- Virtual IP
- Subnet mask
- Subnetting
    - Classful
        - Classes A, B, C, D, and E
    - Classless
        - VLSM
        - CIDR notation (IPv4 vs. IPv6)
- Address assignments
    - DHCP
    - DHCPv6
    - Static
    - APIPA
    - EUI64
    - IP reservations

Standard 5: Understand network topologies, types, and technologies.

- Wired topologies
    - Logical vs. physical
    - Star
    - Ring
    - Mesh
    - Bus

- Wireless topologies
  - Mesh
  - Ad hoc
  - Infrastructure
- Types
  - LAN
  - WLAN
  - MAN
  - WAN
  - CAN
  - SAN
  - PAN
- Technologies that facilitate the Internet of Things (IoT)
  - Z-Wave
  - Ant+
  - Bluetooth
  - NFC
  - IR
  - RFID
  - 802.11

Standard 6: Understand wireless technologies and configurations.

- 802.11 standards
  - a
  - b
  - g
  - n
  - ac
- Cellular
  - GSM
  - TDMA
  - CDMA
- Frequencies
  - 2.4GHz
  - 5.0GHz
- Speed and distance requirements
- Channel bandwidth
- Channel bonding
- MIMO/MU-MIMO
- Unidirectional/omnidirectional
- Site surveys

Standard 7: Understand cloud concepts and their purpose.

- Types of services
  - SaaS
  - PaaS
  - IaaS
- Cloud delivery models
  - Private
  - Public
  - Hybrid
- Connectivity methods
- Security implications/considerations
- Relationship between local and cloud resources

Standard 8: Understand the functions of network services.

- DNS service
  - Record types
    - A, AAA
    - TXT (SPF, DKIM)
    - SRV
    - MX
    - CNAME
    - NS
    - PTR
  - Internal vs. external DNS
  - DNSSEC
  - Third-party/cloud-hosted DNS
  - Hierarchy
  - Forward vs. reverse zone
- DHCP service
  - MAC reservations
  - Pools
  - IP exclusions
  - Scope options
  - Lease time
  - TTL
  - DHCP relay/IP helper
- NTP
- IPAM

STRAND 2

Infrastructure

Standard 1: Understand appropriate network cabling solutions.

- Media types
  - Cooper
    - UTP
    - STP
    - Coaxial
  - Fiber
    - Single-mode
    - Multimode
- Plenum vs. PVC
- Connector types
  - Cooper
    - RJ-45
    - RJ-11
    - BNC
    - DB-9
    - DB-25
    - F-type
  - Fiber
    - LC
    - ST
    - SC
      - APC
      - UPC
      - MTRJ
- Transceivers
  - SFP
  - GBIC
  - SFP+
  - QSFP
  - Characteristics of fiber transceivers
    - Bidirectional
    - Duplex
- Termination points
  - 66 block
  - 110 block
  - Patch panel
  - Fiber distribution panel

- Copper cable standards
  - Cat 3
  - Cat 5
  - Cat 5e
  - Cat 6
  - Cat 6a
  - Cat 7
  - Cat 8
  - RG-6
  - RG-59
- Copper termination standards
  - TIA/EIA 568a
  - TIA/EIA 568b
  - Crossover
  - Straight-through
- Ethernet deployment standards
  - 100BaseT
  - 1000BaseT
  - 1000BaseLX
  - 1000BaseSX
  - 10GBaseT

Standard 2: Diagram the appropriate placement of networking devices on a network.

- Firewall
- Router
- Switch
- Hub
- Bridge
- Modems
- Wireless access point
- Media converter
- Wireless range extender
- VoIP endpoint

Standard 3: Identify the use cases for advanced networking devices.

- Multilayer switch
- Layer 3 Switch
- Wireless controller
- Load balancer
- IDS/IPS
- Proxy server
- Reverse Proxy server

- VPN concentrator
- AAA/RADIUS server
- UTM appliance
- NGFW/Layer 7 firewall
- VoIP PBX
- VoIP gateway
- Content filter

Standard 4: Identify the purposes of virtualization and network storage technologies.

- Virtual networking components
    - Virtual switch
    - Virtual firewall
    - Virtual NIC
    - Virtual router
    - Hypervisor
- Network storage types
    - NAS
    - SAN
    - JBOD
- Connection type
    - FCoE
    - Fiber Channel
    - iSCSI
    - InfiniBand
- Jumbo frame

Standard 5: Understand WAN technologies.

- Service type
    - ISDN
    - - T1/T3
    - - E1/E3
    - - OC-3 – OC-192
    - DSL
    - Metropolitan Ethernet
    - Cable broadband
    - Dial-up
    - PRI
- Transmission mediums
    - Satellite
    - Copper
    - Fiber
    - Wireless

- Characteristics of service
  - MPLS
  - ATM
  - Frame relay
  - PPPoE
  - PPP
  - DMVPN
  - SIP trunk
- Termination
  - Demarcation point
  - CSU/DSU
  - Smart jack

STRAND 3

Network Operations

Standard 1: Create appropriate documentation and diagrams to manage the network.

- Diagram symbols
- Standard operating procedures/work instructions
- Logical vs. physical diagrams
- Rack diagrams
- Change management documentation
- Wiring and port locations
- IDF/MDF documentation
- Labeling
- Network configuration and performance baselines
- Inventory management

Standard 2: Understand business continuity and disaster recovery concepts.

- Availability concepts
  - Fault tolerance
  - High availability
  - Load balancing
  - NIC teaming
  - Port aggregation
  - Clustering
  - Power management
    - Battery backups/UPS
    - Power generators
    - Dual power supplies
    - Redundant circuits

- Recovery
  - Cold sites
  - Warm sites
  - Hot sites
  - Backups
    - Full
    - Differential
    - Incremental
  - Snapshots
- MTTR
- MTBF
- SLA requirements

Standard 3: Understand common scanning, monitoring and patching processes and summarize their expected outputs.

- Processes
  - Log reviewing
  - Port scanning
  - Vulnerability scanning
  - Patch management
    - Rollback
  - Reviewing baselines
  - Packet/traffic analysis
- Event management
  - Notifications
  - Alerts
  - SIEM
- SNMP monitors
  - MIB
- Metrics
  - Error rate
  - Utilization
  - Packet drops
  - Bandwidth/throughput

Standard 4: Identity remote access methods.

- VPN
  - IPSec
  - SSL/TLS/DTLS
  - Site-to-site
  - Client-to-site
- RDP
- SSH
- VNC

- Telnet
- HTTPS/management URL
- Remote file access
    - FTP/FTPS
    - SFTP
    - TFTP
- Out-of-band management
    - Modem
    - Console router

Standard 5: Identify enterprise network policies and best practices.

- Privileged user agreement
- Password policy
- On-boarding/off-boarding procedures
- Licensing restrictions
- International export controls
- Data loss prevention
- Remote access policies
- Incident response policies
- BYOD
- AUP
- NDA
- System life cycle
    - Asset disposal
- Safety procedures and policies

STRAND 4

Network Security

Standard 1: Understand the purpose of physical security devices.

- Detection
    - Motion detection
    - Video surveillance
    - Asset tracking tags
    - Tamper detection
- Prevention
    - Badges
    - Biometrics
    - Smart cards
    - Key fob
    - Locks

Standard 2: Explain authentication and access controls.

- Authorization, authentication, and accounting
  - RADIUS
  - TACACS+
  - Kerberos
  - Single sign-on
  - Local authentication
  - LDAP
  - Certificates
  - Auditing and logging
- Multifactor authentication
  - Something you know
  - Something you have
  - Something you are
  - Somewhere you are
  - Something you do
- Access control
  - 802.1x
  - NAC
  - Port security
  - MAC filtering
  - Captive portal
  - Access control lists

Standard 3: Understand basic wireless network security protocols.

- WPA
- WPA2
- TKIP-RC4
- CCMP-AES
- Authentication and authorization
  - EAP
    - PEAP
    - EAP-FAST
    - EAP-TLS
  - Shared or open
  - Preshared key
  - MAC filtering
- Geofencing

Standard 4: Identify common networking attacks.

- DoS
    - Reflective
    - Amplified
    - Distributed
- Social engineering
- Insider threat
- Logic bomb
- Rogue access point
- Evil twin
- War-driving
- Phishing
- Pharming
- Ransomware
- DNS poisoning
- ARP poisoning
- Spoofing
- Deauthentication
- Brute force
- VLAN hopping
- Man-in-the-middle
- Exploits vs. vulnerabilities

Standard 5: Understand network device hardening.

- Changing default credentials
- Avoiding common passwords
- Upgrading firmware
- Patching and updates
- File hashing
- Disabling unnecessary services
- Using secure protocols
- Generating new keys
- Disabling unused ports
    - IP ports
    - Device ports (physical and virtual)

Standard 6: Explain common mitigation techniques and their purpose.

- Signature management
- Device hardening
- Change native VLAN

- Switch port protection
    - Spanning tree
    - Flood guard
    - BPDU guard
    - Root guard
    - DHCP snooping
- Network segmentation
    - DMZ
    - VLAN
- Privileged user account
- File integrity monitoring
- Role separation
- Restricting access via ACLs
- Honeypot/honeynet
- Penetration testing

STRAND 5

Network Troubleshooting and Tools

Standard 1: Understand network troubleshooting methodology.

- Identify the problem
    - Gather information
    - Duplicate the problem, if possible
    - Question users
    - Identify symptoms
    - Determine if anything has changed
    - Approach multiple problems individually
- Establish a theory of probable cause
    - Question the obvious
    - Consider multiple approaches
        - Top-to-bottom/bottom-to-top OSI model
        - Divide and conquer
- Test the theory to determine the cause
    - Once the theory is confirmed, determine the next steps to resolve the problem
    - If the theory is not confirmed, reestablish a new theory or escalate
- Establish a plan of action to resolve the problem and identify potential effects
- Implement the solution or escalate as necessary
- Verify full system functionality and, if applicable, implement preventive measures
- Document findings, actions, and outcomes

Standard 2: Demonstrate the use of appropriate networking tools.

- Hardware tools
  - Crimper
  - Cable tester
  - Punchdown tool
  - OTDR
  - Light meter
  - Tone generator
  - Loopback adapter
  - Multimeter
  - Spectrum analyzer
- Software tools
  - Packet sniffer
  - Port scanner
  - Protocol analyzer
  - WiFi analyzer
  - Bandwidth speed tester
  - Command line
    - ping
    - tracert, traceroute
    - nslookup
    - ipconfig
    - ifconfig
    - iptables
    - netstat
    - tcpdump
    - pathping
    - nmap
    - route
    - arp
    - dig

Standard 3: Identify troubleshooting methods for common wired connectivity and performance issues.

- Attenuation
- Latency
- Jitter
- Crosstalk
- EMI
- Open/short
- Incorrect pin-out

- Incorrect cable type
- Bad port
- Transceiver mismatch
- TX/RX reverse
- Duplex/speed mismatch
- Damaged cables
- Bent pins
- Bottlenecks
- VLAN mismatch
- Network connection LED status indicators

Standard 4: Identity troubleshooting methods for common wireless connectivity and performance issues.

- Reflection
- Refraction
- Absorption
- Latency
- Jitter
- Attenuation
- Incorrect antenna type
- Interference
- Incorrect antenna placement
- Channel overlap
- Overcapacity
- Distance limitations
- Frequency mismatch
- Wrong SSID
- Wrong passphrase
- Security type mismatch
- Power levels
- Signal-to-noise ratio

Standard 5: Identity troubleshooting methods for common network service issues.

- Names not resolving
- Incorrect gateway
- Incorrect netmask
- Duplicate IP addresses
- Duplicate MAC addresses
- Expired IP address
- Rogue DHCP server
- Untrusted SSL certificate

- Incorrect time
- Exhausted DHCP scope
- Blocked TCP/UDP ports
- Incorrect host-based firewall settings
- Incorrect ACL settings
- Unresponsive service
- Hardware failure

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Network Fundamentals	888	27	7	18	13	7						72	72

** I WILL REPLACE THIS WHEN WE REVIEW THE TEST. **

Course Changes 2020: Skilled and Technical Education Pathways

40.08.00.00.401 **Construction Management 1**
New Course
40.08.00.00.402 **Construction Management 2**
New Course
40.08.00.00.403 **Construction Management 3**
New Course
40.09.00.00.001 **Aviation Maintenance 1**
New Course
40.09.00.00.002 **Aviation Maintenance 2**
New Course
40.10.00.00.044 **Production Graphics 2**
Name Change
40.11.00.00.010 **Bicycle Repair Training**
New Course
40.11.00.00.050 **Unmanned Aerial Systems**
New Course
40.11.00.00.131 **Aviation 1**
New Course
40.11.00.00.132 **Aviation 2**
New Course
40.11.00.00.134 **Aviation Weather**
New Course

STRANDS AND STANDARDS
CONSTRUCTION MANAGEMENT 1

Course Description

This is the first in a sequence of courses that prepares individuals to enter the construction industry. This course is designed to allow for scaled model construction with an emphasis on site preparation and foundation work for residential and commercial construction.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.08.00.00.401
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Construction Management, or
Endorsement 2	Carpentry, or
Endorsement 3	Electrician, or Plumbing

ADA Compliant: October 2020

STRAND 1

Students will explain the importance of safety, the OSHA Focus Four and related protections.

Standard 1

Describe the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control.

- Define incidents and the significant costs associated with them.
- Identify the common causes of incidents and their related consequences.
- Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).

Standard 2

Describe the safe work requirements for elevated work, including fall protection guidelines.

- Identify and describe various fall hazards.
- Identify and describe equipment and methods used in fall prevention and fall arrest.
- Identify and describe the safe use of ladders and stairs.
- Identify and describe the safe use of scaffolds.

Standard 3

Identify and explain how to avoid struck-by and caught-in-between hazards.

- Identify and explain how to avoid struck-by hazards.
- Identify and explain how to avoid caught-in and caught-between hazards.

Standard 4

Identify common energy-related hazards and explain how to avoid them.

- Describe basic job-site electrical safety guidelines.
- Explain the importance of lockout/tagout and describe basic procedures.

Standard 5

Identify and describe the proper use of personal protective equipment (PPE).

- Identify and describe the basic use of PPE used to protect workers from bodily injury.
- Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.

Standard 6

Identify and describe other specific job-site safety hazards.

- Identify various exposure hazards commonly found on job sites.
- Identify hazards associated with environmental extremes.
- Identify hazards associated with hot work.
- Identify fire hazards and describe basic firefighting procedures.

- Identify confined spaces and describe the related safety considerations.

STRAND 2

Students will read and understand civil drawings, specifications, and other construction documentation.

Standard 1

Identify and describe various types of civil drawings, including their fundamental components and features.

- Identify various types of construction drawings.
- Identify and describe the purpose of the five basic construction drawing components.
- Identify and explain the use of dimensions and various drawing scales.
- Explain the importance of specifications.
- List items commonly shown on architectural drawings.
- Describe information typically shown on structural drawings.
- Explain the importance of referencing mechanical, electrical, and plumbing plans.
- Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.

STRAND 3

Students will understand the preliminary steps that must be taken on the site before construction can begin.

Standard 1

Know the major types of soils and how they are classified.

- Understand how factors related to soils can affect design decisions.
- Investigate various way to stabilize soils.

Standard 2

Identify and explain the safe operation and use of construction equipment commonly found on a worksite.

- aerial lifts
- skid-steer loaders
- forklifts
- backhoes
- generators
- compressors
- compactors

Standard 3

State the safety precautions associated with construction equipment.

- Identify safety precautions when transporting construction equipment.
- Identify safety precautions related to interlocking and hydraulic systems.
- Identify safety precautions to observe when fueling construction equipment.
- Identify safety precautions related to batteries of construction equipment.

Standard 4

Recognize, use, and properly care for tools and equipment associated with differential leveling.

- Identify the instruments commonly used for differential leveling.
- Explain how to set up and calibrate a leveling instrument.
- Explain how to use a builder's level and differential-leveling procedures to determine site and building elevations.
- Read and interpret a set of civil plans and how they relate to elevations on a job site.

STRAND 4

Students will understand the methods and materials used in Concrete & Masonry construction.

Standard 1

Identify various concrete ingredients and describe their purpose in a concrete mixture.

- Explain how Portland cement affects a concrete mixture and list the types of Portland cement.
- Describe the characteristics of aggregate used in a concrete mixture.
- List the characteristics of water used in a concrete mixture.
- List types of concrete admixtures and describe how they affect a concrete mixture.

Standard 2

Identify proper concrete mixture measurements and curing methods.

- Describe normal concrete-mix proportions and measurements.
- List special types of concrete.
- Describe the properties of air-entrained concrete.
- Describe how concrete is cured.

Standard 3

Describe the methods for testing concrete.

- Describe the proper procedure for sampling concrete.
- Explain the purpose of a slump test.
- Describe how a concrete compression test is performed.

Standard 4

Calculate concrete volume for rectangular or circular structures.

- Calculate rectangular volume.
- Calculate circular volume.

Standard 5

Describe modern masonry materials and techniques.

- Explain how clay masonry units (brick) are used in construction.
- Explain how concrete masonry units (CMUs or block) are used in construction.
- Explain how stone is used in construction.
- Describe how mortar and grout are used in masonry construction.

Standard 6

Explain how to mix mortar and lay masonry units.

- Explain how to mix mortar.
- Describe how to lay masonry units.

Standard 7

Describe how to install both brick and concrete masonry units.

- Identify the characteristics of both brick and concrete masonry units.
- Explain how to set up, lay out, and bond both brick and concrete masonry units.
- Explain how to lay and tool both brick and concrete masonry units.
- Explain how to clean brick.

STRAND 5

Students will understand the factors considered in foundation and concrete flatwork.

Standard 1

Identify the various types of foundations and list appropriate uses for each.

- Identify the various types of deep-foundation elements.
- Identify the various types of shallow foundation elements.

Standard 2

Explain how to properly perform job-site layout.

- Describe how to establish building layout.
- Explain how to establish building lines with batter boards.
- Describe excavating and trenching processes.
- Explain how to lay out forms.

Standard 3
Explain the proper methods for placing and consolidating concrete into forms.

- Explain the proper method for placing concrete into forms.
- Explain the proper method for consolidating concrete.

Standard 4
Describe the proper methods for finishing and curing concrete.

- Explain the proper method for screeding concrete.
- Explain the proper method for leveling concrete.
- Explain the proper method for finishing concrete.
- Describe how to properly cure concrete.
- Describe the use of joint sealants.

Standard 5
Identify the different kinds of joints in concrete structures.

- Identify construction joints.
- Identify isolation joints.
- Identify control joints.
- Identify decorative joints.

Standard 6
Identify various types of foundation forms and their proper removal.

- Describe how to erect and strip job-built wood forms.
- Explain how to erect manufactured forms.
- Describe how to strip forms.

Standard 7
Describe how slabs-on-grade are formed and finished.

- List slab-on-grade construction considerations.
- Describe how to form and finish a commercial slab-on-grade.
- Discuss the use of screeds when finishing slabs-on-grade.

STRAND 6
Students will be invited to participate in SkillsUSA.

Standard 1
Summarize how to be connected to the industry through an organization like SkillsUSA.

- Understand SkillsUSA membership.
- Understand the program, curriculum, and SkillsUSA championships.
- Understand the National Program of Work Standards.

Performance Skills

- Properly set up and climb/descend an extension ladder, demonstrating proper three-point contact.
- Inspect a typical power cord and GFCI to ensure their serviceability.
- Inspect, don, fit, and remove the following PPE items:
  - Eye protection
  - Hearing protection
  - Hard hat
  - Gloves
  - Fall arrest harness
  - Approved footwear
- Using a supplied floor plan:
  - Locate the wall common to both interview rooms.
  - Determine the overall width of the structure studio.
  - Determine the distance from the outside east wall to the center of the beam in the structure studio.
  - Determine the elevation of the slab.
  - Determine pacing?
- Set up, adjust, and field-test leveling instruments.
- Use a builder's level, leveling rods, and/or laser level with appropriate differential-leveling procedures to determine site and building elevations.
- Perform a concrete slump test or create a concrete test cylinder.
- Calculate concrete volume requirements using formulas, concrete tables, and/or concrete calculators, as applicable.
- Properly mix mortar by hand.
- Properly spread mortar using a trowel.
- Lay brick to the line in courses that are true for height, level, plumb, and range.
- Establish elevations.
- Lay out and construct an instructor-selected foundation using an established grid line.
- Properly place and consolidate concrete in selected concrete forms.
- Use a screed to strike off and level a concrete surface.
- Use a bull float and/or darby to level and smooth a concrete surface.
- Use a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface.
- Use an edger to form a radius at the edges of a concrete pad, slab, etc.
- Use a jointer to make control joints in a concrete surface.

Performance Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS
CONSTRUCTION MANAGEMENT 2

Course Description

This is the second in a sequence of courses that prepares students to enter the construction industry. This course is designed to allow for scaled model construction with an emphasis on the exterior shell and structure of residential and commercial construction.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.08.00.00.402
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	Construction Management, or
	Carpentry, or
	Electrician, or
	Plumbing

ADA Compliant: October 2020

STRAND 1

Students will demonstrate basic math skills needed in the construction environment.

Standard 1

Identify whole numbers and demonstrate how to work with them mathematically.

- Identify different whole numbers and their place values.
- Demonstrate the ability to add and subtract whole numbers.
- Demonstrate the ability to multiply and divide whole numbers.

Standard 2

Explain how to work with fractions.

- Define equivalent fractions and show how to find lowest common denominators.
- Describe improper fractions and demonstrate how to change an improper fraction toa mixed number.
- Demonstrate the ability to add and subtract fractions.
- Demonstrate the ability to multiply and divide fractions.

Standard 3

Describe the decimal system and explain how to work with decimals.

- Describe decimals and their place values.
- Demonstrate the ability to add, subtract, multiply, and divide decimals.
- Demonstrate the ability to convert between decimals, fractions, and percentages.

Standard 4

Identify various tools used to measure length and show how they are used.

- Rulers and squares
- Measuring tapes

Standard 5

Identify units of length, weight, volume, and temperature using the imperial system of measurement, including:

- length
- weight
- volume
- temperature

Standard 6

Convert between civil and architectural units.

- sea level
- site elevation
- eighths to/from tenths

Standard 7

Identify basic angles and geometric shapes and explain how to calculate their area and volume.

- Identify various types of angles.
- Identify basic geometric shapes and their characteristics.
- Demonstrate the ability to calculate the area of two-dimensional shapes.
- Demonstrate the ability to calculate the volume of three-dimensional shapes.

STRAND 2

Students will identify, use, and care for tools required for framing/sheathing.

Standard 1

Identify and explain how to use various types of hand tools.

- hammers and demolition tools
- chisels and punches
- screwdrivers
- non-adjustable and adjustable wrenches
- socket and torque wrenches
- pliers and wire cutters

Standard 2

Identify and describe how to use various types of measurement and layout tools.

- measuring tapes, carpenter and tri squares
- levels and layout tools

Standard 3

Identify and explain how to use various types of cutting and shaping tools.

- handsaws
- files and utility knives

Standard 4

Identify and explain how to use various power tools.

- power drill and bits
- circular saw
- reciprocating saw
- pneumatic and powder-actuated fastening tools

Standard 5

Identify and explain how to use other common hand tools.

- shovels and picks
- chain falls and come-alongs
- clamps

STRAND 3

Students will read and understand structural drawings, codes, specifications, and other construction documentation.

Standard 1

Identify and describe various types of construction drawings, including their fundamental components and features.

- Identify various types of construction drawings.
- Identify and describe the purpose of the five basic construction drawing components.
- Identify and explain the use of dimensions and various drawing scales.
- Explain the importance of specifications, including CSI Master format.
- List items commonly shown on architectural drawings.
- Describe information typically shown on structural drawings.
- Explain the importance of referencing mechanical, electrical, and plumbing plans.
- Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.

STRAND 4

Students will understand the procedures for laying out and framing walls, including roughing- in door and window openings, constructing corners and partition Ts, bracing walls, and applying sheathing.

Standard 1

Identify the components of a wall system.

- Describe methods used to construct corner posts.
- Describe the process for framing partition intersections.
- Describe the purpose of headers and how they are constructed.
- Describe how metal-framed walls are constructed.

Standard 2

Describe the correct procedure to lay out, assemble, erect, and brace exterior walls for a frame building.

- Describe how to properly lay out a wood frame wall.
- Explain how to lay out wall openings.
- Identify where fire stops are to be installed and explain how they are installed.
- List the four steps involved in erecting a wall.

Standard 3

Describe wall framing techniques used in masonry construction.

Standard 4

Identify alternative wall systems.

- Describe how concrete walls are constructed.
- Explain the difference between standard interior wall systems and alternative interior wall systems.

Standard 5

Describe the correct procedure to estimate the materials required to frame wood or metal walls.

- Explain how to estimate the amount of material required for soleplates and top plates.
- Describe how to estimate the number of studs required.
- Explain how to calculate the amount of material needed for a header.
- Describe how to estimate the amount of diagonal bracing required.

STRAND 5

Students will understand the components of floor and roof systems.

Standard 1

Identify the different types of framing systems.

- Describe the general components of a platform-framed structure.
- List differences between TJI, I-Beam, and other trusses.
- Describe the characteristics of post-and-beam framing.

Standard 2

Identify floor system components.

- Define sill plate and describe its role in floor framing.
- List and recognize different types of beams and girders and supports.
- List and recognize different types of floor joists.
- List and recognize different types of bridging.
- Explain the purposes of subfloor and underlayment.

Standard 3

Describe the construction methods for floor systems and identify floor system materials.

- Describe how to check a foundation for squareness.
- Name the methods used to lay out and fasten sill plates to the foundation.
- Describe the proper procedure for installing a beam or girder.
- Describe how to lay out sill plates and girders for floor joists.
- Describe how to lay out and install floor joists for partitions and floor openings.
- Identify different types of bridging and describe how to properly install each type.
- Describe how to properly install subfloor.
- Explain how to install joists for projections or cantilevered floors.

Standard 4

Estimate the amount of material needed for a floor assembly.

- Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
- Describe how to estimate the amount of beam or girder material.
- Describe how to estimate the amount of lumber needed for joists and joist headers.
- Describe how to estimate the amount of bridging required.

- Describe how to estimate the amount of subfloor material required.

Standard 5

Identify common types of roofs used in residential construction.

- Gable
- Dutch Hip
- Flat
- Shed

Standard 6

Recognize the use of trusses in basic roof framing.

- Identify the various types and components of trusses.
- Identify the basics of truss installation.
- Identify the basics of truss bracing.

Standard 7

Describe how to erect a gable roof.

- Describe how to install rafters.
- Identify the two types of dormers.
- Describe how to use a framing square and a Speed Square™ for roof framing.
- Explain how to frame an opening in a roof.
- Describe the basics of roof sheathing installation.

Standard 8

Identify the components of ceiling framing.

- Describe the correct procedure for laying out ceiling joists.
- Describe how to cut and install ceiling joists on a wood frame building.
- Describe how to estimate the number of ceiling joists required for a building.

Standard 9

Describe how to perform a material takeoff for a roof.

- Determine the materials needed for a gable roof.

Standard 10

Identify the different roofing system materials and their preferred applications.

- composition
- roll-roofing
- wood shakes and shingles
- tile/slate
- metal
- built-up
- single ply
- fasteners used on roofing projects.

Standard 11

Describe the installation techniques for common roofing systems.

- Describe how to properly prepare a roof deck.
- Explain the purpose of underlayment and waterproof membrane.
- Discuss the purpose of drip edge, flashing, and roof ventilation.
- Explain how to install composition shingles.
- Explain how to install metal roofing.
- Describe how to install roll roofing.

STRAND 6

Students will be able to understand the methods and materials used in the building envelope.

Standard 1

Demonstrate the proper use of thermal insulation and vapor barriers.

- Describe the requirements for insulation.
- Describe the characteristics of various types of insulation material.
- Calculate the required amounts of insulation for a structure.
- Describe the requirements for moisture control and ventilation.
- Describe various methods of waterproofing.
- Describe air infiltration control requirements.

Standard 2

Demonstrate the proper use of bonding agents, sealers, and sealants.

Standard 3

Identify the various types of cladding systems used in construction.

- Distinguish between extruded and expanded foam insulations.
- Identify trims used in exterior insulation and finish systems (EIFS) and stucco and state their uses.
- Distinguish between traditional and water management EIFS.
- Distinguish between traditional hard-coat plaster and synthetic finishes.
- Describe how to install synthetic veneer stone.
- Describe building features commonly created with glass fiber reinforced concrete (GFRC).

Standard 4

Identify the components of the building envelope.

- Describe various ways that air infiltration can be minimized or prevented.
- Identify various types of fixed, sliding, and swinging windows.
- Identify the common types of exterior doors and explain how they are constructed.

Standard 5

State the requirements for a proper window installation.

- Explain when jamb extensions are used.

- Identify common considerations when framing in glass blocks.

Standard 6

State the requirements for a proper door installation.

- Identify the differences between residential and commercial doors.
- Identify the various types of locksets used on exterior doors and explain how they are installed.

Standard 7

Describe the various types and applications of exterior finish materials.

- Identify the types of wood siding.
- Identify vinyl and metal siding materials and components.
- List applications for fiber-cement siding.
- Discuss the types of veneer finishes.
- List specialty exterior finishes.
- Explain the purpose of flashing.

Standard 8

Explain how to install exterior finish materials.

- Describe surface preparation that must be performed prior to installing exterior finish materials.
- Discuss the types of furring and insulation that might be applied to exterior walls.
- Explain how to establish a straight reference line.
- Describe how to install wood siding.
- Describe how to install vinyl and metal siding.
- Describe how to install fiber-cement siding.
- Explain how to install cornices.

Standard 9

Describe the estimating procedure for exterior finish projects.

- Explain how to perform a takeoff on panel and board siding.

STRAND 7

Students will demonstrate the skills needed to communicate effectively and clearly and their role on the construction team.

Standard 1

Describe the communication, listening, and speaking processes and their relationship to job performance.

- Describe the communication process and the importance of listening and speaking skills.
- Describe the listening process and identify good listening skills.
- Describe the speaking process and identify good speaking skills.

Standard 2

Describe good reading and writing skills and their relationship to job performance.

- Describe the importance of good reading and writing skills.
- Describe job-related reading requirements and identify good reading skills.
- Describe job-related writing requirements and identify good writing skills.

Standard 3

Understand the importance of teamwork plays in the Building Design & Construction industry.

Standard 4

Understand the project manager's role in the Building Design & Construction industry.

Resource

Recommended to include a list of competencies from NCCER Team Leadership:

- communication styles of men & women
- cultural differences
- sexual harassment
- verbal/non-verbal communication
- written/visual communication

Performance Skills

- Create a cut list for all of the structural members in a wall containing both a door and a window.
- Something identifying the student's ability to convert between civil and architectural units.
- Locate and square the footings for a structure using a 3:4:5 right triangle method and check for squareness by measuring the diagonals.
- Visually inspect to determine if they are safe, and properly use a minimum of five of the above listed tools.
- Make a straight, square cut in framing lumber using a crosscut saw.
- Using a supplied floor plan:
  - Locate the wall common to both interview rooms.
  - Determine the overall width of the structure studio.
  - Determine the distance from the outside east wall to the center of the beam in the structure studio.
  - Determine the elevation of the slab.
- Estimate the materials required to frame walls.
- Build a frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.
- Correctly install sheathing on a wall.
- Estimate the amount of material to frame a floor assembly from a set of plans.

- Lay out and construct a floor assembly, including a rough opening and subfloor material.
- Estimate the number of ceiling joists required for a building.
- Perform a material takeoff for a roof.
- Install selected vapor barriers.
- Install selected insulation materials.
- Install selected building wraps.
- Prepare a rough opening for proper window installation.
- Prepare a rough opening for proper door installation.
- Install a lockset.
- Install three of the most common siding types in your area.
- Estimate the amount of lap or panel siding required for a structure.
- Perform a given task after listening to oral instructions.
- Fill out a work-related form provided by the instructor.
- Read and interpret a set of instructions for properly donning a safety harness and then orally instruct another person on how to don the harness.
    - Deliver instructions to a team and have that team perform the task as instructed.

STRANDS AND STANDARDS
CONSTRUCTION MANAGEMENT 3

Course Description

This is the third in a sequence of courses that prepares students to enter the construction industry. This course is designed to allow for scaled or virtual model construction with an emphasis on mechanical, electrical, and plumbing systems as well as interior finishes of residential and commercial construction.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.08.00.00.403
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	Construction Management, or
	Carpentry, or
	Electrician, or
	Plumbing

ADA Compliant: October 2020

STRAND 1

Students will read and understand construction drawings, specifications, and other construction documentation.

Standard 1

Identify and describe various types of construction drawings, including their fundamental components and features.

- Identify various types of construction drawings.
- Identify and explain the use of dimensions and various drawing scales.
- Explain the importance of specifications using the Master CSI format (Specifically Divisions 8,9,10,12 & 21-28).
- List items commonly shown on Mechanical, Electrical, Plumbing, and Architectural Detail drawings.
- Explain the importance of referencing mechanical, electrical, and plumbing plans.
- Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.

STRAND 2

Students will understand the various types of stairs and the common building code requirements related to stairs and railing.

Standard 1

Identify how residential and commercial stairways differ.

Standard 2

Identify terms associated with stair framing.

- Define headroom.
- Define stringer and explain when more than two stringers are used.
- Define treads and risers and explain the importance of uniform tread depths and riser heights.
- List the minimum stairway width requirements for residential and commercial structures.
- Describe the difference between handrails and guardrails.

Standard 3

Describe the procedure used to determine the total rise, number and size of risers, and number and size of treads required for a stairway.

- Explain how to calculate the riser height, tread depth, and total run for a stairway.
- Describe how to calculate stairwell opening sizes.

Standard 4

Describe the procedure to lay out and cut stringers, risers, and treads.

- Explain how to lay out and cut a stringer.
- Summarize how concrete stairs differ from wood framed stairs.

STRAND 3

Students will be able to understand the methods and materials used in Plumbing & Fire Suppression systems.

Standard 1

Understand the types of plumbing systems used in the built environment.

- Identify components of potable water distribution systems.
- Identify components of sanitary piping systems (Drain, Waste, Vent).
- Understand common fixtures used in residential and commercial construction.
- Understand the types of piping, tubing, and fittings used in plumbing systems.

Standard 2

Develop a working knowledge of the various types of fire suppression systems.

- Understand the difference between active and passive fire protection.
- Identify components of a fire suppression system.

Standard 3

Identify the licensing and apprenticeship requirements to become a plumber.

STRAND 4

Students will be able to understand the methods and materials used in Electrical and Low Voltage systems.

Standard 1

Understand the various sources of electrical power and how it is distributed from a generating source.

- State how electrical power is created and distributed.
- Identify general electrical safety practices.
- Describe the OSHA requirements and procedures related to electrical lockout/tagout.
- Specify the types of electrical conductors for various applications.
- Identify components of electrical distribution and lighting in the built environment.

Standard 2

Describe an electric current and the difference between AC and DC current.

- Identify and discuss the various units used to measure, control, and distribute electrical

power within a building.
- Describe the difference between alternating current and direct current.
- Define current.
- Define voltage.
- Define resistance.
- Use Ohm's law to solve for unknown circuit values.

Standard 3

Understand the signal systems used to provide electronic safety and security.

- Identify various fire detection and alarm strategies.
- Describe the various devices used in the design of security systems.
- Understand the principles of intrusion protection.
- Understand the functions of building automation systems.

Standard 4

Identify the licensing and apprenticeship requirements to become an Electrician.

STRAND 5

Students will be able to understand the methods and materials used in HVAC systems.

Standard 1

Identify the most common heating and cooling systems used in residential and commercial buildings.
Describe types of heating systems.

- Describe the types of gas furnaces and how they operate.
- Describe the operation of hydronic heating systems.
- Describe the operation of electric heating equipment.
- Identify common factors to be considered when designing HVAC systems.
- Explain the fundamental concepts of the refrigeration cycle.
- Identify the major components of cooling systems and how they function.

Standard 2

Identify types of ventilation that provide acceptable indoor air quality.

- Define what an acceptable ACH is and how that is accomplished.
- Identify code requirements for natural ventilation vs. mechanical ventilation.

Standard 3

Describe the mechanical equipment and materials used to create air distribution systems.

- Describe various blower types and applications.
- Describe various fan designs and applications.
- Describe common duct materials and fittings.

- Identify the characteristics of common grilles, registers, and dampers.

Standard 4

Identify the licensing and apprenticeship requirements to become an HVAC Technician.

STRAND 6

Students will develop skills related to finding and securing a position in the construction trades.

Standard 1

Describe the opportunities in the construction business and how to enter the construction workforce.

- Describe the construction business and the opportunities offered by the trades.
- Explain how workers can enter the construction workforce.

Standard 2

Explain the importance of critical thinking and how to solve problems.

- Describe critical thinking and barriers to solving problems.
- Describe how to solve problems using critical thinking.
- Describe problems related to planning and scheduling.

Standard 3

Explain the importance of social skills and identify ways good social skills are applied in the construction trade.

- Identify good personal and social skills.
- Explain how to resolve conflicts with co-workers and supervisors.
- Explain how to give and receive constructive criticism.
- Identify and describe various social issues of concern in the workplace.
- Describe how to work in a team environment and how to be an effective leader.

Performance Skills

1. Using a supplied construction document:
   - Identify how many stringers, treads and risers are being called out.
   - Identify 5 components of the Mechanical HVAC systems.
   - Identify 5 components of the Electrical systems.
   - Identify 5 components of the Plumbing systems.
   - Identify how to read a specification for 3 different types of interior finishes.
2. Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.
3. Sketch and label 5 components of a potable water system that you observe on a field trip.
4. Sketch and label 5 components of a sanitary piping system that you observe on a field trip.
5. Sketch and label 5 components of a fire suppression system that you observe on a field trip.
6. Sketch and label 10 components of an electrical distribution system that you observe on a field trip.

7. Using safe practices and a multi-meter, measure current, voltage and resistance of a minimum of 3 electrical components.
8. Present to your peers the home automation system you would select for your dream home of the future.
9. Using safe practices, install and wire-in a breaker in a panel.
10. Using safe practices, build a three-way light switch circuit.
11. Properly join a round duct to a rectangular duct.
12. Conduct an inventory and record personal skills.
    - Find and apply for a construction trades job opening.

STRANDS AND STANDARDS
AVIATION MAINTENANCE I

Course Description

This is a program with a sequence of courses that prepare individuals to inspect, repair, service, and rebuild all airplane parts, including engines, propellers, instruments, airframes, fuel and oil tanks, control cables, and hydraulic units. These courses are designed to meet Federal Aviation Administration (FAA)requirements for licensing as an airframe and powerplant mechanic.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.09.00.00.001
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Maintenance
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will be able to read aircraft drawings and be able to create drawings for proposed maintenance procedures using industry standard drafting techniques.

Standard 1

Identify the purpose and function of aircraft drawings.

Standard 2

Identify types of aircraft drawings:

- Orthographic views
- Electrical
- Hydraulic

Standard 3

Explore methods of illustration:

- Computer-Aided Design (CAD)
- Manual
- Solid works

Standard 4

Understanding drafting lies and their meaning.

Standard 5

Understand dimensioning of a drawing:

- Clearance and tolerances

Standard 6

Read aircraft production drawing.

Standard 7

Apply aviation math with respect:

- Weight and balance
- Rigging and geometry

Standard 8

Identify techniques used in sketching/drafting.

Standard 9

Present drawings and discuss feature in the drawing's graphic presentation of information.

STRAND 2

Students will understand the causes of and how to identify, control and clean corrosion.

Standard 1
List corrosion inspection cleaning and control procedures.

Standard 2
Understand corrosion—an electro chemical action.

Standard 3
Identify the types of corrosion:

- Intergranular
- Filiform
- Dissimilar
- Metal
- Galvanic

Standard 4
Identify corrosive agents:

- Biohazards
- Electrolytic action
- Biodegradable

Standard 5
Understand methods of detection of corrosion:

- Visual
- Nondestructive testing—eddy current
- Ultrasonic
- Xray
- Phase array

Standard 6
Identify corrosion-prone areas.

Standard 7
Understand removal and treatment of corrosion:

- Removal
- Neutralizing
- Protective

Standard 8
Explore corrosion prevention:

- Material selection compatibility
- Surface coatings

- Contamination prevention

STRAND 3

Students will understand importance and calculation of weight and balance for various kinds of aircraft.

Standard 1

Understand importance of weight and balance and identify effect of flight control abilities. know.

Standard 2

Principles of weight and balance.

Standard 3

Define terms used in weight and balance:

- Center of gravity
- Datum
- Lever arm
- C of G range
- Ballast

Standard 4

Identify weighing procedures:

- Weighing aircraft
- Unusable fluids
- Leveling aircraft on axis
- Calibrated equipment

Standard 5

Describe procedure for locating the balance point.

Standard 6

Understand the center of gravity:

- Comparing TCDS vs aircraft weighing data

Standard 7

Describe shifting the center of gravity.

Standard 8

Understand adverse-loading center:

- Effect of aircraft controllability

Standard 9
Understand why weight and balance changes after and alterations:

- Recomputing C of G after equipment changes

Standard 10
Understand helicopter weight and balance:

- Emphasize C of G is smaller vs fixed wing

Standard 11
Identify ranges for loading and weight distribution:

- Pilots
- Passengers
- Cargo
- Fueling loading for flight with C of G

STRAND 4
Students will develop a respect for maintenance forms & records and understand the requirement for accuracy and detail.

Standard 1
Identify Federal Aviation Regulations (FAR):

- FAR's related to forms and records

Standard 2
Identify permanent records:

- Flight logs
- Maintenance logs
- A.D. Compliance logs
- Service bulletin compliance logs
- Component logs

Standard 3
Identify temporal records.

Standard 4
Read and use forms:

- 8130 deficiency reports
- 337 serviceable and non-serviceable tagging

Standard 5
Understand the purpose of the Federal Aviation Administration.

Standard 6
Identify personnel certification:

- Licensing/ratings—FAR part 65, A and P, IA, DAR, DME etc.

Standard 7
Understand maintenance and inspection requirements:

- Part 43 for scope and detail and frequency, requirements of parts 33, 91, 121, 135

STRAND 5
Student will obtain a general familiarization with and understand the purpose of maintenance publication—General familiarization and purpose.

Standard 1
Identify maintenance publications.

Standard 2
Federal Aviation Regulations.

Standard 3
Advisory circulars.

Standard 4
Type certificate data sheets, aircraft specification and aircraft listings.

Standard 5
General aviation airworthiness alerts.

Standard 6
Airworthiness directives.

Standard 7
Microfiche system for keeping publications current.

Standard 8
A.T.A Specification 100

Standard 9
The Federal Aviation Administration.

Standard 10
Personnel certification.

Standard 11
Maintenance and inspection requirements.

STRAND 6
Students will understand the privileges and limitation of aircraft mechanics.

Standard 1
Understand Federal Aviation Regulations—FAR part 65.

Standard 2
Understand the purpose of The Federal Aviation Administration with respect to oversight, suspension and revocation of privileges.

Standard 3
Identify personnel certification.

Standard 4
Understand Maintenance and Inspection Requirements—Part 43, manufacture and component maintenance requirements.

STRAND 7
Students will understand aircraft.

Standard 1
Identify the purpose and function.

Standard 2
Identify rigid fluid lines.

Standard 3
Observe fabricating rigid tubing.

Standard 4
Identify flexible fluid lines.

Standard 5
Understand fluid line fittings.

Standard 6
Observe fluid line installation.

STRAND 8
Students will review and apply mathematics as it applies to aviation.

Standard 1
Understand basic math concepts including whole numbers, fractions, decimals, and percentages.

Standard 2
Perform metric to standard conversions unit 1 metric conversions.

Standard 3
Understand equations and formulas.

Standard 4
Extract roots and raise numbers to a given power. (LEVEL 3)

Standard 5
Calculate power and roots.

Standard 6
Understand percentages.

Standard 7
Rate, percent, base, amount, and difference:

- Solve ratio, proportion, and percentage problems. (LEVEL 3)

Standard 8
Understand algebraic operations:

- Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers. (LEVEL 3)

Performance Skills

- Use symbols and system schematics to create an aircraft drawing. (LEVEL 2)
- Identify commonly used aircraft electrical and electronic symbols. (LEVEL 2)
- Identify lines and symbols. (LEVEL 2)
- Use diagrams and schematics to perform and installation. (LEVEL 2)
- Draw sketches of repairs and alterations. (LEVEL 3)
- Make sketches. (LEVEL 3)
- Use blueprint information. (LEVEL 3)
    - Trace circuits with aircraft wiring diagrams. (LEVEL 3)
    - Interpret dimensions. (LEVEL 3)
    - Read and interpret drawings. (LEVEL 3)
    - Interpret installation diagrams. (LEVEL 3)
- Use graphs and charts to ensure installation or repair meets manufacturers specifications. (LEVEL 3)
- Use manufactures charts and graphs. (LEVEL 3)

- Identify and select appropriate cleaning materials. (LEVEL 3)
  - Identify caustic cleaner. (LEVEL 3)
  - Identify cleaning agents for aircraft engine parts. (LEVEL 3)
  - Select and properly use PPE for the chosen cleaning material.
- Identify, remove and treat aircraft corrosion and perform aircraft cleaning. (LEVEL 3)
  - Identify and remove corrosion on aluminums. (LEVEL 3)
  - Remove oxidation – Ferrous base (Level 3)
  - Clean and preserve rubber products – de-ice boots, prop heating elements. (LEVEL 3)
- Weight and balance lab.
  - Weigh aircraft in accordance with manufacture specifications and procedures. (LEVEL 3)
  - Locate, interpret and apply weight and balance information. (LEVEL 2)
- Perform complete weight and balance check and record data. (LEVEL 3)
  - Solve Weight and balance problems. (LEVEL 3)
  - Compute forward and aft loaded center of gravity. (LEVEL 3)
  - Compute weight and balance on a helicopter. (LEVEL 3)
  - Examine weight and balance records. (LEVEL 3)
- Calculate complete weight and balance and loading for passengers and cargo in preparation for flight.
- Complete required maintenance forms, records and inspection reports. (LEVEL 3)
  - Make maintenance record of work performed. (LEVEL 3)
  - Use inspection guides-
    - Part 43 Appendix D
    - Aircraft Manufacture
    - Component Manufacture Requirements. (LEVEL 3)
  - Fill out a malfunction and defect report—Form 8010-1 (LEVEL 3)
- Demonstrate ability to read, comprehend and apply information contained in FAA and manufactures aircraft maintenance specifications, data sheets, manuals, publication, and related federal aviation regulations, airworthiness directives and advisory material on aircraft component or appliance of choice. (LEVEL 3)
  - Locate reference data including Ad and advisory circular. (LEVEL 3)
  - Use information from the aircraft specifications or type certificate data sheets to determine conformity. (LEVEL 3)
  - Find information in the manufactures manuals to determine maintenance procedures. (LEVEL 3)
  - Locate information in 14 CFR—to determine form and block entry requirement. (LEVEL 3)
- Read technical data. (LEVEL 3)

    - Select and use supplementary type certificates and airworthiness directives. PMA, TSO and Advisory Circulars, applicable to specific aircraft or appliance. (LEVEL 3)
- Exercise mechanic privileges within limitations prescribed by part 65 of this chapter. (LEVEL 3)
    - Interpret 14 CFR Part 65 for licensing activity. (LEVEL 3)
- Fabricate and install rigid and flexible fluid lines and fittings. (LEVEL 3)
    - Bend and form aluminum tubing and determine pressure capabilities based on materials and fittings selected. (LEVEL 3)
    - Fabricate flares on tubing. (LEVEL 3)
    - Fabricate and install flexible hoses tubing and determine pressure capabilities based on materials and fittings selected. (LEVEL 3)

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS
AVIATION MAINTENANCE 2

Course Description

A program with a sequence of courses that prepares individuals to inspect, repair, service, and rebuild all airplane parts, including engines, propellers, instruments, airframes, fuel and oil tanks, control cables, and hydraulic units. These courses are designed to meet Federal Aviation Administration (FAA) requirements for licensing as an airframe and power plant mechanic.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.09.00.00.002
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Maintenance
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will understand basic electrical principles and be able to calculate current, voltage, resistance and identify continuity.

Standard 1

Understand Ohm's Law.

Standard 2

Identify the impacts of the discovery of electricity.

Standard 3

Understand direct current.

Standard 4

Understand alternating current.

Standard 5

Identify electrical measuring instruments.

Standard 6

Understand circuit analysis and troubleshooting.

Standard 7

Identify relationship between electrical generators and motors.

STRAND 2

Students will understand aircraft ground operations and servicing lecture.

Standard 1

Understand and practice shop safety.

Standard 2

Understand and practice fire protection.

Standard 3

Understand and practice safety on the flight line.

Standard 4

Understand tie down procedures.

Standard 5

Understand, identify points jacking and hoisting.

Standard 6

Understand ground movement of aircraft.

Standard 7
Identify ground servicing equipment.

Standard 8
Identify distinguishing features of aircraft fuels.

Standard 9
Understand and practice safe engine starting procedures.

STRAND 3
Students will understand aviation maintenance materials and processes.

Standard 1
Identify specifications and standards.

Standard 2
Identify and locate types of hardware. (list)

Standard 3
Understand methods of safety.

Standard 4
Identify hand tools. (list)

Standard 5
Understand metals.

Standard 6
Terminology

Standard 7
Non-ferrous metals

Standard 8
Ferrous metals

Standard 9
Understand non-metallic structure materials.

Standard 10
Wood

Standard 11
Plastics

Standard 12
Understand nondestructive inspection.

- Visual inspection
- Liquid penetrant inspection
- Magnetic particle inspection
- Eddy current inspection
- Ultrasonic inspection
- Radiographic inspection

STRAND 4
Students will understand how the laws of physics apply to aviation maintenance.

Standard 1
Conservation of mass/energy.

Standard 2
Simple machines work and power.

Standard 3
Force and motion.

Standard 4
Stress and strain.

Standard 5
Heat

Standard 6
Pressure

Standard 7
Gas laws

Standard 8
Fluid mechanics/dynamics

Standard 9
Sound and vibration

Standard 10
Light

STRAND 5
Students will understand the effects of basic human factors on aviation mechanics.

Standard 1
Introduction

Standard 2
Meaning

Standard 3
Understand causes and remedies for fatigue and stress.

Standard 4
Understand the effects of the human condition and decision making.

Standard 5
Human factors and management.

Standard 6
Understand human performance limitations.

Standard 7
Understand aviation resource management.

Performance Skills
Calculate and measure capacitance and inductance. (LEVEL 2)

- Measuring and calculating capacitance and inductance. (LEVEL 2)
- Calculate the measure electrical power. (LEVEL 2)
- Learn the functions and purpose of a multimeter. (LEVEL3)
- Measure voltage, current, resistance, and continuity. (LEVEL 3)
- Measuring voltage, current, resistance, continuity, and leakage. (LEVEL 3)
- Determine relationship of voltage, current, and Ohm's Law resistance in electrical circuits. (LEVEL 3)
    - Troubleshoot a broken electrical circuit.
- Read and interpret electrical circuit diagrams, including solid state devices and logic functions. (LEVEL 3)
    - Reading electrical circuit diagrams, including solid state devices and logic functions. (LEVEL 3)
- Inspect and service batteries. (LEVEL 3)
    - Inspecting and servicing lead-acid batteries. (LEVEL 3)
    - Inspecting and servicing nickel-cadmium batteries. (LEVEL 3)

Start, ground operate, move, service and secure aircraft and identify typical ground operation hazards. (LEVEL 2)

- Service and secure aircraft. (LEVEL 2)
- Identify and select fuel. (LEVEL 2)

Identify and select appropriate nondestructive testing methods. (LEVEL 1)

- Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections. (LEVEL 2)
- Perform basic heat-treating processes. (LEVEL 1)
  - Identify effects of heat treatment. (LEVEL 1)
  - Understand heat treatment processes and strain relieving. (LEVEL 2)
- Identify and select aircraft hardware and materials. (LEVEL 3)
  - Identify and select aircraft hardware. (LEVEL 3)
  - Identify aluminum alloys. (LEVEL 3)
  - Identify steel alloys. (LEVEL 3)
  - Identify rivets by physical characteristics. (LEVEL 3)
- Inspect and check welds. (LEVEL 3)
  - Perform inspection of welded assemblies. (LEVEL 3)
- Perform precision measurements. (LEVEL 3)
  - Use precision instruments for measurements. (LEVEL 3)

Use and understand the principles of simple machines; sound fluid, and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight. (LEVEL 2)

- Describe heat transfer applications in aircraft. (LEVEL 2)
- Describe the inclined plane, the lever and the pulley. (LEVEL 2)
- Describe relationship between pressure area and force. (LEVEL 2)

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS
PRODUCTION GRAPHICS 2

Course Description

Create, produce and reproduce visual graphics that communicate to an audience. Develop knowledge and skills relative to the graphic design & printing industries. Apply effective principles and techniques to project designs. Print various projects for yourself and customers. Provides an over-view of the publishing and print industries on the commercial level. Instruction includes the use of industry standard graphics software with the Adobe Creative Suite.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.10.00.00.044
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	564
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Graphics/Printing Technology
Endorsement 2	N/A
Endorsement 3	N/A

ADA Compliant: October 2020

STRAND 1

Students will be able to understand and demonstrate production management.

Standard 1

Practice print production workflow.

Standard 2

Perform job cost/estimation.

Standard 3

Conduct sales/customer service.

Standard 4

Read job ticket/specifications.

Standard 5

Generate an invoice.

Standard 6

Determine appropriate production method(s).

Standard 7

Calculate financial discounts/mark-ups/fees.

Standard 8

Calculate material required for a given set of specifications.

STRAND 2

Students will be able to understand and demonstrate safe practices.

Standard 1

List safety rules involving chemicals and flammable liquids.

Standard 2

Read, comprehend, and follow instructions on warning labels.

Standard 3

List the steps to be taken in case of injury in the lab.

Standard 4

Identify locations of first aid kit, eye wash station, MSDS, and safety equipment.

Standard 5

Follow proper safety procedures and dress code when operating equipment.

Standard 6

Demonstrate common sense when working with others.

Standard 7
Pass general lab safety test.

STRAND 3
Students will comprehend and demonstrate production design.

Standard 1
Use Adobe Creative Suite/Cloud apps appropriately.

Standard 2
Apply principles/elements of design.

Standard 3
Calculate surface area to determine required substrate size.

Standard 4
Perform basic linear measurements (millimeters, points, inches).

Standard 5
Identify substrates and their appropriate production methods.

Standard 6
Design a package or point of purchase display.

STRAND 4
Students will comprehend and practice the design/proofing process.

Standard 1
Collect project information from client (client brief).

Standard 2
Develop concepts/thumbnails.

Standard 3
Generate roughs.

Standard 4
Create mock-up/comp(s) based on client specifications.

Standard 5
Review mockup(s) with client.

Standard 6
Perform proofing, revision, approval process.

STRAND 5

Students will understand and demonstrate principles of pre-media (pre-press).

Standard 1

Identify different color spaces.

Standard 2

Output a digital print using two different ICC profiles.

Standard 3

RIP a file for print.

Standard 4

Define knockout, overprint, trap, bleed, and slug.

Standard 5

Identify different image types (i.e. line, continues tone, halftone and screen ruling).

Standard 6

Understand file formats and their uses.

Standard 7

Define dummy, imposition, and signature.

Standard 8

Engineer a die-line to include cuts, scores, and glue-tabs.

Standard 9

Create a print-ready PDF including printer marks, bleeds, and page information.

STRAND 6

Students will produce projects using various production methods.

Standard 1

Produce a project using a die line (i.e. paper airplane).

Standard 2

Print a process color digital output.

Standard 3

Print a multi-color offset or screen print.

Standard 4

Print a spot color project.

Standard 5

Setup and perform a production run.

STRAND 7

Students will recognize and perform various finishing and binding operations for multiple production methods.

Standard 1

Recognize various finishing operations (i.e. embossing, foil stamping, engraving, perforating, scoring, spot UV, die-cut, grommets, hemming & pole sleeves, etc.).

Standard 2

Choose media display and mounting methods.

Standard 3

Perform linear measurements (mm, pt, in).

Standard 4

Calculate the mid-point of a linear measurement (divide a measurement in half).

Standard 5

Setup and perform a finishing operation.

STRAND 8

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 3.

Standard 1

Understand and develop collaboration skills.

- Develop a working relationship with a mentor.
- Apply supervisory skills.
- Manage a project and evaluate others.

Standard 2

Understand and demonstrate change management skills.

- Evaluate your career and training goals.
- Identify and apply conflict resolution skills.
- Illustrate an organizational structure.
- Plan and implement a leadership project.

Standard 3

Understand how customer service applies to the workplace.

- Serve as a volunteer in the community.
- Examine workplace ethics: the role of values in making decisions.
- Understand the cost of customer service.
- Develop customer service skills.
- Maximize customer service skills.

Standard 4

Understand and demonstrate career readiness.

- Market your career choice.
- Research resume writing.
- Demonstrate interviewing skills.
- Predict employment trends.
- Re-evaluate career goals and establish long-term goals.
- Construct a job search network.
- Evaluate professional competencies.
- Analyze your entry-level job skills.
- Design and present a lesson plan on an aspect of your career choice.
- Write an article for a professional journal in your career area.
- Refine your employment portfolio.

Performance Skills

1. Understand and demonstrate production management.
   - Practice print production workflow.
   - Calculate material required for a given set of specifications.
2. Understand and demonstrate safe practices.
   - Pass general lab safety test.
3. Comprehend and demonstrate production design.
   - Design a package or point of purchase display.
4. Practice the design/proofing process.
   - Perform proofing, revision, approval process.
5. Demonstrate principles of pre-media (pre-press).
   - Create a print-ready PDF including printer marks, bleeds, page information.
6. Produce projects using various production methods.
   - Setup and perform a production run.
7. Perform various finishing and binding operations for multiple production methods.
   - Setup and perform a finishing operation.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Production Graphics 2	564	12	4	15	2	19	0	10	1	0	0	63	56

STRANDS AND STANDARDS
BICYCLE REPAIR TRAINING

Course Description

This course prepares students to understand and demonstrate proper bicycle repairs, including steering systems, braking systems, drive/shifting systems, and suspension systems. Students will also understand and demonstrate proper safety procedures and gain an understanding of bicycle anatomy and the appropriate tools necessary to maintain them.

Intended Grade Level	9-12
Units of Credit	1.0
Core Code	40.11.00.00.010
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Bicycle Repair Training
Endorsement 2	N/A
Endorsement 3	N/A

ADA Compliant: October 2020

STRAND 1

Students will understand and demonstrate safe practices.

Standard 1

- Pass a safety test with 100% proficiency.
- Wear proper PPE.
- Understand the importance of and practice shop cleanliness.

STRAND 2

Students will understand and use appropriate tools for bicycle building, tune-up, and repairs.

Standard 1

- Operate a torque wrench:
  - newton meters
  - foot pounds
- Thread tapping and re-tapping:
  - Thread pitch
  - Common threads
- Reaming and facing metal frames
- Tools for bicycles:
  - Spoke nipple wrench
  - Chain breaker
  - Pin spanner
  - Truing stand

STRAND 3

Students will understand the basic anatomy of bicycle systems and their interactions.

Standard 1

- Frame
- Wheels
- Steering
- Brakes
- Drive/Shifting
- Suspension

STRAND 4

Students will understand the parts and adjustments of wheel systems.

Standard 1

- Identify the parts of a wheel system

- Hub:
  - Disc Brakes
- Spokes
- Rim
- Tubes:
  - Presta / Schrader Valves
- Tire

- Understand the procedures for wheel truing:
  - Lateral
  - Radial
- Setup tubeless road and mountain tires:
  - Taping rims
  - Install valve stems
  - Install sealant
  - Troubleshoot issues
- Replace/repair tubes and tires:
  - Locate tube punctures
  - Patch site prep and installation
  - Check tire for wear and sharp objects

STRAND 5

Students will understand the parts and adjustments of the steering system.

Standard 1

- Identify parts of steering system:
  - Handlebars
  - Stem
  - Headset
  - (opt.) Detangler/Gyro/Rotor
  - Fork
- Identify various handlebar styles:
  - Properly align stem with front wheel

STRAND 6

Students will understand the parts and adjustments of the braking system.

Standard 1

- Identify types of bicycle braking:
  - Rim
  - Caliper

        - Cantilever
        - "V"
    - Disc
    - Drum
    - Coaster
    - Fixed Gear
- Identify the basic parts of a rim braking system:
    - Brake lever
    - Adjusting barrel/nut
    - Cable
    - Arms
    - Block/Pad
- Adjust brakes to stop the bicycle with appropriate pressure on the levers

STRAND 7

Students will understand the parts and adjustments of the drive/shifting system.

Standard 1

- Identify types of bicycle drives:
    - Fixed
    - Coaster
    - Geared
- Identify the parts of a traditional geared drive system:
    - Pedal
    - Crank
    - Chainrings
    - Bottom bracket
    - Chain
    - Rear cassette
- Identify the parts of the shifting system:
    - Front/rear shift levers
    - Cables
    - Front/rear derailleurs
- Adjust derailleurs to shift smoothly between each gear or chainring:

STRAND 8

Students will understand the parts and adjustments of suspensions systems.

Standard 1

- Identify common suspension systems:

    - Front (fork)
    - Rear (frame)
- Understand suspension terminology:
    - Travel
    - Sag
    - Lockout
    - Compression Damping
    - Rebound Damping
- Perform a 30-hour suspension service
- Set proper suspension sag

STRAND 9

Students will understand the proper assembly and fitting of a bicycle.

Standard 1

- Understand optimal rider positions for different types of bicycles:
    - Road
    - Mountain
    - Hybrid
- Set seat and bar height for a rider

STRAND 10

Students will understand and demonstrate proper care and service cycles for a bicycle.

Standard 1

- Lubrication:
    - Chain
    - Cables
- Tire pressure
- Storage procedures
- Transportation methods

Performance Skills

- Translate shop talk to non-technical language understandable by customers
- Conflict resolution
- Teamwork
- Customer Service
- Follow repair service instructions

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS

UNMANNED AERIAL SYSTEMS

Course Description

This course covers the history, safety, rules, and regulations, as well as the design and construction of Small Unmanned Aerial Systems (UAS). Students fly both rotary and fixed wing UAS in preparation for certification.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.11.00.00.050
Concurrent Enrollment Core Code	N/A
Prerequisite	N/**A**
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Flight
Endorsement 2	Aviation-Maintenance
Endorsement 3	N**/A**

ADA Compliant: October 2020

STRAND 1

Students will gain an understanding of current Federal Aviation Administration (FAA) Small Unmanned Aerial Systems (UAS) laws and standards required to fly drones legally in the National Air Space (NAS).

Standard 1

Understand the organization of 14 CFR Part 107:

- General
- Operating Rules
- Remote Pilot Certification
- Waivers

Standard 2

Use Crew Resource Management (CRM) principles to provide a safe environment for UAS operations:

- Aeronautical Decision Making (ADM)
- Risk Management (RM)
- Task Management (TM)
- Controlled Flight into Terrain (CFIT)
- Situational Awareness (SA)text

Standard 3

Understand FAA forms and incident reporting requirements:

- Integrated Airman Certification and Rating Application (IACRA)
- Part 107 Waivers/Authorizations
- Part 107 Accident Report

STRAND 2

Students will understand how weather impacts UAS flight and sources of aviation weather information.

Standard 1

Understand the basics of how weather forms and effects aviation

Standard 2

Read and interpret sources of aviation weather information:

- Meteorological Terminal Aerodrome Report (METAR)
- Terminal Aerodrome Forecast (TAF)

Standard 3

Minimum weather rules (14 CFR 107):

- Visibility – 3SM
- Distance – 500’ below clouds, 2000’ horizontal to clouds

STRAND 3

Students will discover the new and upcoming technologies being used in UAS applications.

Standard 1

Research applicable current UAS technologies:

- Fixed wing
- Rotor
- Other

Standard 2

Research applicable new and emerging UAS technologies

STRAND 4

Students will understand ethical and social responsibilities associated with UAS operation.

Standard 1

Understand state and local rules and statutes regarding privacy:

- Model release
- Voyeurism

Standard 2

Understand copyright law with respect to photography:

- Title 17 United States Code (USC) – Copyright Law
- Fair Use Doctrine
- Procedure for securing copyright for photographic image capture

Standard 3

Understand the pilot's responsibility to the UAS community

Standard 4

Understand responsible flight operations:

- Flight operation insurance
- Crew Resource Management (CRM)
- Go/No-go decision making

STRAND 5

Students will understand how drones are used in the real world, the related jobs, and requirements for those jobs.

Standard 1

Know the state of the primary industrial applications of UAS:

- Aerial Photography

- Aerial Photogrammetry:
    - Mapping
    - Multi-spectral Imaging

Standard 2

Understand the requirements for UAS operations careers:

- Logbook
- Resume
- Portfolio

Standard 3

Develop a business plan with UAS usage as a primary operation

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS

AVIATION 1

Course Description

Students will get an exposure to aviation professions, history, technology, and related business segments.

Intended Grade Level	9 - 12
Units of Credit	0.5
Core Code	40.11.00.00.131
Concurrent Enrollment Core Code	N/**A**
Prerequisite	N/**A**
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Flight
Endorsement 2	Aviation-Maintenance
Endorsement 3	N/**A**

ADA Compliant: October 2020

STRAND 1

Students will understand and identify aviation careers.

Standard 1

Know pilot career opportunities (i.e. Cargo, Passenger Rotor/fixed, Government, Military, Civil Defense, Corporate, General Aviation)

Standard 2

Know Airframe and Powerplant Maintenance opportunities

Standard 3

Know supporting aviation careers (i.e. Traffic Control, Fleet, Airport Management, Flight Attendant, Flight Safety, FSDO, Security, Training)

STRAND 2

Students will have an overview of the history aviation from the late 1700s to the present.

Standard 1

Early Aviation (1700s-WWI)

- K. Lilienthal
- Wright Bros.
- Montgolfier Bros.

Standard 2

Military Aviation

- WWI
- WWII
- Korea/Vietnam
- Stealth/GPS/ Drones
- Modern aircraft

Standard 3

Birth of Commercial Aviation to Modern Day Carriers

- Airmail
- DC3
- Deregulation Act of 1978
- Major/Regional Carriers

Standard 4

Post-9/11 Aviation

- Safety
- Security

Standard 5

Space, the Final Frontier. These are the voyages of the Starship Enterprise.

- SpaceX
- Boeing
- NASA

STRAND 3

Students will understand basic principles of controlled flight.

Standard 1

Describe functional rotor parts of an aircraft.

- Nose – Engine/Prop
- Main/Tail Rotor
- Configurations
- Fuselage
- Empennage
- Wing
- Tail
- Cowling
- Landing gear

Standard 2

Understand the basic principles of flight.

Standard 3

Understand basic flight instruments (six-pack)

- Airspeed Indicator
- VSI
- Attitude Indicator
- Altimeter
- Compass
- Turn Coordinator

STRAND 4

Students will understand basic aviation weather considerations.

Standard 1

Understand basic atmospheric principles.

- Air Density
- Temperature
- ISA 29.92

- Metric evaluation

Standard 2

Describe common cloud types.

- Cumulus
- Stratus
- Lenticular

Standard 3

Understand impact of wind on aviation.

- Runway Direction
- Jetstream
- Winds Aloft

Standard 4

Understand how atmospheric condition effect flight & performance.

- Density Altitude
- Icing
- FRO's
- Dew Point

STRAND 5

Students will understand National Aerospace System.

Standard 1

Phonetic Alphabet + Numbers

Standard 2

Traffic Control

- Radio Communication
- Tower, En Route, Ground, Uncontrolled

Standard 3

Airspace

- Airports
- Charts
- Altitudes
- Classifications (A-G, restrictions, special use, TFR)

Performance Skills

- "Fly" a traffic pattern (sim, real, tabletop model, etc.)
- Make simulate radio calls using appropriate etiquette

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

STRANDS AND STANDARDS

AVIATION 2

Course Description

Students will get an exposure to physics of flight, aircraft systems, airport operations, Federal Aviation Regulations/Aeronautical Information Manual. (FAR/AIM)

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.11.00.00.132
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Flight
Endorsement 2	Aviation-Maintenance
Endorsement 3	N/A

ADA Compliant: October 2020

STRAND 1

Students will understand the principles of flight and aerodynamics.

Standard 1

Four forces of flight:

- Lift
- Weight
- Thrust
- Drag

Standard 2

Airfoil:

- Production of Lift
- Bernoulli vs. Newton

Standard 3

Axes (plural of axis) of Motion:

- Pitch
- Yaw
- Roll

STRAND 2

Students will understand aircraft systems.

Standard 1

Know the basic airframe systems:

- Electrical
- Fuel
- Oil
- Hydraulic
- Pitot-Static
- Environmental pressurization, oxygen

Standard 2

Aircraft Instruments:

- Six-pack
- Glass cockpit
- Navigation
- Collision avoidance

Standard 3

Flight Controls:

- Fixed wing
- Rotor

Standard 4

Propulsion systems:

- Piston
- Turboprop
- Turboshaft
- Turbofan
- Turbojet
- Ramjet
- Rocket
- Electric

STRAND 3

Students will understand aviation operations and related aviation business.

Standard 1

Air carrier operations:

- Route structure
- Hub & spoke
- Carrier Equipment
- Revenue Flight Management

Standard 2

Corporate Aviation:

- Business Model (who owns the equipment?)
- Equipment types for corporate aviation
- Tax Benefits

Standard 3

Fixed Base GA:

- FBO
- MRO
- Flight Instructor
- Other aviation operations

Standard 4

Unmanned Base Operation

Standard 5
Urban Air Mobility

STRAND 4

Students will understand federal aviation regulations and aeronautical information manual.

Standard 1
Certification Standards:

- Certificates/Ratings
- Currency
- Proficiency

Standard 2
Federal Aviation Regulations / Aeronautical Information Manual (FAR/AIM):

- CFR Title 14
- FAR Organization (Parts)
- AIM Organization (Sections)
- Frequently referenced FAR Parts (61, 91, 107, 121, 135, 141, 147)

STRAND 5

Students will understand aviation organizations.

Standard 1
Understand role of Government Aviation Organizations:

- Department of Transportation (DOT)
- Federal Aviation Administration (FAA)
- International Civil Aviation Organization (ICAO)
- National Aeronautics and Space Administration (NASA)
- National Transportation Safety Board (NTSB)
- Transportation Security Administration (TSA)
- Department of Defense (DOD)

Standard 2
Understand the role of Professional Aviation Organizations:

- Aircraft Owners and Pilots Association (AOPA)
- National Business Aviation Association (NBAA)
- Experimental Aircraft Association (EAA)
- Airline Pilots Association (ALPA)
- Women in Aviation International (WAI)
- Civil Air Patrol (CAP)

Performance Skills

- Demonstrate how control surface effect principles of flight
- Identify aviation fluids
- Identify fluid contaminants

Workplace Skills

- Demonstrate proper fueling technique
- Check oil level
- Run a checklist

STRANDS AND STANDARDS
AVIATION WEATHER

Course Description

Aviation Weather will give students the knowledge related to the Private Pilot's License and prepare them for careers in aviation. Areas of study will include atmosphere, weather patterns, weather hazards, and pilot weather products.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.11.00.00.134
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation-Flight
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will understand the composition and elements of the Earth's atmosphere.

Standard 1

Elements and composition of Earth's atmosphere

- Describe basic elements and gas composition of the atmosphere.
- Differentiate the layers in the atmosphere.
- Explain stability and lapse rates and how they affect aviation.

Standard 2

Cloud formations and locations

- Identify cloud formations and weather associated with each type:
    - Stratiform
    - Cirriform
    - Stratocumuliform
    - Cumuliform
    - Cumulonimboform
- Describe cloud classifications (genus) and location of each:
    - Cirro-
    - Alto-
    - Cumulo-
    - Nimbo-
    - Strato-

Standard 3

Atmospheric pressure and gas laws

- Understand atmospheric pressure.
- Describe gas laws relating to the atmosphere.

Standard 4

Atmospheric moisture

- Discuss relationship between temperature moisture (dew point), and precipitation.
- Describe fog formation and impacts to aviation.

STRAND 2

Students will understand properties of cold and warm air masses.

Standard 1

Moving air masses

- Describe weather fronts and associated weather patterns:
    - Cold Front
    - Warm Front
- Understand boundary layers and related winds.

- Describe hazards of Low-Level Wind Shear.

Standard 2

Define and identify hazards of Airframe Icing.

Standard 3

Define turbulence and associated hazards.

- Describe hazardous winds including mountain winds.

Standard 4

Identify thunderstorms and associated hazards.

STRAND 3

Students will become familiar with common aviation weather information sources.

Standard 1

Read basic aviation weather information sources:

- Terminal Aerodrome Forecast (TAF)
- Meteorological Aerodrome Report (METAR)
- Pilot Report (PIREP)

Standard 2

Describe and read weather advisories.

- Significant Meteorological Information – SIGMET
  - Convective
  - Non-convective
- Airmen Meteorological Information – AIRMET
- Convective Weather Information – CW
- Analyze Upper Winds and Temperatures.

Standard 3

Read aviation weather charts

- Surface charts
- Upper air charts
- Significant weather charts.

STRAND 4

Students will be able to describe other weather phenomena hazardous to aviation and interpret weather radar data.

Standard 1

Describe weather hazards associated with hurricanes.

Standard 2

Understand impacts of space weather.

Standard 3
Describe the hazards of volcanic ash to aviation.

Standard 4
Understand the causes and hazards of sand/dust storms.

Standard 5
Read satellite imagery.

Performance Skills

- Read a basic METAR/TAF/Prog Chart/Winds Aloft/PIREP
- Make a go/no go decision for flight based on weather data
- Explain weather associated with cold or warm fronts
- Calculate windspeed and direction from flight data
- Identify cloud formations approximate levels

Workplace Skills

- Identify Cloud types
- Identify Aircraft parts
- Virtual Communication (clear & direct)
- Teamwork (run an airport environment)
- Detail orientation
- Following Checklist
- Use Compass to find direction
- Pressurize
- Vacuum

Course Changes 2020: Technology & Engineering Pathways

38.01.00.00.011 Manufacturing Principles 1
Reviewed, no significant changes, reformatted document

38.01.00.00.012 Manufacturing Principles 2
Reviewed, no significant changes, reformatted document

38.01.00.00.151 Engineering Principles 1
Moved Electrical Engineering section to EP2

38.01.00.00.152 Engineering Principles 2
Moved Civil Engineering section to EP2

38.01.00.00.340 CAM Automated Manufacturing
Removed PLTW affiliation

38.01.00.00.350 Aerospace Engineering
Removed PLTW affiliation

38.02.00.00.241 Plastics 1
Divided original course into semesters with revision per feedback from industry & post-secondary partners

38.02.00.00.242 Plastics 2
Divided original course into semesters with revision per feedback from industry & post-secondary partners

38.02.00.00.251 Composites 1
Divided original course into semesters with revision per feedback from industry & post-secondary partners

38.02.00.00.252 Composites 2
Divided original course into semesters with revision per feedback from industry & post-secondary partners

38.02.00.00.261 Woods 1
Was “Woodworking”, revised with stronger emphasis on manufacturing & production

38.02.00.00.262 Woods 2
Was “Cabinetmaking”, revised with stronger emphasis on manufacturing & production

38.02.00.00.263 Woods 3
Was “Furniture Design & Construction”, revised with stronger emphasis on manufacturing & production

38.03.00.00.001 Exploring Technology
Reviewed, no significant changes, reformatted document

38.03.00.00.010 Engineering Technology
Reviewed, no significant changes, reformatted document

38.03.00.00.040 Robotics Technology
New course

38.03.00.00.050 Energy & Power Technology
Reviewed, no significant changes, reformatted document

38.03.00.00.060 Manufacturing Technology
Reviewed, no significant changes, reformatted document

STRANDS AND STANDARDS

MANUFACTURING PRINCIPLES 1

Course Description

The first in a sequence of courses addressing the history & operational structure of industry, lean manufacturing principles, product development, precision measurement, and quality management. Emphasis is placed on the interaction of process selection, cost, and overall quality.

Core Code	38.01.00.00.011
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	None
Skill Certification Test Number	621
Test Weight	0.5
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology & Engineering, or
	Engineering

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/cte/tech/publicationsresources under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop and practice fundamental habits and skills required in the 21st Century workplace.

Standard 1

Demonstrate reliability and compliance with established attendance policies.

- Understand and practice using a time clock.
- Demonstrate a record of regular, timely attendance.
- Notify supervisors (teachers) when a work shift (class period) will be missed prior to any absences.

Standard 2

Follow established practices and procedures with exactness.

- Accept personal responsibility for work quality.
- Follow instructions precisely and record data accurately.
- Complete assigned tasks with in a timely manner and with a high degree of workmanship.

Standard 3

Work productively as a member of a team.

- Communicate effectively with other team members using a variety of methods (verbal, written, electronic).
- Collaborate to solve problems and improve processes.

- Consider the group's success and not just individual achievement.
- Use time effectively.
- Contribute "value-added work".

Standard 4

Contribute to a culture of safety.

- Understand and comply with OSHA regulations, FDA regulations, SDS information, and established safety procedures.
- Watch for potential hazards, unsafe or impaired workers, or unsafe procedures and speak out if they are observed.
- Care for the safety of others.
- Actively participate in improving safety conditions.

Standard 5

Maintain a high standard of personal and industrial hygiene.

- Practice good habits of personal hygiene and dress appropriately.
- Wear the appropriate personal protective equipment.
- Adopt the habit to "clean as you go".
- Learn and experience accepted protocols for working in a clean room environment and maintaining a sterile field.
- Guard against Foreign Object Debris (FOD) and particulates from contaminating the workspace or product.

Standard 6

Use personal electronic devices appropriately.

- Maintain a professional tone in all communications.
- Avoid use during work hours and remain focused on the task at hand.

Standard 7

Understand the basic organization and respective functions of a typical corporation.

- Administrative
- Sales & Marketing
- Engineering
- Manufacturing / Production
- Quality Assurance
- Accounting

STRAND 3

Students will increase their ability to comprehend and correctly interpret technical documents.

Standard 1

Read technical documents for understanding.

- Manufacturing Work Orders

- Engineering Specifications
- Standard Operating Procedures (SOPs)
- Technical Manuals and Instructions

Standard 2

Correctly interpret technical drawings, including:

- Orthographic projection
- Basic dimensioning
- Basic tolerancing (±)
- General notes

STRAND 4

Students will properly select and make accurate measurements with calibrated equipment.

Standard 1

Demonstrate the use of applied mathematics.

- Correctly add and subtract fractions.
- Correctly add and subtract decimals (at least 3 decimal places).
- Convert fractions to decimals and decimals to fractions.
- Use ratios, proportions, and percentages.
- Practice rounding, estimating, and hand calculations.
- Know and recognize engineering notation.
- Convert between standard and metric units.

Standard 2

Demonstrate the proper selection, use, and care of precision measurement equipment typically found in a manufacturing environment.

- Measuring tape or scale
- Protractor
- Pin, block, ball, thread, go-no-go and feeler gauges
- Calipers and micrometers

Standard 3

Understand the significance of and how to correctly handle calibrated measuring equipment.

Standard 4

Determine whether or not a selection of parts meet specifications.

Standard 5

Understand “traceability”, quality stamps, and an employee’s role in accurately maintaining record of process and part compliance.

STRAND 5

Students will be able to describe basic Lean Manufacturing principles and the appropriate practices to apply in response to specific problems.

Standard 1

Research and learn the general history of Lean Manufacturing and its development.

Standard 2

Understand 8 types of waste ("DOWNTIME").

- **D**efects
- **O**verproduction
- **W**aiting
- **N**ot utilizing people
- **T**ransportation
- **I**nventory
- **M**otion
- **E**xtra process

Standard 3

Understand and employ the 5 S's.

- Sort
- Set in order
- Shine
- Straighten
- Self-Discipline/Sustain

Standard 4

Understand "value-added work"

- Value as defined by the customer.
- Is the customer is willing to pay for it?
- Does it change for, fit, or function?
- Can it be done correctly the first time?

STRAND 6

Students will be introduced to the basics of manufacturing using Six Sigma principles.

Standard 1

Research and learn the general history of Six Sigma & Continuous Improvement.

Standard 2

Understand the fundamentals of Six Sigma.

- DMAIC
  - **D**efine
  - **M**easure

    - **A**nalyze
    - **I**mprove
    - **C**ontrol
  - Defining a process
  - Basic metrics
    - Defects per Unit (DPU)
    - Defects per Million Opportunities (DPMO)
    - First Time Yield (FTY)
    - Rolled Throughput Yield (RTY)
    - Cycle Time
  - Pareto Analysis (80:20 rule)
  - Critical Quality Characteristics (CTQs)
  - Cost of Poor Quality (COPQ)

Standard 3

Develop basic skills in failure analysis.

- Create and use Cause & Effect / Fishbone diagrams.
- Conduct "5 Whys" root failure analysis.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
Manufacturing Principles 1	621	3	4	12	11	9	8	47	44

Performance Skills

1. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/cte/tech/publicationsresources
2. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
3. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

STRANDS AND STANDARDS

MANUFACTURING PRINCIPLES 2

Course Description

The second in a sequence of courses addressing the history & operational structure of industry, lean manufacturing principles, product development, precision measurement, and quality management. Emphasis is placed on the interaction of process selection, strength optimization, cost, and overall quality.

Core Code	38.01.00.00.012
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	Manufacturing Principles 1
Skill Certification Test Number	Industry Certification
Test Weight	0.5
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology & Engineering, or
	Engineering

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/cte/tech/publicationsresources under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will gain an understanding of how a typical corporation is structured and how the responsibilities for various aspects of production are often organized.

Standard 1

Understand the company vision and how the employee fits into that vision and mission.

Standard 2

Understand how a typical corporation is organized and what each department contributes.

- Production
- Engineering
- Accounting
- Shipping & Receiving
- Quality Control
- Human Resources

Standard 3

Understand how Production Systems are organized.

- Forecasting
- Production Planning
- Plant Layout
- Inventory Control
- Work Measurement

- Job Sequencing
- Operation Scheduling

Standard 4

Understand the value of the end product and how each employee's actions positively or negatively affect that value.

STRAND 3

Students will correctly interpret advanced tolerancing, including Geometric Dimensioning and Tolerancing (GD&T).

Standard 1

Calculate the potential result of a "tolerance stack".

Standard 2

Determine whether or not a selection of parts are "within spec".

Standard 3

Understand the use of and responsibilities associated with the use of a quality stamp.

STRAND 4

Students will increase their ability to both comprehend and create technical documents.

Standard 1

Communicate professionally using email.

Standard 2

Use software applications commonly found in the workplace.

- MS Excel
- MS Word

STRAND 5

Students will be introduced to the basic elements of Statistical Process Control.

Standard 1

Understand essential concepts and terminology used in statistics.

- Scatter plot
- Bell curve
- Average
- Mean
- Median
- Mode
- Variation
- Standard deviation

Standard 2

Create and correctly interpret an X-Y work chart to bring a process in control and make it more capable.

STRAND 6

Students will complete the requirements to earn certification from an industry recognized institution in Six Sigma and/or Lean Manufacturing.

Standard 1

Industry recognized Lean Bronze certifications include:

- ASQ
- AME
- Shingo Institute
- SME

Standard 2

Industry recognized Lean Six Sigma Yellow Belt certifications include:

- ASQ
- IASSC
- MSI
- SixSigma

Skill Certificate Test Points by Strand

Complete Lean Manufacturing Bronze or Six Sigma Yellow Belt Certification.

Performance Skills

4. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/cte/tech/publicationsresources
5. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
6. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

STRANDS AND STANDARDS

ENGINEERING PRINCIPLES 1

Learning that works for Utah CTE®

Course Description

The first in a sequence of "hands on" courses that tie observations and concepts common to a variety of different engineering disciplines in order to develop a better understanding of basic math and science principles used in engineering. By utilizing problem-solving skills in a laboratory environment, students will develop skills and attitudes that impact and expand occupational opportunities.

This is a foundation course in the Engineering pathway.

Core Code	38.01.00.00.151
Concurrent Enrollment Core Code	38.01.00.13.151
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	None
Skill Certification Test Number	601
Test Weight	0.5
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology & Engineering, or
	Engineering

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will investigate career opportunities within the world of Engineering.

Standard 1

Identify occupations related to Engineering.

- Ref: https://schools.utah.gov/file/375c047f-5840-490f-b705-f307f1452ad1

Standard 2

Differentiate among various Engineering disciplines.

- Bioengineering
- Chemical Engineering
- Civil & Environmental Engineering
- Computer Engineering
- Electrical Engineering
- Mechanical Engineering
- Materials Science

Standard 3

Investigate different types of occupational training and educational opportunities.

STRAND 3

Students will understand and develop positive work ethics, communication skills, and leadership skills.

Standard 1

Demonstrate positive work ethics and leadership skills.

- Responsibility
- Reliability
- Dependability
- Effective Communication
- Delegation
- Cooperation
- Teamwork
- Integrity

Standard 2

Employ the Technology Student Association (TSA) student organization's program as an integral element of the curriculum.

Standard 3

Participate in problem-solving, both individually and as part of a team.

Standard 4

Understand the importance of inter-disciplinary teams.

Standard 5

Take minutes of a team meeting.

Standard 6

Make accurately proportioned sketches using correct drawing conventions.

- Notes are neat and legible
- Objects should be drawn to correct proportions
- Dimensions are used appropriately
- Views can be isometric, orthogonal, sections, or assemblies

Standard 7

Create and utilize an engineering notebook per established conventions.

- Sequential and chronological
- Accurate and complete reflection of the progress being recorded
- Sketches or pictures are included where appropriate
- No loose entries or pages
- Each page is dated and witnessed
- Unused spaces are identified and lined out
- Errors are not erased or obliterated
- Test data and calculations are included

STRAND 4

Students will identify the qualities of successful engineering design, recognize its role in society, and develop projects using an engineering design process.

Standard 1

Identify the qualities of good design and their relationship to the design's user.

- Examine a design with respect to its quality and usability.
- Understand that these qualities are the result of choices made and constraints applied during the design process.

Standard 2

Recognize and identify the role of engineering and engineered products in society.

Standard 3

Identify the requirements for and role of intellectual property in design.

Standard 4

Recall education requirements for professional success as a designer/engineer.

Standard 5

Identify and explain the elements of an engineering design process.

- Identify & define the design problem
- Brainstorm solutions
- Create models & build a prototype
- Test the prototype
- Redesign and optimize

Standard 6

Understand the concept of a problem statement and design requirements.

Standard 7

Create design specifications considering such factors as:

- Performance
- Time and financial constraints
- Ergonomics
- Safety
- The state-of-of the art

Standard 8

Translate design requirements into a design solution.

Standard 9

Use brainstorming methods to identify solutions to a design problem.

Standard 10

Recognize and demonstrate that there are many possible successful designs and that a design process does not always result in a single best design.

Standard 11

Explain the role of and be able to utilize mathematical and functional modeling in the creation and assessment of a design.

Standard 12

Perform a design-of-experiments.

Standard 13

Build and test designs against design specifications, evaluate the results of those tests, and present their analyses.

Standard 14

Demonstrate that design is an iterative process, subject to continuous evolutionary improvement.

STRAND 5

Students will understand ways in which Civil Engineering can enhance health and well-being of individuals.

Standard 1

Identify several different careers that support large scale civil or environmental projects.

- Transportation Engineering
- Structural Engineering
- Construction Engineering
- Environmental Engineering
- Geotechnical Engineering
- Water Resources Engineering

Standard 2

Use idealized equations that are fundamental to Civil Engineering.

- Hydrostatic pressure from density and height.
- Flow velocity in an ideal (frictionless) system using Bernoulli's equation.
- Internal forces in a simple truss structure.

Standard 3

Describe how real world factors change performance from the ideal to:

- Water tower height affects pressure driving force.
- Pressure driving force affects flow rate from a pipe.
- Fittings, bends, pipe length, and pipe diameter affect flow rate in a pipe.

Standard 4

Work in teams to design and build a project related to Civil Engineering.

- Water distribution network
- Tower building

Standard 5

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished

Standard 6

Give a brief presentation on an existing or an emerging Civil Engineering technology.

STRAND 6

Students will understand ways in which Computer Engineering can enhance health and well-being of individuals.

Standard 1

Identify several different careers that support the computer industry.

- Computer hardware design
- Network design
- Network management
- Programming
- Systems support

Standard 2

Identify the main internal and external components of a computer.

- Memory
- Processor
- Video and Sound
- Input and Output Peripherals

Standard 3

Explain the basic components of a computer's programming design.

- Purpose of software
- Difference between software and data
- Purpose of computer programming languages

Standard 4

Understand various elements of coding structure.

- Explain the difference between a variable's name and its value.
- Predict the results of code snippets which use
    - Variables
    - Operators
    - Branching structures
    - Lopping Structures
    - Function calls

Standard 5

Work in teams to design and build a project related to Computer Engineering.

- Pinball game
- Rehabilitation therapy game

Standard 6

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 7

Give a brief presentation on an existing or an emerging Computer Engineering technology.

STRAND 7

Students will understand ways in which Bioengineering can enhance the lives of individuals.

Standard 1

Identify several different careers that support bioengineering or Biomanufacturing.

- Bioinstrumentation
- Biomechanics
- Biomaterials
- Medical Imaging
- Rehabilitation Engineering
- Systems Physiology

Standard 2

Understand the role of specialists in solving bioengineering problems.

Standard 3

Work in teams to design and build a project related to Bioengineering.

- Prosthetic arms for developing countries.

Standard 4

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 5

Give a brief presentation on an existing or an emerging Bioengineering technology.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand							Total Points	Total Questions
		1	2	3	4	5	6	7		
Engineering Principles 1	601	4	6	6	15	6	7	7	51	34

Performance Skills

7. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/file/71cd951d-a99b-45ac-a426-6c824700fdfe
8. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e
9. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

STRANDS AND STANDARDS

ENGINEERING PRINCIPLES 2

Course Description

The second in a sequence of “hands on” courses that tie observations and concepts common to a variety of different engineering disciplines in order to develop a better understanding of basic math and science principles used in engineering. By utilizing problem-solving skills in a laboratory environment, students will develop skills and attitudes that impact and expand occupational opportunities.

This is a foundation course in the Engineering pathway.

Core Code	38.01.00.00.152
Concurrent Enrollment Core Code	38.01.00.13.152
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	Engineering Principles 1
Skill Certification Test Number	602
Test Weight	0.5
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology & Engineering, or
	Engineering

STRAND 1

Students will follow safety practices.

Standard 1

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- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
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Standard 3

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STRAND 2

Students will investigate career opportunities within the world of Engineering.

Standard 1

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Standard 2

Differentiate among various Engineering disciplines.

- Bioengineering
- Chemical Engineering
- Computer Engineering
- Electrical Engineering
- Civil & Environmental Engineering
- Mechanical Engineering
- Materials Science

Standard 3

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STRAND 3

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Standard 1

Demonstrate positive work ethics and leadership skills.

- Responsibility
- Reliability
- Dependability
- Effective Communication
- Delegation
- Cooperation
- Teamwork
- Integrity

Standard 2

Employ the Technology Student Association (TSA) student organization's program as an integral element of the curriculum.

Standard 3

Participate in problem-solving, both individually and as part of a team.

Standard 4

Understand the importance of inter-disciplinary teams.

Standard 5

Take minutes of a team meeting.

Standard 6

Make accurately proportioned sketches using correct drawing conventions.

- Notes are neat and legible.
- Objects should be drawn to correct proportions.
- Dimensions are used appropriately.
- Views can be isometric, orthogonal, sections, or assemblies.

Standard 7

Create and utilize an engineering notebook per established conventions.

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Standard 3

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Standard 4

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Standard 5

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- Create models & build a prototype
- Test the prototype
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Standard 6

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Standard 7

Create design specifications considering such factors as:

- Performance
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Standard 8

Translate design requirements into a design solution.

Standard 9

Use brainstorming methods to identify solutions to a design problem.

Standard 10

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Standard 11

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Standard 12

Perform a design-of-experiments.

Standard 13

Build and test designs against design specifications, evaluate the results of those tests, and present their analyses.

Standard 14

Demonstrate that design is an iterative process, subject to continuous evolutionary improvement.

STRAND 5

Students will understand ways in which Electrical Engineering can enhance health and well-being of individuals.

Standard 1

Identify several different careers that support the electrical or electronics industry.

- Control
- Electronics
- Microelectronics
- Signal Processing
- Power
- Telecommunications
- Instrumentation
- Mechatronics

Standard 2

Define and explain the following electronic terms and concepts:

- Electricity
- Electronics
- Conductor
- Insulator
- Semi-Conductor
- Series Circuit
- Parallel Circuit
- Voltage

- Resistance
- Current

Standard 3

Explore the fundamentals of atomic theory as it relates to electricity.

- The electron's role in electricity.
- The difference between an insulator and a conductor and be able to identify common examples of each.

Standard 4

Use idealized equations that are fundamental to Electrical Engineering.

- Ohm's law to calculate current, voltage or resistance in simple circuits.
- Kirkhoff's voltage law and understand how it applies to simple circuits.
- Kirckhoff's current law and understand how it applies to simple circuits.
- Watt's law to calculate current, voltage or power.

Standard 5

Assemble an electronic circuit and understand the use of schematics, function of basic electronic components, and electronic measurement.

Standard 6

Work in teams to design and build a project related to Electrical Engineering.

- LED Light Display

Standard 7

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 8

Give a brief presentation on an existing or an emerging Electrical Engineering technology.

STRAND 6

Students will understand ways in which Chemical Engineering can enhance the lives of individuals.

Standard 1

Identify several different careers that support the chemical industry.

- Petroleum
- Pharmaceutical
- Plastics

- Biomaterials
- Food Production
- Mining & Minerals
- Environmental Engineering

Standard 2

Understand the concepts of a process flow diagram.

- Batch process
- Continuous process

Standard 3

Understand the concepts of material balances and energy balances.

Standard 4

Work in teams to design and build a project related to Chemical Engineering.

- Photobioreactor to grow algae for biodiesel.
    - Know the needs of algae in a bioreactor.
    - Build and use a spectrophotometer to track the concentration of algae.
    - Describe the transesterification reaction process of converting algae oil to biodiesel.
    - Characterize the resulting product of the transesterification reaction.

Standard 5

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 6

Give a brief presentation on an existing or an emerging Chemical Engineering technology.

STRAND 7

Students will understand ways in which Materials Science can enhance health and well-being of individuals.

Standard 1

Identify several different careers related to materials science.

- Ceramics
- Polymers
- Metals
- Semiconductors

- Composites

Standard 2

Identify and explain the importance of material properties.

- Materials have different properties based on their composition and chemical structure.
- Specialized materials form the basis of many engineering designs.
- Composite materials possess the material properties of their constituent materials.

Standard 3

Use idealized equations that are fundamental to Statics.

- Tension and compression stresses.
- Hooke's Law and how it applies to bending.
- A beam under a load perpendicular to the axis of the beam is under both tensile and compressive stress.

Standard 4

Work in teams to design and build a project related to Materials Science.

- Composite beam using supplied materials as agglomerates.
    - Perform a design of experiments to determine optimal plaster to water mix ratio to give the desired properties of plaster.

Standard 5

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 6

Give a brief presentation on an existing or an emerging Materials Science.

STRAND 8

Students will understand ways in which Mechanical Engineering can enhance the lives of individuals.

Standard 1

Identify sub-disciplines of Mechanical Engineering and explain what each involves:

- Robotics
- Biomechanics
- Aerospace Engineering
- Ergonomics and Safety

- Fluid Mechanics
- Micro and nanoscale engineering

Standard 2

Use CAD to model a simple 3D object.

- Trebuchet arm

Standard 3

Understand the concept of design optimization; balancing competing design requirements to create an optimal design.

- Adjusting the release pin on a trebuchet to maximize its throwing distance.
- Using simulations to predict performance.

Standard 4

Demonstrate design optimization by maximizing design performance while working within constraints.

- Limiting the amount of material used.
- Limiting the overall project cost.
- Limiting the types of materials that can be used.
- Limiting the dimensions of the design.

Standard 5

Work in teams to design and build a project related to Mechanical Engineering.

- Trebuchet

Standard 6

Write a reflection of the project.

- What was the objective?
- What worked?
- What didn't work and why didn't it work?
- How did the design compare with the best and worst performers?
- What you would do differently?
- Was the objective accomplished?

Standard 7

Give a brief presentation on an existing or an emerging Mechanical Engineering technology.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand								Total Points	Total Questions
		1	2	3	4	5	6	7	8		
Engineering Principles 2	602	4	5	4	4	6	9	8	8	48	32

Performance Skills

10. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/file/71cd951d-a99b-45ac-a426-6c824700fdfe
11. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e
12. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

STRANDS AND STANDARDS

CAM AUTOMATED MANUFACTURING

Course Description

CAM Automated Manufacturing is an introduction to the fundamentals of computerized manufacturing technology. Students build on the solid modeling skills developed in the CAD courses. Students use 3-D computer software to solve design problems. They assess their solutions through mass property analysis (the relationship of design, junction, and materials), modify their designs, and use prototyping equipment to produce 3-D models.

Core Code	38.01.00.00.340
Concurrent Enrollment Core Code	None
Units of Credit	1.0
Intended Grade Level	11-12
Prerequisite	CAD Mechanical Design 2
Skill Certification Test Number	965
Test Weight	1.0
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology& Engineering, or
	Limited Engineering, or
	Engineering

STRAND 1

Students will use 3D software for mass property analysis.

Standard 1

Apply necessary sketched features to generate a solid model.

- Demonstrate the ability to store, retrieve copy, and output drawing files depending upon system setup.
- Utilize 2D computer sketching functions.
- Incorporate various coordinate systems in the construction of 2D geometrical shapes.
- Calculate the X and Y coordinates given a radius and angle.
- Produce 2D sketches using available sketching features.
- Apply editing techniques to produce accurate sketches.
- Understand and apply sketch constraints.
- Analyze drawings with appropriate inquiry functions.
- Define sketched objects with dimensions and geometric constraints.
- Demonstrate the application and modifying of placed features.

Standard 2

Develop multi-view drawings such as top, front, right side, isometric, section, and auxiliary views from the solid model.

- Demonstrate the proper application of annotations and reference dimensions while conforming to established drafting standards.
- Update model and drawing views using revision specification sheets provided by the instructor.

Standard 3

Create assembly models through the integration of individual parts and sub-assemblies.

- Generate an assembly drawing, which include Views, Balloons, and Bill of Materials.

Standard 4

Prepare a prototype model from a drawing database.

- Identify the need for rapid-prototyping.
- Recognize the wide array of industry-wide prototyping methods in use.

STRAND 2

Students will develop an understanding of the operating procedures and programming capabilities of machine tools.

Standard 1

Explain the history of Computer Controlled Machines charting the growth of NC and how it has been implemented into Private Industry.

- Explain how the application of CNC machines has impacted manufacturing.
- Explain the advantages and disadvantages of CNC Machining.

- Chart the evolution of machine tools, controllers, and software used in programmable machines.
- Explore career opportunities and educational requirements within the field of programmable machines.

Standard 2

Identify and explain the function of the major components of a CNC machine tool.

- Understand that CNC machine movements are identified by axes and that the axis system is a worldwide standard for machine movement.
- Define the three primary axes used in CNC machining and explore the remaining axes used in advanced machining.
- Identify the axis relative to various CNC machines.
- Contrast open and closed loop control systems.
- Identify the types of drive systems used in CNC machines.
- Identify Significant Points on geometric shapes (ex. Center point, end point).
- Identify the optimum location for the Program Reference Zero (PRZ) point.
- Use the CNC control program to indicate the machine position and then contrast that position to the relative position of the part origin (PRZ).
- Understand the difference between reference and position points.
- Be able to plot points using absolute, relative (incremental) and polar coordinates.
- Identify the three categories of machine movement: straight line, curved line, and non-regular shape.

Standard 3

Analyze part geometry to select appropriate cutting tools and fixturing devices needed to create the part using a CNC machine.

- Identify various types of tool changes used in CNC machine tools.
- Explain the importance of cutting tool materials and how they affect the speed and feed rates used by machine tools.
- Setup and edit the tool library of a CNC control program providing offset values and tool geometry.
- Calculate and verify appropriate spindle speeds and feed rates specific to each cutting tool utilized in an NC part program.
- Select appropriate cutting tools to efficiently, safely and accurately cut parts using a CNC machine.
- Complete a preliminary planning sheet to identify necessary work holding devices, cutting tools, reference points, machining sequences and safe operation.
- Examine different types of tool holding devices used in CNC machine tools.
- Apply various work holding devices commonly used for CNC machining.

Standard 4

Create a simple NC part program using a text editor and a CAM package..

- Write a basic NC part program using necessary G and M codes including remarks that describe the function of each code.

- Define the term “Alphanumeric Coding.”
- Define the term “G codes.”
- Define the term “M code.”
- Identify the three sections of a program; Initial Commands, Program Body, and Program End.
- Analyze, identify and correct errors found in NC part program files.
- Use simulation software to graphically verify NC program operation.
- Perform a “Dry Run” to verify the machine setup and program operation.

Standard 5

Employ a CAD/CAM/CNC software solution to create a part.

- Safely and accurately fixture a part in a CNC machine and set the program reference zero (PRZ).
- Verify NC part programs using a simulation software before machining the part on a CNC device.
- List and demonstrate all possible methods of disabling a CNC machine in the event of an emergency.
- Follow a safety checklist prior to running an NC part program on a CNC machine.
- Demonstrate the ability to safely setup, maintain and operate a CNC machine center using appropriate documentation and procedures.

Standard 6

Operate a CNC machine to cut a part to specifications.

STRAND 3

Students will convert computer-generated geometry into a program to direct the operation of CNC machine tools.

Standard 1

Read technical drawings identifying and understand the dimensional tolerances and limits.

- Measure using standard inch and metric systems.
- Convert measurements between metric and standard inch systems.

Standard 2

Make precision measurements to the degree of accuracy required by plan specification using appropriate instruments.

- Understand how comparison instruments can be used to check dimensions, compare shapes, indicate centers and check parallel surfaces.
- Be aware of advanced and automated measurement systems that are applied in industry. (e.g., Coordinate Measuring Systems, Digital Probes and Optical Scanners).
- Be aware of the importance of precision measurement in SPC and quality control.

Standard 3

Define the acronym CAM and explain what the purpose of a CAM package is.

- Demonstrate their ability to operate the user interface of a CAM package and access help using appropriate documentation and help screens.
- Perform basic file operations using a CAM package such as saving, opening, printing an editing part program files.
- Demonstrate an ability to import and export CAD files using a CAM package.
- Setup a CAM package by editing the material and tool libraries, defining stock sizes, selecting the appropriate post processor and defining the units of measure to be used.
- Apply the fundamental and advanced milling and turning procedures used in CAM packages.
- Use a CAM package to generate and edit tool paths by applying appropriate machining processes to geometry from a CAD program.

STRAND 4

Students will program robots to handle materials in assembly-line operations.

Standard 1

Explore the chronological development of automation leading to robotics.

- Formulate a definition of a robot.
- Demonstrate the development of robotics from Science Fiction.
- Investigate career opportunities in the robotics career fields.
- Identify a minimum of four dangerous and repetitive jobs for which robots are used.
- Evaluate the positive impact robots have on manufacturing.
- Discuss the social implications of robots.

Standard 2

Identify and compare the four classifications of robots.

- Classify different types of robots.
- Investigate a classification of robot.

Standard 3

Design and build a working model of a robot.

- Identify and report specifications and work envelopes of robots.
- Identify and sketch the mechanical components to a robot.
- Recognize the need for end of arm tooling and how this tooling affects the robots operation.
- Understand the necessity for specialty tooling applications in robotics.
- Design and develop an end effector.
- Understand of the way end effectors are specific to a process.
- Prepare and document a presentation on end of arm tooling.

Standard 4

Understand the various drive systems used in robotics and analyze the advantages and disadvantages of each.

Standard 5

Understand the basic components of robot controllers.

- Demonstrate an understanding of control techniques and computer situations.
- Design and build a feed system with sensors.

Standard 6

Analyze and generate the solution to a robotic manufacturing problem.

- Program a robot to perform several tasks.
- Program a robot to solve a materials handling problem.

STRAND 5

Teams of students will design manufacturing work cells and tabletop factories to solve complex problems that arise in integrating multiple pieces of computer-controlled equipment.

Standard 1

Understand how the individual components of a flexible manufacturing system are interrelated.

- Recognize the benefits and problems associated with CIM technology and how they affect the manufacturing process.
- Identify some basic characteristics of a manufacturing operation that lend themselves to computer integrated manufacturing.
- Identify some of the typical components and sub systems that make up an automated machining, assembly and process-type manufacturing operation.
- Identify the three categories of CIM manufacturing systems.
- Compare and contrast the benefits and drawbacks of the three categories of CIM manufacturing systems.
- Recognize the working relationship between the CNC mill and the robot.

Standard 2

Explore the individual components used in selected CIM systems.

- Analyze and select components for a CIM system for a specific industrial application.
- Identify and study the relationship between a CNC milling machine interface and a jointed arm robot interface through a communication handshaking process.
- Understand the various applications of a Programmable Logic Controller as related to its use in a CIM system.
- Understand the difference between a PLC and a computer with interface.
- Recognize and understand the necessary safety precautions associated with a fully automated CIM system.
- Demonstrate how their individual components work together to form a complete CIM system.

Standard 3

Assemble and test their individual component designs by integrating them into a complete miniature FMS built from a robotic modeling kit.

- Identify the components of a FMS.
- Recognize and explain the significance of teamwork and communication when they combine the designs of the individual groups into a complete miniature FMS.

STRANDS AND STANDARDS

AEROSPACE ENGINEERING

Course Description

Aerospace Engineering propels students' learning in the fundamentals of atmospheric and space flight. As they explore the physics of flight, students bring the concepts to life by designing an airfoil, propulsion system, and rockets. They learn basic orbital mechanics using industry-standard software. They also explore robot systems through projects such as remotely operated vehicles.

Core Code	38.01.00.00.350
Concurrent Enrollment Core Code	None
Units of Credit	1.0
Intended Grade Level	10-12
Prerequisite	None
Skill Certification Test Number	967
Test Weight	1.0
License Area of Concentration	Secondary Education
Required Endorsement(s)	Technology & Engineering, or
	Limited Engineering, or
	Engineering

STRAND 1

Students will gain an awareness of the development of Aerospace Engineering.

Standard 1

Deliver organized oral presentations of work tailored to the audience.

- Identify major Aerospace Engineering accomplishments.
- Describe trends in Aerospace Engineering.
- Analyze how Aerospace Engineering achievements were made.
- Predict how Aerospace Engineering achievements will impact future accomplishments.
- Synthesize discrete facts into a coherent sequence of events.

STRAND 2

Students will know the basic forces of flight and how they are controlled.

Standard 1

Identify major components of an aircraft.

- Approximate the center of gravity of geometric shapes.
- Identify the three axis of an aircraft.
- Label the motions about the three axis of an aircraft.
- Describe the four major forces which act on an aircraft.

Standard 2

Describe the factors that impact lift and drag.

- Label the components of an airfoil.
- Demonstrate how lift may be created with an airfoil.
- Describe the four ways that lift is generated by an airfoil.
- Describe the Earth's atmosphere composition and layers.
- Describe the relationship of altitude, temperature and pressure within the Earth's atmosphere.
- Calculate the values of Earth's atmosphere altitude, temperature and pressure relative to each other.
- Predict how aircraft characteristics affect lift, drag, and Reynolds Number.
- Calculate the values of lift, drag and Reynolds Number.

Standard 3

Explain factors which improve aircraft stability.

- Describe how the motions about the three axis of an aircraft are stabilized and controlled by aircraft components.
- Revise the weight and location of masses onboard an aircraft for safe flight balance.
- Calculate the center of gravity of an aircraft.

Standard 4

Design a glider to meet or exceed desired performance.

- Design an airfoil to meet or exceed desired performance.
- Summarize test data to evaluate glider performance against design criteria.
- Revise a glider to meet or exceed desired performance.
- Analyze the factors that contribute to a successful glider design.
- Accurately construct a glider that represents a design.
- Predict glider performance.
- Compare glider performance to predicted performance.
- Optimize glider performance to improve performance.

STRAND 3

Students will have a basic understanding of navigation.

Standard 1

Describe major advances in navigation technology.

- Identify components of common aviation navigation aids.
- Describe how an aircraft reacts to flight control inputs.
- Describe purpose of air traffic control system how it functions.

Standard 2

Explain how Global Positioning System (GPS) functions.

- Identify the functions of a typical Global Positioning System (GPS) unit functions.

Standard 3

Interpret an indication shown on a navigation aid.

- Illustrate navigation aid indication on a map.

Standard 4

Operate an aircraft in a simulated environment.

- Plan a flight route.
- Use a navigation aid to fly an aircraft to a destination in a simulated environment.
- Predict an aircraft collision based on aircraft vectors.
- Calculate an alternate aircraft vector for safe separation.

Standard 5

Create a route consisting of latitude and longitude waypoints using a Global Positioning System (GPS) unit.

- Interpret a route from latitude and longitude waypoints.

STRAND 4

Students will gain an understanding of materials used in Aerospace Engineering.

Standard 1

Describe common aerospace materials and their properties.

- Identify moment of inertia and Young's Modulus equations.

- Recognize the impact of loading conditions on a structure.
- Classify materials for aerospace applications.

Standard 2

Model a structure using a 3D modeling software.

- Analyze deformation of a structure as a result of force application.
- Design a structure that meets a given criteria.

Standard 3

Construct a composite structure.

- Measure mechanical properties of material.
- Interpret measurements of a tensile tester.
- Calculate moment of inertia and Young's Modulus equations.

STRAND 5

Students will have a basic understanding of rocket propulsion and space travel.

Standard 1

Describe the four primary forces acting on an aircraft.

- Explain how Newton's Third Law applies to aerodynamic forces.

Standard 2

Describe the characteristics of the four types of propulsion systems.

- Classify rocket engine systems.
- Identify the thrust and impulse equations.
- Describe parts and functions of a typical model rocket engine.
- Outline model rocket safety suggestions.
- Label model rocket components and functions.
- Recognize the equation of center of gravity and center of pressure.

Standard 3

Identify common space propulsion systems.

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Standard 4

Identify basic criteria to consider when designing a spacecraft.

Standard 5

Construct a physical model of a system.

- Measure mechanical properties of material.
- Interpret measurements of a test system.

Standard 6

Construct a stable model rocket.

- Simulate performance of propulsion systems.

- Design an aircraft propulsion system to meet a given objective such as maximum efficiency, maximum thrust to weight ratio.
- Infer how changes in propulsion system parameters affect performance.
- Interpret measurements of a model rocket engine thrust.
- Design a stable model rocket.
- Gather performance data associated model rocket launch such as maximum height of flight.
- Calculate maximum height using rocket engine test data and indirect height measurements.
- Select spacecraft components based on characteristics of each component.
- Select spacecraft landing system based on characteristics of each component.

STRAND 6

Students will consider human factors in design.

Standard 1

Describe common human body systems and their functions.

- Measure human vision quality such as acuity, astigmatism, color vision perception, depth perception and peripheral vision field.
- Analyze how human factors affect aerospace system design.
- Infer reaction time through indirect measurements.

Standard 2

Analyze an aircraft accident to determine likely causes.

- List common factors contribute to an aircraft accident.

STRAND 7

Students will learn about manmade objects in space.

Standard 1

Recognize common celestial groups such as galaxy, star and planet.

- Describe the relative sizes of celestial bodies.
- Explain how global governance applies to space issues.

Standard 2

Outline how past space faring achievements contributed to subsequent achievements.

- Describe how commercial organizations contribute to space related activities.
- Identify the impact that space junk has on space based activities.
- Design a system to mitigate space junk.
- Construct a prototype to demonstrate a design solution.

STRAND 8

Students will make elementary calculations describing orbital motion.

Standard 1

List major contributions made by people studying orbital mechanics.

- Describe common satellite orbital pattern shapes and applications.
- Explain Kepler's Laws.
- Name and describe the six Keplerian elements.
- Recognize the equations for orbital period, orbital gravitational potential energy, orbital kinetic energy, and total orbital energy.
- Analyze how an orbital mechanics theory can describe satellite motion.
- Identify the most appropriate orbital pattern for an application.

Standard 2

Model a satellite system using a modeling software.

- Describe how an orbital mechanics modeling software can be applied design a satellite system.
- Calculate an orbiting body's orbital period, orbital gravitational potential energy, orbital kinetic energy, and total orbital energy.

STRAND 9

Students will consider and improve efficiencies in design.

Standard 1

Design aerospace system as an alternate to an aircraft which use aerospace engineering concepts. Examples include a wind turbine and a parachute.

- Describe the parts and functions of a wind turbine.
- Identify factors that impact aircraft efficiency.
- Recognize the drag equation.

Standard 2

Construct an alternate aerospace system.

- Measure output of an alternate aerospace system.
- Optimize an alternate aerospace system.
- Explain aircraft efficiency affects aircraft design.

STRAND 10

Students will simulate a satellite mapping mission.

Standard 1

Outline how a satellite data is gathered and used to create a map.

- Describe how input and output devices function.
- Relate sensor input to the environment being measured.
- Operate output devices to perform a function.
- Explain the purpose of a flowchart or pseudocode.
- Create a flowchart or pseudocode to perform a task.

- Describe functions of a computer program.
- Identify how functions of a computer program can be applied to perform a task.

Standard 2

Describe how spacecraft systems function.

- Describe how human factors impact space travel.
- Analyze how aerospace unmanned systems function.

Standard 3

Recognize factors that affect communication with equipment in space.

- Describe the impact of a communication delay on the success of a mission.

Standard 4

Operate a remote system through a series of performance tasks including autonomous navigation.

Standard 5

Operate a simulated spaceflight.

- Construct a control program to accomplish a specified goal.
- Gather data using robot control software.
- Arrange data using spreadsheet software.

STRAND 11

Students will learn about the variety of careers in Aerospace Engineering.

Standard 1

Describe factors that a student should consider when planning a career.

- Outline questions as preparation to interview a professional.
- Collect information related to a future career.
- Interview a professional.
- Assemble career information into a coherent plan.
- Deliver organized presentations of work tailored to the audience.

STRANDS AND STANDARDS

PLASTICS 1

Course Description

This course is the first in a series of two courses focusing on the types of plastics, properties of plastics, and molding methods. A specific emphasis is given to the plastic injection molding as it relates to the manufacturing of components for consumer products.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.02.00.00.241
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	None
Test Weight	N/A
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Plastics

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Practice a culture of safety, maintain an attitude of safety in daily operations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will research the importance of plastics in our society.

Standard 1

Describe the history of plastics and their origin (i.e. petroleum industry).

Standard 2

Investigate how the use of plastic molding helps drive innovation.

Standard 3 (Optional)

Investigate how plastic products used in the health care industry to improve and save lives.

STRAND 3

Students will outline the basic methods of plastic processing.

Standard 1

Identify a variety of plastic processing methods.
For example:

- Injection molding
- Extrusion
- Thermoforming
- Blow molding
- Compression molding

Standard 2
List a variety of everyday products/parts that are made from various plastic processing methods.

Standard 3
Define what plastic injection molding is.

Standard 4
Give a brief history of the plastics molding process and its development.

STRAND 4
Students will identify the basic materials used in the plastic injection molding process.

Standard 1
Identify the types of materials used in the plastics injection process.

- Thermoplastic (properties and examples)
- Thermoset (properties and examples)

Standard 2
Develop a basic understanding of resins and identify their properties.

- Explain why different materials are better for certain applications than others.

Standard 3

- Provide examples of products manufactured by Utah's plastic injection molding industry.

STRAND 5
Students will identify components of a plastic injection molding machine.

Standard 1
Identify what a hopper is and describe its function.

Standard 2
Identify what an injection unit is and describe its function.

- Barrel
- Screw

Standard 3
Identify what a nozzle is and describe its function.

Standard 4
Identify what a mold is and describe its function.

Standard 5
Identify what a clamping unit is and describe its function.

Standard 6

Identify what an ejection unit is and describe its function.

- Outline the part ejection/removal process.

STRAND 6

Students will identify basic components of an injection mold.

Standard 1

Identify and label the following:

- mold base
- locating ring
- cavity
- core
- material delivery system
    - sprue
    - runners
    - gates
- part ejection system

STRAND 7

Students will produce simple injection molded parts.

Standard 1

Establish a repeatable process.

Standard 2

Identify the common quality defects.

- Short shot
- Flash
- Sink marks, blush, flow lines & knit lines
- Material degradation (burning, discoloration, black specs)

Standard 3

Ensure that the product meets quality specifications.

Performance Skills

13. Produce simple injection molded parts to specification.
14. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
15. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

STRANDS AND STANDARDS

PLASTICS 2

Course Description

This course is the second in a series of two courses focusing on the types of plastics, properties of plastics, and molding methods. A specific emphasis is given to the plastic injection molding as it relates to the manufacturing of components for consumer products.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.02.00.00.242
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	None
Test Weight	N/A
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Plastics

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Practice a culture of safety, maintain an attitude of safety in daily operations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will demonstrate knowledge of a basic plastic injection molding process and injection molding machine operations.

Standard 1

Describe the press operation.

Standard 2

Describe the role of automated manufacturing in the plastics industry.

Standard 3

Describe the need for material preparation.

Standard 4

Outline the melting/mixing process.

Standard 6

Describe the forming/packing process.

Standard 7

Describe the importance of cooling the product.

STRAND 3

Students will employ a basic design process to develop a solution to a design problem using plastic injection molding.

Standard 1

Identify the design problem and decide how to address it.

- Analyze market research to determine consumer wants and needs (requirements).
- Investigate existing design solutions.
- Identify requirements and constraints and determine how they will affect the design process and record them in an engineering notebook.
- Clearly and concisely define the problem to be solved and the measurements of successfully addressing the problem in an engineering notebook.

Standard 2

As a team, brainstorm possible solutions.

- Document multiple solutions in an engineering notebook.
- Evaluate the strengths and weaknesses of each proposed solution.
- Decide on and record the best solution in an engineering notebook.

Standard 3

Using available facilities and materials, create a prototype of the proposed design.

- Mathematical models
- 3D solid modeling
- 3D printed models
- Scale models

Standard 4

Test the prototype, record the results, and evaluate the performance of the design.

- Identify and record both failures and successes in an engineering notebook.
- Evaluate the performance of the prototype against the stated requirements.

Standard 5

Redesign the prototype by repeating the design process in order to further optimize the design.

- Reconsider any discarded ideas.
- Look for mathematical relationships and use them to identify the factors that affect the design the most.
- Record the results of the engineering process in an engineering notebook.

STRAND 4

Students will demonstrate the basic steps of product/process development and validation.

Standard 1

Establish a repeatable process.

Standard 2

Identify the common quality defects.

- Short shot
- Flash
- Sink marks, blush, flow lines & knit lines
- Material degradation (burning, discoloration, black specs)
- Dimension out-of-specification

Standard 3

Ensure that the product meets quality specifications.

Standard 4 (Optional)

Explore FDA requirements.

- Define the purpose and importance of regulatory bodies (FDA, ISO, Europe, etc.).
- Determine how a device is regulated, from submission for FDA clearance to recalls.
- Follow quality standards and procedures.

STRAND 5

Students will investigate future training opportunities and careers in engineering.

Standard 1

Investigate the USBE's CTE engineering pathway.

Standard 2

Identify what positions exist in the plastics molding industry.
For example:

- Machine Operators
- Toolmakers/Mold makers
- Engineers (Manufacturing, Design, etc.)
- Technicians (Process, Tooling, Mold Changeover, Quality Control, Maintenance, etc.)

Standard 3

Investigate different types of occupational training.
For example:

- Trade school
- Community College
- University
- Graduate Training

Standard 4

Recognize the importance of both "hard" and "soft" skills in the workplace.

Performance Skills

16. Employ a basic design process to develop a solution to a design problem using plastic injection molding.
17. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
18. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

STRANDS AND STANDARDS
COMPOSITES 1

Course Description

This course is the first in a series of two courses on the manufacture of goods and items made of composites. This course will focus mainly on the material properties and manufacturing principles of fiberglass reinforced plastics (FRP).

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.02.00.00.251
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	None
Test Weight	N/A
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Composites

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Practice a culture of safety, maintain an attitude of safety in daily operations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will investigate the fundamental nature of composites and how they are used to improve our world.

Standard 1

Discuss what composites are.
For example:

- Define: composite, reinforcement, matrix, fiber, resin, plastic.
- Concept of composites: A reinforcement embedded in a matrix (compare to islands in an ocean).
- Role of the reinforcement: Carry the load, give strength, give stiffness.
- Role of the matrix: Hold reinforcements in place, protect from environment, contribute to impact toughness.

Standard 2

Discuss the history of composites and how they have developed over the years.
For example:

- The use of straw combined with mud to make bricks – 3000 B.C. (Reinforced concrete is a more modern example).
- Mongolian bows were made from a bamboo core with horn on the side under compression (facing the bowman) and sinews on the tensile side (away from the bowman) and held together with animal glue and, perhaps, wrapped with silk threads over a birch bark cover.

- Early aircraft were designed with wooden frames covered with cotton cloth and waxed string.
- Later aircraft used rayon (reconstituted cellulose) to reduce weight.
- Plywood (multi-layers in which the grains are crossed, held together by adhesive) was sometimes used as a substitute for aluminum.
- Modern aircraft make regular use of fiber glass, non-fiber glass, and contemporary composites.
- High performance aircraft use layers of carbon fibers and epoxy resin laid with fibers pointing in different directions in each layer which are then cured to bind all together in a solid structure.

Standard 3

Discuss the use of composites in today's society.
For example:

- Fiberglass reinforced plastics (FRP) use for mid-strength/low cost and high strength/low weight in such areas as:
  - Automobiles, boats, windmill blades, tubs and showers, medical devices, architectural structures, storage tanks
  - Spacecraft, airplanes, helicopters, body armor, artificial feet, energy applications, advanced automobiles and non-structural applications (heat transfer, electrical conductivity)
- The FRP industry (resin manufacturers, fiberglass manufacturers, fabrication machine makers, and fabrication shops).
- Discuss the advanced materials industry (prime aerospace companies, major parts suppliers, minor parts suppliers, tooling suppliers, manufacturing machine makers, production materials vendors, fiber manufacturers, resin manufacturers, prepreg companies, core material makers, fiber weavers, and preform makers).

Standard 4

Discuss the advantages and disadvantages of composites over other materials.
For example:

- Strength, stiffness, and weight (compare composite to steel and aluminum).
- Fatigue and crashworthiness (sudden versus progressive failure modes).

STRAND 3

Students will demonstrate familiarity with the basic materials used in the composites industry.

Standard 1

Compare fiberglass reinforced plastics (FRP) and advanced composites.
For example:

- In FRP the properties of the plastic dominate, and the reinforcement adds strength and stiffness, whereas advanced composites are dominated by reinforcement properties and the matrix is secondary.

- FRP sometimes uses random fiber orientation, whereas advanced composites fibers are carefully placed.
- The material properties of the individual components in advanced composites are typically higher.
- Fiberglass or natural fibers are used in FRP whereas carbon or other very strong and stiff fibers are typically used in advanced composites.

Standard 2

Define the differences between thermoset and thermoplastic resins.
For example:

- Thermoset resins
  - Often a liquid polymer at room temperature, or a polymer dissolved in a reactive solvent (the solvent combines with the polymer during the curing process to create the solid)
  - Polymerization (curing) is achieved by using an initiator to start the reaction, perhaps with some heat applied, while the resin and reinforcement are in a mold
  - May be softened, but can never be re-melted or returned to their uncured (liquid) state
  - Parts can be made in high production quantities, but cure times must allow for the chemical reaction (polymerization or crosslinking) to occur
- Thermoplastic resins
  - May be formed to a desired shape by applying pressure (usually in a mold) when the resin is softened or melted
  - May be reshaped by re-softening or re-melting and by applying additional pressure.
  - Have a high melting temperature
  - Excellent for mass producing small parts (short cycle times)
  - May easily be recycled

Standard 3

Identify the reinforcement material forms that are available for use in composites.
For example:

- Roving
- Chopped strand
- Non-oriented strand mat
- Fabric (woven)
- Preforms (braids, knits, stitched)

Standard 3

Distinguish common bagging materials from composites.
For example:

- Release film or peel ply
- Compression mat (commonly referred to as “Monkey Fur”)

STRAND 4

Students will gain experience performing wet layup and vacuum bagging processes with advanced composites materials.

Standard 1

Discuss the manufacturing methods used with advanced composites.
For example:

- Wet layup/hand layup
- Compression molding
- Filament-winding
- Pultrusion

Standard 2

Follow a drawing as it relates to the placement and orientation of the fibers to counteract the loads that will be applied.

- Be able to read and interpret layup drawings/manufacturing plans.
  - Plies
  - Orientation
  - Dimensions
  - Alignments
- Locate and proper interpret the layup tools for the orientation clock.
- Demonstrate the ability to apply laminates according to the documentation.

Standard 3

Use common manufacturing practices employed for composites and documentation.
For example:

- Read the resin label.
- Select the resin that meet the specifications.
- Select the reinforcement materials that meet the specifications.
- Control the reinforcement to resin ratio (fiber volume).
- Resin system components are mixed by weight, not volume.
- Understand the cure profile (heat cycle).
- Consolidate the composite during cure to ensure that the layers are properly adhering, fiber resin content is correct, and the voids are reduced.

Standard 4

Create wet layups with and without bagging procedures.

- Discuss automated cutting (include nesting concept).
- Use accepted industry clean-room procedures.
- Discuss vacuum bagging (discuss all bagging materials, illustrate bag side and mold side, discuss use of caul plates or pressure pads).
- Discuss tooling (molds) for layup (including materials and support structures).
- Discuss roll wrapping.

Standard 5

Compare and contrast the material properties of composite samples.

- Wet layup without a vacuum bag
- Wet layup with a vacuum bag.

STRAND 5

Students will understand the purposes of good quality control, be able to follow quality procedures, demonstrate their understanding of precision measuring, and perform property testing and other quality control procedures as they relate to the composites industry.

Standard 1

Be able to follow a quality control testing procedure.

- Investigate organizations who produce accepted testing standards.
- Comparing a quality procedure to a recipe.

Standard 2

Demonstrate how to measure linear and cylindrical measurements accurately and how to represent the result appropriately.
For example:

- Pin Gages
- Rulers
- Calipers

Standard 3

Evaluate the advantages and disadvantages of non-destructive testing versus destructive testing.

- Test coupons
- Costs of using actual parts

Standard 4

Conduct environmental testing and evaluate its application to composites.

- UV degradation

Standard 5

Investigate International Standards Organization (ISO) certifications and their purposes.

Performance Skills

1. Identify the basic materials used in the composites industry.
2. Demonstrate appropriate and safe composites fabrication while performing wet layup and vacuum bagging processes to industry standard.
3. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources

4. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

STRANDS AND STANDARDS
COMPOSITES 2

Course Description

This course is the second in a series of two courses on the manufacture of goods and items made of composites. This course will focus mainly on the material properties and manufacturing principles of advanced composites (generally carbon-fiber parts for the aerospace industry).

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.02.00.00.252
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	None
Test Weight	N/A
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Composites

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Practice a culture of safety, maintain an attitude of safety in daily operations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will enhance their understanding of the composites industry by learning and demonstrating appropriate safety procedures that apply specifically to composites fabrication.

Standard 1

Know how to find and interpret Safety Data Sheets (SDS).

- Be able to read and understand the product labeling.
- Know how to react to exposure of dangerous products.

Standard 2

Develop appropriate safety rules for the laboratory.

- Understand the safety rules for storage and disposal of resins, solvents, and other volatile liquids.
    - Peroxides and other dangerous fluids and solvents.
    - Highly contaminating substances (including mold release).

Standard 3

Maintain a high standard of work area cleanliness and order.

- Industrial – clean as you go, assign a place for all tools and supplies and then replace them to their assigned place.
- Personal – use PPE to protect yourself from chemicals and chemical reactions.

- Understand the requirements and purposes of protecting against foreign object damage/debris (FOD).
- Practice effective clean room and dust room procedures (isolation).

STRAND 3

Students will demonstrate familiarity with the basic materials used in the composites industry.

Standard 1

Review the differences between fiberglass reinforced plastics (FRP) and advanced composites.
For example:

- In FRP the properties of the plastic dominate, and the reinforcement adds strength and stiffness, whereas advanced composites are dominated by reinforcement properties and the matrix is secondary.
- FRP sometimes uses random fiber orientation, whereas advanced composites fibers are carefully placed.
- The material properties of the components are higher in advanced composites.
- Fiberglass or natural fibers are used in FRP whereas carbon or other very strong and stiff fibers are typically used in advanced composites.

Standard 3

Identify the reinforcement materials used in advanced composites.
For example:

- Carbon (including metal-coated)
- Aramid (Kevlar)
- Polyethylene (Spectra)
- Boron, basalt, and other specialty fibers
- Ceramic
- Metal

Standard 4

Identify the reinforcement material forms that are available for use in advanced composites.
For example:

- Filaments, tow, strands, yarns
- Prepreg (unidirectional) tape (include a discussion of why prepreg must be stored at low temperature)
- Woven and non-woven
- Preforms (braids, knits, stitched)

Standard 5

Identify and briefly discuss the matrices used in advanced composites.
For example:

- Epoxies
- Bismaleimide (BMI)

Standard 6

Identify core materials and their purpose.

- The I-beam effect (stiffness).
- Types of sandwich materials (rigid foams, honeycomb, Balsa wood, others).
- Bonding sandwich materials to composite face sheets.

STRAND 4

Students will gain experience performing wet layup and vacuum bagging processes with advanced composites materials.

Standard 1

Discuss and illustrate the wet (thermoset) manufacturing methods used with advanced composites.

- Wet layup/hand layup
- Compression molding (discuss BMC and SMC)
- Filament winding
- Pultrusion
- Resin transfer molding (RTM)
- Tape laying

Standard 2

Follow a drawing as it relates to the placement and orientation of the fibers to counteract the loads that will be applied.

- Be able to read and interpret layup drawings/manufacturing plans.
    - Plies
    - Orientation
    - Dimensions
    - Alignments
- Locate and proper interpret the layup tools for the orientation clock.
- Demonstrate the ability to apply laminates according to the documentation.

Standard 3

Use common manufacturing practices employed for composites and documentation.
For example:

- Read the resin label.
- Select the resin that meet the specifications.
- Select the reinforcement materials that meet the specifications.
- Control the reinforcement to resin ratio (fiber volume).
- Resin system components are mixed by weight, not volume.
- Understand the cure profile (heat cycle).
- Consolidate the composite during cure to ensure that the layers are properly adhering, fiber resin content is correct, and the voids are reduced.

Standard 4

Create wet layups with and without bagging procedures.

- Discuss automated cutting (include nesting concept).
- Use accepted industry clean-room procedures.
- Discuss vacuum bagging (discuss all bagging materials, illustrate bag side and mold side, discuss use of caul plates or pressure pads).
- Discuss autoclave curing.
- Discuss out-of-autoclave curing.
- Discuss tooling (molds) for layup (including materials and support structures).
- Discuss roll wrapping.

Standard 5

Compare and contrast the material properties of composite samples.

- Wet layup without a vacuum bag
- Wet layup with a vacuum bag.
- Prepreg with a vacuum bag or mold.
- Prepreg without a vacuum bag or mold.

Standard 6

Discuss and illustrate automated processes for advanced composites.

- Discuss and illustrate resin transfer molding (RTM) and other liquid infusion processes.
- Discuss the need for fiber placement and tape laying and the limitations (part size, complexity) for these methods.
- Discuss the economics of manufacturing processes for advanced composites.

STRAND 5

Students will enhance their understanding of the composites industry by learning and demonstrating appropriate and safe processes for parts fabrication.

Standard 1

Understand how the flow of parts through the plant is monitored and improved.

- Part travelers or computer.
- Understand the concepts of work in progress (WIP) and bottlenecks.

Standard 2

Investigate how unused or waste raw materials and waste molded parts are disposed of and/or recycled.

- Expired or scrap prepreg.
- Waste solvents.
- Expired peroxides.
- Dust and solid composite molded parts.
- Rejected composite molded parts.

Standard 3

Practice accurately machining cured composites.

- Set a reference point for the cutting machine.
- Use fixtures and jigs for drilling and countersinking holes.
- Investigate specialized cutting tools for composites.
- Choosing a tool (depends on the type of reinforcement and the type of cut to be made), usually grinding rather than cutting.
- Consider dust control and tool wear.

STRAND 6

Students will enhance their understanding of the composites industry by learning and demonstrating appropriate and safe processes for joining parts and sub-assemblies.

Standard 1

Install fasteners properly.

- Demonstrate and understanding of the corrosion potential between carbon composites and aluminum.
- Identify various types of fastener materials – steel, titanium, Inconel.
- Install fasteners in composites.

Standard 2

Demonstrate how to make proper adhesive bonds on composites.

- Prepare the surface.
- Choose an appropriate adhesive.
- Cure the adhesive.

Standard 3

Describe what sandwich structures are, their purpose, and how to make them.

- Types of sandwich materials (rigid foams, honeycomb, others).
- Bonding of sandwich materials to composite face sheets.
- Cutting and drilling sandwich structures.

Standard 4

Demonstrate how to effectively use sealant.

- Define what sealant is and where is it used in composite assemblies.
- Apply a sealant appropriately.

Performance Skills

5. Identify the advanced materials used in the composites industry.
6. Demonstrate appropriate and safe composites fabrication using advanced composites materials while performing wet layup and vacuum bagging processes to industry standard.

7. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
8. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

STRANDS AND STANDARDS

WOODS 1

Course Description

The first in a sequence of courses that prepares individuals to apply technical knowledge and skills to lay-out, shape, assemble, and finish projects. Value is placed on developing craftsmanship, a production sense, and in design principles. This course emphasizes the safe use of a variety of hand tools, power tools, and machinery.

Core Code	38.02.00.00.261
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	None
Skill Certification Test Number	5201
Test Weight	0.5
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Woods

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop foundational skills for woodworking.

Standard 1

Demonstrate the safe use of woodworking hand tools and equipment.

- Ref: https://schools.utah.gov/file/2c4efa51-62bb-4ea6-85eb-948282eddb70

Standard 2

Use basic manufacturing documentation.

- Work from a scale drawing.
- Use a material list.
- Follow a work order or a plan of procedure.

Standard 3

Reliably make measurements to within a sixteenth (1/16) of an inch.

Standard 4

Demonstrate basic math concepts.
For example:

- Add, subtract multiply and divide multi-digit numbers.
- Add, subtract, multiply, and divide fractions and mixed numbers.
- Reduce fractions and convert fractions to decimals.
- Calculate ratios and percentages.

STRAND 3

Understand wood products, characteristics, and procedures.

Standard 1

Classify several examples of woods by type.

- Softwoods (coniferous trees)
- Hardwoods (deciduous trees)

Standard 2

Describe the parts of a tree and the significance that it has in project construction.

- Bark
- Annual (growth) rings
- Sap wood
- Heart wood
- Pith
- Lignin

Standard 3

Demonstrate the use of basic joinery techniques.
For example:

- Butt
- Miter
- Rabbet
- Dado

Standard 4

Understand order of operations for squaring a board.

1. Plane to within 1/16” of final thickness
2. Joint an edge
3. Rip to width
4. Cut one end square
5. Cut to length
6. Sand to final thickness

Standard 5

Understand and demonstrate proper techniques for applying adhesives.

Standard 6

Understand and demonstrate sanding and finishing techniques.

- Understand and properly apply the basic rules of sanding.
- Properly prepare a surface for finishing.
- Understand application methods of stain and clear finishes.

STRAND 4

Students will be able to perform automated manufacturing processes using CNC equipment.

Standard 1

Know and understand basic terms related to CNC machines.
For example:

- X, Y, and Z axis
- Vector
- G-code

Standard 2

Configure a CNC machine and program it with a tool path to create a simple decorative design on a wood surface.

STRAND 5

Students will investigate future training opportunities and careers in woodworking.

Standard 1

Locate the USBE's CTE Manufacturing & Production pathway.

Standard 2

Identify occupations related to woodworking.
For example:

- Cabinetmaking
- Custom Millwork
- Production Manager
- Forester
- Architect
- Teacher

Standard 3

Recognize the importance of both "hard" and "soft" skills in the workplace.

Performance Skills

19. Complete a woodworking project that demonstrates the use of woodworking tools, machinery, basic joinery, adhesive, and finishing techniques.
20. Use a CNC machine to apply a simple design to a wood surface.
21. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e
22. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand					Total Points	Total Questions
		1	2	3	4	5		
Woods 1	5201	7	16	24.5	4	2	53.5	48

STRANDS AND STANDARDS
WOODS 2

Course Description

The second in a sequence of courses that prepares individuals to apply technical knowledge and skills to lay-out, shape, assemble, and finish projects. Value is placed on developing craftsmanship, a production sense, and in design principles. This course emphasizes the development of production principles in a manufacturing environment.

Core Code	38.02.00.00.262
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	10-12
Prerequisite	Woods 1
Skill Certification Test Number	5202
Test Weight	0.5
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Woods

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop foundational skills in manufacturing & production.

Standard 1

Understand and demonstrate the safe use of woodworking hand tools and equipment.

- Ref: https://schools.utah.gov/file/2c4efa51-62bb-4ea6-85eb-948282eddb70

Standard 2

Demonstrate an ability to design and create patterns, jigs, and fixtures to provide repeatability and which could be used in a production environment.

Standard 3

Practice Lean Manufacturing & Six Sigma production principles.
For example:

- 8 types of waste
- 5 S's
- Value-added work
- DMAIC
- 5 Why's

STRAND 3

Understand wood products, characteristics, and procedures.

Standard 1

Identify typically available wood products and how they are best used.
For example:

- Plywood
- Particle board
- MDF
- Melamine

Standard 2

Demonstrate the use of basic joinery techniques.
For example:

- Dovetail
- Miter
- Biscuit
- Dowel
- Dado

Standard 3

Properly use a selection of adhesives.
For example:

- Yellow glue
- Polyurethane glue
- Contact cement

STRAND 4

Students will construct a cabinet, or an equivalent project build largely from sheet stock.

Standard 1

Use a design, planning, and estimation process.

- Extract pertinent cabinet information and specifications from a set of house plans.
- Identify cabinet standards related to kitchen, vanity, and commercial type cabinets (quality standards, dimension standards, etc.).
- Identify principles of design as they apply to the work triangle in a kitchen layout.
  For example:
  - U-shape
  - Peninsula
  - Corridor
  - L-shape

- Use standardized sizes and accepted dimensions for standard built-in cabinets.
  For example:
  - Work surface height 36”
  - Base cabinet depth 24”
  - Overhead cabinet depth 12”
  - Distance between the upper and lower cabinet 16”-18”
- Draw the necessary views of a selected project.
- Create a Bill of Material for the selected project.
- Optimize the layout of the required parts (nesting) on the available materials.
- Determine the square footage of the sheet stock to be used and determine the project cost.
- Follow a procedure list for construction of a cabinet.

Standard 2

Demonstrate an understanding of the components of a cabinet.

- Identify the components of a cabinet, doors, and drawers.
  For example:
  - Face, Side, Bottom, Back
  - Rail, Stile, Mullion, Transom, Panel
  - Base, Toe kick
  - Shelf
  - Molding
  - Nailer
- Identify options for door and drawer front design.
  For example:
  - Flush
  - Overlay
  - Lip

Standard 3

Demonstrate the use of fasteners and their best applications.
For example:

- Nails or brads
- Screws
- Staples

Standard 4

Demonstrate the use of project components and hardware.
For example:

- Hinges (offset, overlay, concealed, or butt)
- Drawer guides (wood or metal)
- Knobs and pulls
- Shelf supports

Standard 5

Assemble a cabinet with the proper adhesive and fasteners.

- Layout and construct cabinet doors.
- Cut out and construct drawers.
- Install door and drawer.
- Identify basic construction methods.
    - Frame and panel
    - Casework construction
    - Face frame
    - European 32mm

Standard 6

Demonstrate proper finishing techniques.
For example:

- Finish sand
- Soften edges
- Select and apply an appropriate finish material

Standard 7

Demonstrate effective transportation and installation techniques.
For example:

- Packaging & shipping
- Lifting & handling
- Scribing & trimming
- Leveling & shimming

STRAND 5

Students will be able to perform automated manufacturing processes using CNC equipment.

Standard 1

Know and understand basic terms related to CNC machines.
For example:

- 2D, 2.5D, and 3D
- Post processor

Standard 2

Configure a CNC machine and program it to cut out or shape a component in an assembly.

STRAND 6

Students will investigate future training opportunities and careers in woodworking.

Standard 1

Investigate the woodworking/manufacturing industry.

- Identify career opportunities in woodworking in a manufacturing/production environment.
- Research the pathways available in woods & manufacturing.
    - Project Manager
    - Line Operator
    - Finisher
    - Contractor

Performance Skills

23. Complete a woodworking project that demonstrates production environment practices.
24. Use a CNC machine to cut out and shape parts for an assembly.
25. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e
26. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
Woods 2	5202	8	11	8	13	6	2	48	43

STRANDS AND STANDARDS
WOODS 3

Course Description

The third in a sequence of courses that prepares individuals to apply technical knowledge and skills to lay-out, shape, assemble, and finish projects. Value is placed on developing craftsmanship, a production sense, and in design principles. This course emphasizes the development of widely understood and accepted design principles.

Core Code	38.02.00.00.263
Concurrent Enrollment Core Code	38.02.00.13.263
Units of Credit	0.5
Intended Grade Level	11-12
Prerequisite	Woods 1
Skill Certification Test Number	5203
Test Weight	0.5
License Area of Concentration	CTE or Secondary
Required Endorsement(s)	Woods

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop foundational skills in design principles.

Standard 1

Create projects using a working drawing and utilizing a list of materials while demonstrating the safe use of woodworking hand tools and equipment.

- Ref: https://schools.utah.gov/file/2c4efa51-62bb-4ea6-85eb-948282eddb70

Standard 2

Students will consider form, function, and joinery.

Standard 3

Students will follow established principles of good design.
For example:

- Balance/Symmetry
- Contrast
- Harmony/Unity
- Hierarchy/Emphasis
- Pattern/Repetition
- Proportion/Scale
- Space

Standard 4

Students will explore and compare the elements of established design styles.
For example:

- Art Deco
- Federal Period
- Mission
- Queen Anne
- Scandinavian

STRAND 3

Understand wood products, characteristics, and procedures.

Standard 1

Calculate board footage.

- (nominal thickness in inches * nominal width in inches * actual length in inches)/144

or

- (nominal thickness in inches * nominal width in inches * actual length in feet)/12

Standard 2

Describe and identify natural defects.

- Warp (cup, twist, bow, crook)
- Cracks
- Bark inclusions
- Knots

Standard 3

Identify common grades of lumber and sheet goods.
For example:
Hardwoods

- FAS – Firsts & Seconds
- F1F – FAS One Face
- SEL – Select
- 1C – Number 1 Common

Sheet stock

- A
- B
- C
- D

Standard 4

Understand the methods of the seasoning and drying lumber.

- Standard moisture content levels for kiln and air-dried lumber.
- The effects of moisture on materials (expansion and contraction).

Standard 5

Demonstrate the use of basic joinery techniques.
For example:

- Spline
- Mortise & Tenon
- Lap
- Blind dado

Standard 6

Demonstrate sanding and finishing techniques.

- Understand and properly apply the basic rules of sanding.
- Select and correctly use each specified grit size.
- Properly prepare a surface for finishing.
- Properly apply stain, penetrating oil, and/or a clear finish.
- Properly apply a clear coat.

STRAND 4

Students will follow a disciplined design process to develop a project.

Standard 1

Understand the design, planning, and estimation process.

- Identify standard furniture dimensions relating to tables, seating, and shelving.
- Draw/sketch the necessary views of a selected project.
- Create a material list for the selected project and determine the project cost.

Standard 2

Create a mock-up of the project.

- Simplify the design where possible.
- Create a step-by-step plan for creating each element of the designed product.

Standard 3

Complete a finished product that showcases the woodworking and design skills developed by the student.

STRAND 5

Students will be able to perform automated manufacturing processes using CNC equipment to produce an assembly.

Standard 1

Know and understand basic terms related to CNC machines.
For example:

- Datum, Absolute Coordinates, and Relative Coordinates
- Depth of Cut (DoC), Speed, and Feed
- Tool Path, Cutter Radius, Conventional Milling, and Climb Milling

Standard 2

Configure a CNC machine and program it to cut out or shape the components of an assembly.

STRAND 6

Students will investigate future training opportunities and careers in woodworking.

Standard 1

Investigate different types of occupational training.
For example:

- Trade school
- Community College
- University

Standard 2

Recognize the importance of both “hard” and “soft” skills in the workplace.

Performance Skills

27. Complete a finished product that showcases the woodworking and design skills developed by the student.
28. Assemble a portfolio of design concepts supporting the design development of the main project for this course.
29. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e
30. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as SkillsUSA.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
Woods 3	5203	3	5	15	5	5	5	38	36

STRANDS AND STANDARDS
EXPLORING TECHNOLOGY

Course Description

Exploring Technology is a comprehensive, action-based, course that introduces students to technology and its impact on society. Students will develop problem-solving skills, improve awareness for College & Career Readiness (CCR), and build understanding of the relationship between science, technology, engineering, and math (STEM). Emphasis is placed on broad exploration in cooperative activities rather than individual skill development and projects. Students will explore Engineering and at least three of the following seven technology areas: 1) agriculture & biotechnology, 2) construction, 3) energy & power, 4) information & communication, 5) manufacturing, 6) medical, and 7) transportation.

Core Code	38.03.00.00.001
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	7-8
Prerequisite	None
Skill Certification Test Number	None
Test Weight	None
License Area of Concentration	Secondary
Required Endorsement(s)	Technology & Engineering, or
	Technology

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/cte/tech/publicationsresources under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop an understanding of the characteristics and scope of technology, the core concepts of technology, and the relationships among and between technologies and other fields of study.

Standard 1

In order to comprehend the scope of technology, students should learn that:

- New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.
- The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.
- Technology is closely linked to creativity, which has resulted in innovation.
- Corporations can often create demand for a product by bringing it onto the market and advertising it.

Standard 2

In order to recognize the core concepts of technology, students should learn that:

- Technological systems include input, processes, output, and, at times, feedback.
- Systems thinking involves considering how every part relates to others.
- An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.
- Technological systems can be connected to one another.

- Malfunction of any part of a system may affect the function and quality of the system.
- Requirements are the parameters placed on the development of a product or system.
- Trade-off is a decision-making process recognizing the need for careful compromises among competing factors.
- Different technologies involve different sets of processes.
- Maintenance is the process of inspecting and servicing a product or system on a regular basis in order to continue functioning properly, to extend its life, or to upgrade its capability.
- Controls are mechanism or particular steps that people perform using information about the system that causes systems to change.

Standard 3

In order to appreciate the relationships among technologies and other fields of study, students should learn that:

- Technological systems often interact with one another.
- A product, system, or environment developed for one setting may be applied to another setting.
- Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.

STRAND 3

Students will develop an understanding of the cultural, social, economic, and political effects of technology, the effects of technology on the environment, the role of society in the development and use of technology, and the influence of technology on history.

Standard 1

In order to recognize the changes in society caused by the use of technology, students should learn that:

- The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technologies development and use.
- Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
- The development and use of technology poses ethical issues.
- Economic, political, and cultural issues are influenced by the development and use of technology.

Standard 2

In order to understand the effects of technology on the environment, students should learn that:

- The management of waste produced by technological systems is an important societal issue.

- Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
- Decisions to develop and use technologies often put environmental and economic interests in direct competition with one another.

Standard 3

In order to realize the impact of society on technology, students should learn that:

- Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
- The use of inventions and innovations has led to changes in society and the creation of new needs and wants.
- Social and cultural priorities and values are reflected in technological devices.
- Meeting societal expectations is the driving force behind the acceptance and use of products and systems.

Standard 4

In order to be aware of the history of technology, students should learn that:

- Many inventions and innovations have evolved by using slow and methodical processes of tests and refinements.
- The specialization of function has been at the heart of many technological improvements.
- The design and constructions of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of special relationships.
- In the past, an invention or innovation was not usually developed with the knowledge of science.

STRAND 4

Students will participate in a problem-based learning activities that explore engineering a range of other technological areas.

Standard 1

Students will know and be able to apply a basic design process that can be used to solve an engineering problem.

- Identify & define the design problem
    - List requirements
    - Identify constraints
    - Conduct research to identify similar efforts
- Brainstorm solutions
    - List possible solutions
    - Evaluate trade-offs
    - Synthesize the results and select the best solution
- Create models & build a prototype

        - Mathematical models
        - 3D solid models
        - Scale models
    - Test the prototype
        - Record test results data
        - Evaluate the test results against the requirements
        - Identify weaknesses
    - Redesign and optimize
        - Record findings
        - Improve on the initial design
        - Consider discarded ideas

Standard 2

In order to explore a broad range of technologies, students will use a disciplined design process as they participate in problem-based learning activities in at least three (3) of the following areas of technology:

- Agriculture & Biotechnology
- Construction
- Energy & Power
- Information & Communication
- Manufacturing
- Medical
- Transportation

Standard 3

Students should be given ample opportunities to use math and science applications in each activity.

STRAND 5

Students will be introduced to careers related to each selected area of technology.

- Explore career opportunities in each selected area of technology.
- Explore training and education requirements for a given occupation in each selected area of technology.

STRANDS AND STANDARDS
ENGINEERING TECHNOLOGY

Course Description

A foundational engineering design course that introduces basic problem-solving and documentation skills. Various aspects of engineering will be explored along with technology's environmental, societal, political, and economic impacts on our world. By utilizing problem-solving skills, students will develop essential abilities and attitudes that will in turn expand their occupational opportunities in the world of engineering.

Core Code	38.03.00.00.010
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	8-9
Prerequisite	None
Skill Certification Test Number	615
Test Weight	0.5
License Area of Concentration	Secondary
Required Endorsement(s)	Technology & Engineering, or
	Technology

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of show safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any materials, tools, or equipment.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop an engineering mindset.

Standard 1

Use an engineering design process to solve a problem.
For example:

1. Identify & define the problem (criteria & constraints).
2. Brainstorm solutions.
3. Create a model (predictive analysis) & build a prototype.
4. Test the prototype (gather data).
5. Iteration (redesign & optimize).

Standard 2

Use mathematics and science to produce technology (STEM) which often requires a multi-disciplinary approach.

- Algebra
- Geometry
- Physics

Standard 3

Demonstrate the relationship between a scientific method and an engineering design process.
For example:

- Record data
- Sketch ideas
- Analyze data to develop a mathematical model
- Reach a conclusion (cause & effect)

STRAND 3

Students will apply the elements of an engineering design process to create a product or system.

Standard 1

Identify the design problem and decide how to address it.
For example:

- Clearly define the problem based on wants and needs.
- Identify criteria and constraints and determine how they will affect the design.
- Investigate existing design solutions.
- Consider factors including safety, reliability, cost, quality control the environment, production, manufacturability, maintenance and repair, aesthetics ergonomics, and human factors.

Standard 2

As a team, think of new ideas or approaches to the problem and choose one.

- Brainstorm a variety of potential solutions.
- Evaluate their strengths and weaknesses based on the established criteria.
- Choose the best solution.

Standard 3

Create a model and a prototype of the proposed design.
For example:

- Mathematical models (spreadsheets and graphs)
- Technical drawings (isometric & orthographic)
- 3D solid models
- Working prototype

Standard 4

Test the prototype, record the results, and evaluate the performance of the design.
For example:

- Identify and record both failures and successes.
- Evaluate the performance of the prototype against the stated requirements.

Standard 5

Redesign the prototype by repeating the design process in order to further optimize the design. For example:

- Learn from failed attempts and identify areas for improvement from testing.
- Reconsider any discarded ideas.
- Look for mathematical relationships and use them to identify the factors that affect the design the most.
- Repeat the steps of the design process until the prototype meets the requirements.

STRAND 4

Students will develop an understanding of the cultural, environmental, economic, and political effects of engineering, and the impacts of technology throughout history.

Standard 1

In order to understand the effects of engineering on society, students should learn that engineers have improved the quality of life by introducing revolutionary technologies such as:

- Clean water systems
- Transportation & infrastructure
- Medicines & biotechnology
- Electronics
- Energy

Standard 2

In order to realize the impact of society on technology, students should learn that:

- The use of inventions and innovations has led to changes in society and the creation of new needs and wants.
- Each innovation introduces both solutions and new challenges.

Standard 3

Students will recognize that engineers will have a role in solving current and future problems such as the National Academy of Engineering Grand Challenges.

STRAND 5

Students will apply engineering fundamentals.

Standard 1

Distinguish between six simple machines and their identifying characteristics.

- Lever
- Wedge
- Inclined Plane
- Screw
- Wheel & Axle
- Pulley

Standard 2

Practice real world applications of physical laws.

- Ohm's Law & Watt's Law
- Newton's Laws of Motion
- Pascal's Principle
- Bernoulli's Principle
- Mass and energy balances, and chemical reactions.

STRAND 6

Students will investigate future training opportunities and careers in engineering.

Standard 1

Investigate the USBE's CTE engineering pathway.

Standard 2

Identify occupations related to engineering.

- Technician
- Designer
- Engineer
- Manager

Standard 3

List and differentiate among different engineering disciplines.
For example:

- Aerospace
- Biomedical
- Civil
- Chemical
- Computer (both Hardware & Software)
- Electrical
- Energy
- Manufacturing
- Mechanical

Standard 4

Investigate different types of occupational training.
For example:

- Trade school
- Community College
- University
- Graduate Training

Standard 5

Recognize the importance of both "hard" and "soft" skills in the workplace.

Performance Skills

9. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/file/71cd951d-a99b-45ac-a426-6c824700fdfe

31. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/file/fd0c16aa-8bee-4d07-85b5-88e0c913790e

32. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
Engineering Technology	615	3	10	9	5	9	6	42	29

STRANDS AND STANDARDS
ROBOTICS TECHNOLOGY

Course Description

An introductory course focused on robotic technologies and what it means to be living in an automated world. Students will gain an understanding of how robotic technologies impact the environment, society, and the economy. Students will develop a foundation in essential abilities and attitudes in connection with math and science skills that will in turn expand their opportunities in the world of automation.

Core Code	38.03.00.00.040
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	8-9
Prerequisite	None
Skill Certification Test Number	None
Test Weight	None
License Area of Concentration	Secondary
Required Endorsement(s)	Technology & Engineering, or
	Technology

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will be introduced the history, environmental, societal and economic impacts of robotics and mechatronics.

Standard 1

Analyze the historical impacts of robotics technology and compare them with contemporary applications.
For example:

- Analyze the key elements that led to the invention of the modern robot.
- Define robotics and mechatronics.
- Discuss the future of robotics and mechatronics.

Standard 2

Discuss the political and societal impacts of robotics.
For example:

- Understand how the use of robots and drones affects society.
- Explore the use of robots in industry and their effect on the economy.

Standard 3

Explore different types of robots and mechatronics systems.
For example:

- Automated Guided Vehicle (AGV)
- CNC machines
- Industrial robots
- Domestic robots

STRAND 3

Students will be introduced to the hardware used to create Robots and other Mechatronics systems.

Standard 1

Students will be introduced to the basic electronics and control systems used to create robots and other mechatronic systems.
For example:

- Inputs
- Outputs
- Processors
- Electronic components

Standard 2

Students will be introduced to the mechanical components available for use in robots and other mechatronic systems.
For example:

- Structural components
- Hydraulic systems
- Pneumatic systems

STRAND 4

Students will be introduced to software design, coding structures, and software development.

Standard 1

Explore the concepts of computational thinking, the software design process, programming structures, and programming languages.

- Understand the concepts in computational thinking.
    - Decomposition, algorithms, binary, etc.
- Understand and use the software design process
    - Input, processing, output.
    - User interface design (UI)
    - User experience (UX)
- Understand and use programming structures.
    - Sequence programming
    - Decisions with if – then – else statements
    - Loops – repeat, for, while, etc.
    - Functions, modules, methods
    - Variables
- Understand and explore different programming languages.
    - Block type languages
    - Text based languages

STRAND 5

Students will use a design process to create a computer program for a robot to perform a physical task.

Standard 1

Work in teams in a collaborative environment.

Standard 2

Use a design process and document the work.
For example:

6. Identify & define the problem (criteria & constraints).
7. Brainstorm solutions.
8. Create a model (predictive analysis) & build a prototype.
9. Test the prototype (gather data).
10. Iteration (redesign & optimize).

Standard 3

Code the program using an appropriate programming environment and debug the program as needed.

Standard 4

Successfully operate the robot with the program or application that is developed.

STRAND 6

Students will investigate career opportunities in robotics and the automated manufacturing industry.

Standard 1

Identify available courses to complete the Engineering pathway with an emphasis in Robotics.

- Career Pathway: Engineering
- Ref: https://schools.utah.gov/file/4de1dd59-0425-4f76-9e33-fdcf5de45dbf (scroll down to page 23)

Standard 2

Identify occupations related to the robotics and automated manufacturing.
For example:

- Mechatronics
- Electrical Engineering
- Mechanical Engineering
- Computer Science
- Industrial Maintenance
- Manufacturing Engineering

Standard 3

Identify different types of opportunities to pursue training in Robotics and Automation.
For example:

- Apprenticeship
- Technical School
- College & University

STRANDS AND STANDARDS

ENERGY & POWER TECHNOLOGY

Course Description

An introductory course focused on the world of energy technology. Students will gain an understanding of how energy & power technologies impact politics, the environment, society, and the economy. Students will develop a foundation in essential abilities and attitudes that will in turn expand their occupational opportunities in the world of energy & power.

Core Code	38.03.00.00.050
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	8-9
Prerequisite	None
Skill Certification Test Number	None
Test Weight	None
License Area of Concentration	Secondary
Required Endorsement(s)	Technology & Engineering, or
	Technology

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/cte/tech/publicationsresources under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop an understanding of and be able to select and use energy & power technologies.

Standard 1

In order to understand energy, students should learn that:

- Energy is the capacity to do work.
- Energy can be used to do work, using many processes.
- Energy resources can be renewable, nonrenewable or inexhaustible.
- Energy can be classified into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.
- Energy cannot be created or destroyed; however, it can be converted from one form to another.

Standard 2

In order to understand power, students should learn that:

- Power is the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
- Power systems are used to drive and provide propulsion to other technological products and systems.
- Much of the energy used in our environment is not used efficiently.
- It is impossible to build an engine to perform work that does not exhaust thermal energy to the surroundings.

- Power systems must have a source of energy, a process, and loads.

STRAND 3

Students will develop an understanding of the cultural, social, economic, and political effects of technology, the effects of technology on the environment, the role of society in the development and use of technology, and the influence of technology on history.

Standard 1

In order to be aware of the history of technology, students should learn that:

- Many inventions and innovations have evolved by using slow and methodical processes of tests and refinements.
- The specialization of function has been at the heart of many technological improvements.
- The design and constructions of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of special relationships.
- In the past, an invention or innovation was not usually developed with the knowledge of science.

Standard 2

In order to realize the impact of society on technology, students should learn that:

- Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
- The use of inventions and innovations has led to changes in society and the creation of new needs and wants.
- Social and cultural priorities and values are reflected in technological devices.
- Meeting societal expectations is the driving force behind the acceptance and use of products and systems.

Standard 3

In order to understand the effects of technology on the environment, students should learn that:

- The management of waste produced by technological systems is an important societal issue.
- Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
- Decisions to develop and use technologies often put environmental and economic interests in direct competition with one another.

STRAND 4

Students will identify and understand mechanical system technologies.

For example:

- internal combustion engine

Standard 1
Identify devices that use mechanical power.

Standard 2
Identify and explain basic components and functions of mechanical power devices.

Standard 3
Design, create, and test a simple mechanical system.

Standard 4
Calculate work and power in a system that converts energy from electrical to mechanical.

STRAND 5
Students will identify and understand electrical system technologies.
For example:
- Power distribution
- Electrical generators and motors

Standard 1
Identify devices that use electrical power.

Standard 2
Identify and explain basic components and functions of electrical power devices.

Standard 3
Distinguish between electrical and electronic.

Standard 4
Distinguish between series and parallel circuits.

Standard 5
Test the relationship between voltage, current, and resistance using a digital multi-meter.

STRAND 6
Students will identify and understand fluid system technologies.
For example:
- Pneumatic system
- Hydraulic system

Standard 1
Identify devices that use fluid power.

Standard 2
Identify and explain basic components and functions of fluid power devices.

Standard 3
Differentiate between the characteristics of hydraulic and pneumatic systems.

Standard 4
Design, create, and test a hydraulic or pneumatic device.

Standard 5
Calculate values in a fluid power system using Pascal's Law.

Standard 6
Calculate flow rate, flow velocity, and mechanical advantage in a hydraulic system.

STRAND 7
Students will investigate career opportunities in the energy industry.

Standard 1
Identify occupations related to the energy industry.

Standard 2
Identify different types of occupational training.

STRANDS AND STANDARDS
MANUFACTURING TECHNOLOGY

Course Description

An introductory course focused on the world of manufacturing technology. Students will gain an understanding of how manufacturing technologies impact politics, the environment, society, and the economy. Students will develop a foundation in essential abilities and attitudes that will in turn expand their occupational opportunities in the manufacturing world.

Core Code	38.03.00.00.060
Concurrent Enrollment Core Code	None
Units of Credit	0.5
Intended Grade Level	8-9
Prerequisite	None
Skill Certification Test Number	620
Test Weight	0.5
License Area of Concentration	Secondary
Required Endorsement(s)	Technology & Engineering, or
	Technology

STRAND 1

Students will follow safety practices.

Standard 1

Identify potential safety hazards and follow general laboratory safety practices.

- Assess workplace conditions regarding safety and health.
- Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.
- Locate and understand the use of shop safety equipment.
- Select appropriate personal protective equipment.

Standard 2

Use safe work practices.

- Use personal protective equipment according to manufacturer rules and regulations.
- Follow correct procedures when using any hand or power tools.
- Ref: https://schools.utah.gov/cte/tech/publicationsresources under the Safety Program and Management tab.

Standard 3

Complete a basic safety test without errors (100%) before using any tools or shop equipment.

STRAND 2

Students will develop an understanding of the cultural, social, economic, and political effects of technology, the effects of technology on the environment, the role of society in the development and use of technology, and the influence of technology on history.

Standard 1

In order to be aware of the history of technology, students should learn that:

- Many inventions and innovations have evolved by using slow and methodical processes of tests and refinements.
- The specialization of function has been at the heart of many technological improvements.
- The design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
- In the past, an invention or innovation was not usually developed with the knowledge of science.

Standard 2

In order to realize the impact of society on technology, students should learn that:

- Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
- The use of inventions and innovations has led to changes in society and the creation of new needs and wants.

- Social and cultural priorities and values are reflected in technological devices.
- Meeting societal expectations is the driving force behind the acceptance and use of products and systems.

Standard 3

In order to understand the effects of technology on the environment, students should learn that:

- The management of waste produced by technological systems is an important societal issue.
- Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
- Decisions to develop and use technologies often put environmental and economic interests in direct competition with one another.

STRAND 3

Students will develop an understanding of and be able to select and use appropriate manufacturing technologies.

Standard 1

In order to better understand manufacturing technologies, students should learn that:

- Materials must first be located before the can be extracted from the earth through such processes as harvesting, drilling, and mining.
- Materials have different qualities and may be classified as natural, synthetic, or mixed.
- Manufacturing systems are mechanical processes that change the form of materials through the process of separating, forming, combining, and conditioning.
- Chemical technologies are used to modify or alter chemical substances and provide a means for humans to alter or modify materials and produce chemical products.

Standard 2

In order to select and use manufacturing technologies, students should learn that:

- The manufacturing process includes the designing, development, making, and servicing of products and systems.
- Manufacturing systems may be classified into types, such as customized production, batch production, and continuous production.
- Manufactured goods may be classified as durable and non-durable. Durable goods are designed to operate for a long period of time, while non-durable goods are designed to operate for a short period of time.
- The interchangeability of parts is an inherent requirement of an effective manufacturing processes.
- Servicing keeps products in good condition.

Standard 3

Demonstrate basic technical drawing and reading skills.

Standard 4

Take measurements using basic equipment used in manufacturing.

- Steel rule
- Digital or analog caliper
- Micrometer

STRAND 4

Students will define free enterprise and marketing as it relates to manufacturing.

Standard 1

In order to define free enterprise and marketing, student should learn that:

- The basic concepts of entrepreneurship.
- The process of obtaining capital and managing finances.
- Marketing a product involves conducting research on its potential, establishing a product's identity, advertising it, selling it, and distributing it.

STRAND 5

Students will design and operate to a mass production system that creates a product of value.

Standard 1

In order to better understand a production system, students will:

- Assume an individual production role within a continuous system.
- Understand the importance of labor efficiency and be able to identify ways to improve a mass production system.
- Include evidence of planning that ensures the product, system, or service meets established criteria.

STRAND 6

Students will investigate the educational pathways and career opportunities in the manufacturing industry.

Standard 1

Identify occupations related to the manufacturing industry.

Standard 2

Identify different types of occupational training.

Skill Certificate Test Points by Strand

Example table below. Refer to instructions for specifics.

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
Manufacturing Technology	620	13	7	25	5	10	3	63	52

Performance Skills

33. Create and utilize an engineering notebook per established conventions. https://schools.utah.gov/cte/tech/publicationsresources
34. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*. https://schools.utah.gov/cte/tech/publicationsresources
35. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).

Course Changes 2020: K-8 Courses: Digital Literacy and Elementary Keyboarding. Teaching as a Profession 1 and 2 - These courses are part of the K-12 Teaching as a Profession Pathway.

Digital Literacy

SY19-20 Revisions

The overall feedback from subject-matter experts for the Digital Literacy course were as follows:

- The strands and standards were very broad.
- The strands and standards covered a lot of material.
- The strands could be combined with other strands.

Looking at the revisions for the Digital Literacy course we included the following:

- NEW – Performance skills for students to demonstrate strands that require demonstrating skills vs. a traditional paper test.
    - Strand 1
    - Strand 3
    - Strand 5
    - Strand 6
- NEW – Vocabulary list of key terms a student should know included at the end of the strands and standards.
- Included the basic computer science principles a student will need to know on how a digital device uses computer science in everyday settings.
- Included the basic computer science principles of having students becoming creators (instead of consumers) when using digital devices.
    - Strand 2 Standard 4
    - Strand 3 Standard 2
- Included digital wellness to the standards.
- Included strategies to deal with cyberbullying as well as steps on how to report cyberbullying.

Elementary Keyboarding

SY19-20 Revisions

To align to Board Rule R277-700-4, to assess students for proficiency in keyboarding by Grade 5, with feedback from subject-matter experts, we updated to the Elementary Keyboarding strands and standards to:

- Strands and standards are broken down into to grade levels (K-2 and 3-5).
- Allow students to develop and improve keyboarding technique, not speed.
- Show improvement based on standards-based grading.
- Align to the K-5 Computer Science standards.

Teaching as a Profession 1

SY19-20 Revisions

Feedback from subject-matter experts and post-secondary institutions for Teaching as a Profession 1 course were as follows:

- The strands and standards were too broad and too in-depth for the introductory level course of the K-12 Teaching as a Profession pathway.

Looking at the revisions for Teaching as a Profession 1 you will see that we restructured the course to introduce students to the role and positive influence of an effective educator. Students will explore various careers in education and develop employability skills to become a successful professional. Students will understand the value of multiculturalism and diversity in the classroom and how it enhances individual student learning. Students will identify instructional strategies and understand the role of technology and feedback in student engagement.

We also included vocabulary definitions into the strands and standards as well as a vocabulary list at the end of the strands and standards for students and teachers.

Before finalizing the strands and standards, we asked and received feedback from post-secondary institutions and the Special Education Department at the Utah State Board of Education.

Teaching as a Profession 2

SY19-20 Revisions

After reviewing feedback from Teaching as a Profession 1 and the revision of those standards, we had to adjust Teaching as a Profession 2 to help with the progression from Teaching as a Profession 1. You will see some overlap from Teaching as a Profession 1 and Teaching as a Profession 2 due to a student could take Teaching as a Profession 2 without having to take Teaching as a Profession 1 as a pre-requisite.

We took feedback from subject-matter experts and post-secondary institutions, and with the revisions for Teaching as a Profession 1, the changes made to Teaching as a Profession 2 focuses on the following objectives:

- Students are introduced to career opportunities and the required credentials needed to be a qualified educator.
- Students explore educator roles and responsibilities and professional education organizations.
- Students identify historic court cases that have impacted the learning environment.
- Students will develop lesson plans, using educational theories, to incorporate multiculturism and diversity while understanding the role of classroom management procedures.
- Student will implement instructional strategies and develop learner appropriate activities that inspire each student to enjoy learning.

We also included vocabulary definitions into the strands and standards and a vocabulary list at the end of the strands and standards for students and teachers.

Before finalizing the strands and standards, we asked and received feedback from post-secondary institutions.

STRANDS AND STANDARDS
DIGITAL LITERACY

Course Description

This course is a foundation to the digital world that provides a broad understanding of key applications, computing fundamentals, and living online. Students will have opportunities to use technology and develop skills that promote creativity, critical thinking, productivity, and collaboration in the classroom and day-to-day life. This course is aligned with the International Society for Technology in Education (ISTE) for Students, the K-12 Computer Science Standards, and industry standards for Digital Literacy Certification. The alignment of these national and international benchmarks will ensure that students complete this course as a prerequisite to transition successfully to the 9-12th grade digital studies courses.

ADA Compliant: June 2020

Pilot Year	2020-2021
Effective School Year	2021-2022
Intended Grade Level	7 or 8
Units of Credit	0.50
Core Code	32.02.00.00.170
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	None
Test Weight	None
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business and Marketing (CTE/General)
Endorsement 2	Business and Marketing Essentials
Endorsement 3	Business and Marketing Info Management L1
Endorsement 4	College and Career Awareness/Digital Literacy
Endorsement 5	Intro to Computer Science
Endorsement 6	Programming and Software Development

STRAND 1

(Keyboarding Efficiency) Students will enhance keyboarding skills. *This strand will be incorporated throughout the course.*

Standard 1

Students will enhance and demonstrate proper key by touch skills and keyboarding techniques.

- Sit up straight.
- Feet flat on the floor.
- Body centered with the "G" and "H" keys.
- Fingers curved on home row (A, S, D, F, J, K, L, ;).
- Wrists straight and elbows naturally at sides.
- Correct fingers used for keystrokes.
- **Key by touch** (eyes on copy or screen, not on keys).
- Key with smooth rhythm.

Strand 1 Performance Skill listed below

STRAND 2

(Information Processing Cycle) Students will identify a computer as a device that utilizes hardware and software to accept input, process data, store data, and produce output.

Standard 1

Identify computer hardware in the information processing cycle.

- Define **hardware** as the physical components that make up a computing system, computer, or computing device.
- Identify primary hardware components of a computer.
    - Monitor
    - Keyboard
    - System unit
    - Motherboard
    - Power supply
    - Hard Drive/Solid State Drive (SDD)
    - Central Processing Unit (CPU)
    - Mouse/Touchpad/Touchscreen
- Define **peripheral devices** as an internal or external device that connects directly to a computer but does not contribute to the primary function of a computer.
- Identify primary peripheral devices.
    - Printer
    - Camera
    - Projector
    - Speakers
    - Headphones

- Microphone
- Game controller
- Virtual Reality (VR) headsets

Standard 2

Explain the role of software for a computing system.

- Define **software** as a set of instruction that runs a computing system, computer, or other computing device.
- Define the two types of software for a computing system.
  - **Operating system** is software that controls the communication between the hardware and application software of a computer.
  - **Application software** is developed to help the user perform specific tasks.
- Identify the primary operating system of a computing device.
  - Windows
  - Mac OS
  - Android
  - iOS
  - Linux
- Identify the common application software for a computing device.
  - Business software (i.e. word processing, spreadsheets, databases, presentation, email, calendaring)
  - Communication software (i.e. social media, email, video conference, instant messaging)
  - Entertainment software (i.e. virtual reality, streaming, gaming)
  - Multimedia software (i.e. photo, image, video, audio, speech to text, artificial intelligence (AI) speech technology)
  - Education software (i.e. learning management system (LMS), gradebook, e-books)

Standard 3

Define input device and explain how input devices function in the information processing cycle.

- Define **input device** as hardware equipment used to transfer data to a computing system for processing.
- Explain the function of primary input devices.
  - Keyboard
  - Mouse/Touchpad
  - Touchscreen
  - Microphone
  - Camera
  - Game controller

Standard 4

Define processing and explain how processing functions in the information processing cycle.

- Define **processing** as interpreting input and producing output.
- Define and explain the main processing device in a computer system.
    - **Central Processing Unit (CPU)** is the master chip that controls all other aspects of the computer.
- Define the relationship of an algorithm, loop, and conditional in computer processing.
    - **Algorithm** is a set of instructions to complete a task.
        - The CPU uses the algorithm as an input to produce output.
    - **Loop** is a programming structure that repeats a set of instructions as long as a specific condition is true.
        - The CPU uses the loop as an input to repeat the task to output data until the specific condition is true.
    - **Conditional** is a feature of a programming language that performs different computations or actions depending on whether a programmer-specified Boolean condition evaluate to true or false.
        - The CPU uses the conditional as an input to continue to evaluate whether or not to send output data.
- Explain the role of the CPU, memory, and storage when purchasing a computing device based on the individual user's needs.

Standard 5

Explain how memory and storage devices function in the information processing cycle.

- Define **memory** as temporarily stored data for immediate use in a computer system.
- Define the two types of memory for a computer system.
    - **Random Access Memory (RAM)** is used by the operating system and application software while the computer is running.
    - **Read Only Memory (ROM)** is preloaded instructions for booting up the computer.
- Define **storage** as a place where data can be held and retrieved at a later time.
- Identify the benefits of using different types of primary storage.
    - Define **hard drive** as an internal storage device that stores data.
    - Define **external hard drive** as a portable storage device that stores data.
    - Define **flash drive** as a small, portable storage device that uses electrical rewritable storage (flash) to store or transfer data (i.e. USB, thumb drive, memory stick, jump drive).
    - Define **Solid-state drive (SSD)** as a storage device that uses an electrical rewritable storage (flash) and performs tasks faster than a hard drive.
    - Define **memory card** as a small, flat flash drive used in mobile devices and digital cameras (i.e. SD card, micro SD card).
    - Define **cloud storage** as storage where data is transmitted and stored on remote storage systems where it is maintained, managed, and backed up and

made available to users over a network (i.e. Google Drive, iCloud, Dropbox, OneDrive).

- Explain the role of memory and storage when purchasing a computing device based on the individual user's needs.

Standard 6

Explain how output devices function in the information processing cycle.

- Define **output** as information processed from a computing system and received by the user.
- Define **output device** as hardware equipment used to transfer data out from a computer system.
- Explain the function of primary output devices.
    - Monitor/Screen
    - Printer
    - Projector
    - Speakers
    - Headphones

STRAND 3

(Global Collaborator) Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively locally and globally (ISTE 1 and 7).

Standard 1

Define the components of the Internet.

- Define **network** as a group of two or more digital devices connected to share information.
- Define **Internet** as a global network.
- Define **bandwidth** as the amount of information that can travel on an Internet connection in a certain timeframe.
- Define **uniform resource locator (URL)** as an address for a worldwide webpage.
- Define **Internet protocol (IP) address** as a unique set of numbers separated by periods that identifies each digital device using the Internet to communicate.
- Define **Internet browser** as an application used to access and view websites.
- Define **search engine** as a program that searches for and identifies items in a database using keywords to find websites for information on the Internet.
- Define **server** as a computer or computer program which manages access to databases of information in a network.

Standard 2

Explain how to connect and navigate the Internet.

- Identify the different components required for an Internet connection.
    - Define **Internet service provider (ISP)** as a company that provides subscribers with access to the Internet.

        - Define **modem** as a hardware component that converts packets into a usable signal to allow another device, such as a router, to connect to the Internet.
            - Define **packet** as small bits of data sent over a network.
        - Define **router** as a device that transports the packets of information between the digital device and modem.
        - Define **digital device** as a device that utilizes hardware and software during the information processing cycle.
- Identify types of Internet connections.
    - Cellular
    - Digital Subscriber Line (DSL)
    - Fiber optic
    - Satellite
    - Wireless (WiFi)
- Explain how Internet connection and bandwidth impact speed and accessibility.
- Define **uniform resource locator (URL)** as an address of a World Wide webpage on the Intenet.
- Explain the component of a URL
    - Scheme (i.e. http://, https://)
    - Sub-domain (WWW)
    - Domain name (name of the website)
    - Top Level Domain (i.e. .org, .com, .net., .edu., .gov)
    - File path (description of the exact webpage location)
- Search Internet content efficiently and effectively.
    - Search engine (i.e. Google, Bing).
    - Don't use common words and punctuation.
    - Specific keywords.
    - Use quotation marks.
- Demonstrate the use of common website navigation components.
    - Menu
        - Chrome app launcher (waffle)
        - Three dots (kabob)
        - Three lines (hamburger)
    - Home page
    - Search bar
    - Graphics
    - Hyperlinks
- Identify components of credible online content.
    - Author
    - Date
    - Verified sources
    - Domain
    - Design

- Writing style

Standard 3

Identify a variety of online communication tools and the primary features of email.

- Identify different types of communication programs.
  - Define **email** as messages distributed by email application software from one digital device to another using a network (i.e. Gmail, Outlook, Yahoo).
  - Define **instant messaging** as online chat that offers real-time text communication over the Internet (i.e. Google Chat, Instagram DM (Direct Message), Facebook Messenger)
  - Define **video conference** as a conference where participants, in different locations, are able to communicate with each other in sound and vision (i.e. Skype, Google Meet, Microsoft Teams, FaceTime, Zoom)
  - Define **web authoring** as a category of software that allows the user to develop a website using visual tools based on code (i.e. Weebly, Google Sites, Wix, Adobe Spark, WordPress).
  - Define **social networking** as the use of internet based social media sites to stay connected with others.
- Identify the primary feature of an email.
  - Define **subject** as an informative, catchy, and brief line of text seen when the email reaches the recipient's inbox.
  - Define **CC** as a courtesy copy (previously known as carbon copy) including one or more recipients when a message is intended for one person but is relevant to other people as well.
  - Define **BCC** as a blind courtesy copy (previously known as blind carbon copy) to let others see an email without the main recipient knowing.
    - Explain a variety of scenarios where CC and BCC would be used in an email.
  - Define **attachment** as a file sent with an email message (i.e. image, video, text document). Often represented by a paperclip icon.
  - Define **inline image** as an image that is placed inside the body of the email. This allows the recipient to view the image without having to open the attachment.
    - Explain a variety of scenarios where attachment and incline image would be used in an email.
  - Define **signature block** as a personalized block of text automatically included at the bottom of an email. A signature can include name, address, phone number, website, and other business information.
  - Define **reply** as the response to an email that goes to a single person (the person who sent the original email or the person who sent the last message in the email thread).
  - Define **reply all** as the response to an email that goes to everyone who was included in the email, including CC.

        - Explain a variety of scenarios where reply and reply all would be used in an email.
    - Define **forward** as the operation of re-sending an email message delivered to one email address to one or more different email addresses.
- Identify the primary email folders.
    - Inbox
    - Deleted/Trash
    - SPAM/Junk Mail

Strand 3 Performance Skill listed below

STRAND 4

(Digital Citizen) Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act in and model ways that are safe, legal, and ethical (ISTE 2).

Standard 1

Define digital citizenship and digital footprint.

- Define **digital citizenship** as continuously developing norms of appropriate, responsible, and empowered technology use.
- Define **digital footprint** as the information about a particular person that exists on the Internet as a result of their online activity.

Standard 2

Demonstrate knowledge of online safety, digital security, and online privacy.

- Define **online safety** as being aware of online risks and maximizing the user's personal safety.
- Identify guidelines to protect users from various types of online predators.
    - Avoid using suggestive screen names or photos.
    - Be aware of excessive attention.
    - Do not talk to anyone that wants to get too personal.
    - Keep in mind that people are not always who they say they are.
    - Never arrange to meet with someone you only know online in person.
    - Tell a trusted adult if you encounter a problem.
- Define **digital security** as tools used to secure identify and data online.
- Identify threats in the digital world.
    - Define **adware** as software that automatically displays unwanted advertising material when a user in online (i.e. pop-up advertisements)
    - Define **computer worm virus** as a malicious software that replicates itself to spread to other digital devices through a network.

        - Define **denial of service attacks** as an attack to shut down a computer device or network by flooding it with traffic to make it inaccessible to the intended users.
        - Define **hackers** as a person or program that uses computers to gain unauthorized access to data.
        - Define **malware** as software that is specifically designed to disrupt, damage, or gain unauthorized access to a digital device.
        - Define **ransomware** as a type of malicious software that is used to block access to a digital device until a sum of money is paid.
        - Define **spyware** as software that enables a user to obtain private information about another's computer activity by transmitting data secretly from their hard drive.
        - Define **Trojan Horse** as a malicious code that looks legitimate and takes control of your computer to damage, disrupt, and destroy your data.
    - Explain the importance of using anti-virus protection software on your digital device.
        - Define **anti-virus protection software** as software designed to protect your computing device and destroy computer viruses.
    - Define **online privacy** as the protection of private data and communication.
    - Identify threats to online transactions.
        - Browser extensions
        - Credit card fraud
        - Data misuse
        - Hacking
        - Money theft
        - Unprotective services
    - Identify threats to email and online communication.
        - Catfishing
        - Email scams
        - Hacking
        - Phishing attacks
        - Spoofing
    - Explain the importance of different security measures on your digital devices.
        - Password/passphrase
        - Two-factor authentication
        - Firewalls
        - Secure website (HTTPS)
        - Updates

Standard 3

Define intellectual property and the legal and ethical responsibility in the digital world.

- Define **intellectual property** as a creative work or idea for which an individual has ownership rights.
- Identify common intellectual property protections.

        - Define **copyrights** as the exclusive legal right given to the creator of works printed, posted, published, filmed, or recorded.
        - Define **creative commons** as licenses that allow for the distribution of copyrighted works when the creator wants to give other people the right to share, use, or build upon what they have created.
        - Define **patents** as the legal right granted to an inventor.
        - Define **public domain** as intellectual property that is available for public use.
        - Define **trade secrets** as formulas, patterns, or methods used to produce a creative work that is generally not known outside a company.
        - Define **trademarks** as a distinctive protected mark or feature that identifies a person or thing.
    - Identify intellectual property violations.
        - Define **plagiarism** as the practice of taking someone else's intellectual property and using it as your own (i.e. copy/paste, images).
        - Define **copyright infringement (piracy)** as the unauthorized use of or reproduction of another's work for financial gain (i.e. music, movies, images).
    - Define **digital ethics** as how to manage oneself ethically and professionally when using digital device.
    - Define **netiquette** as being courteous and respectful when communicating online.
    - Explain the personal responsibilities of being ethical in a digital world.
        - Take care of technology equipment.
        - Explore appropriate and safe sites.
        - Follow copyright laws.
        - Help prevent cyberbullying.
        - Maintain a positive digital footprint.
        - Always use netiquette.

Standard 4

Identify measures to improve personal digital wellness.

- Define **digital wellness** as the preventative measures aimed at regulating and improving the healthy use of technology.
- Identify measures to achieve personal digital wellness.
    - Understand device use (i.e. get a detailed understanding of technology use)
    - Create boundaries (i.e. set limits for certain apps and sites, limit notifications)
    - Make adjustments to device screen (i.e. remove distracting apps on your screen, adjust light preferences)
    - Try single-tasking (i.e. to improve focus, try reducing the number of screens around you)
- Define **cyberbullying** as the use of electronic communication to bully a person, typically by sending messages of an intimidating, embarrassing, or threatening nature.
- Identify strategies to deal with cyberbullying.
    - Seek assistance from a trusted adult.
    - Be assertive (not aggressive, fighting, or teasing back).
    - Avoid unsafe websites.

    - Use positive statements to maintain positive self-esteem.
    - Avoid getting emotionally upset.
- Identify the steps to report cyberbullying.
    - Don't respond to and don't forward the cyberbullying messages.
    - Keep evidence of cyberbullying.
        - Record dates, times and descriptions of instance when cyberbullying occurred.
        - Save and print screenshots, emails, and text messages.
    - Block the person who is cyberbullying.
    - Tell a trusted adult.
- Identify consequences of cyberbullying for the perpetrator and victim.
    - Perpetrator
        - Criminal record
        - Internet or app restrictions
        - Negative digital footprint
        - School discipline
    - Victim
        - Anxious/Depression
        - Changes in appetite
        - Stress of being in a constant state of fear

STRAND 5

(Knowledge Constructor) Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others (ISTE 1 and 3).

Standard 1

Define common features and functions of software programs.

- Identify the primary structural elements of the user interface.
    - Define **icons** as an image that represents a capability of a computer and is usually selected.
    - Define **menus** as list of options or commands to help the user find information or complete a task.
    - Define **tabs** as part of a computer window that allows the user to go to different parts of the program or website.
    - Define **toolbar** as a set of icons used to perform certain functions.
    - Define **window** as a viewing area on a computer.
- Identify the primary interaction elements of the user interface.
    - Define **adjustment handle** as a small box that appears on the corners and edges of an element allowing the user to adjust size and shape.
    - Define **command button** as an element the user interacts with to tell the digital device to complete a task.

        - Define **cursor** as a movable indicator on a computer screen, identifying the point that will be affected by input from the user.
        - Define **insertion point** as the blinking vertical line in your document where you can enter text on your page.
    - Identify primary keyboard shortcuts.
        - Cut
        - Copy
        - Paste
        - Undo
        - Redo
        - Save
        - Print
        - Find
    - Identify the difference between Save and Save As.
        - Define **Save** as a command that creates an original file and location or updates changes made in a document while keeping the original file name and location.
        - Define **Save As** as a command that creates a copy of a current document and allows the user to rename and/or relocate the document.

Standard 2

Demonstrate knowledge of file management.

- Perform basic **file management system** tasks.
- Define **file management system** as software that manages the storage of data files.
    - Create and delete **files**.
        - Define **file** as storage of computer recorded data.
    - Create and delete **folders**.
        - Define **folders** as an icon on a computer used to access a directory of file storage.
    - Create **subfolders**.
        - Define **subfolders** as a folder contained within another folder.
    - Duplicate files.
- Identify where deleted content is contained (i.e. recycle bin, trash can, permanently deleted).
- Demonstrate the ability to sort and locate files based on search terms and file type.
- Rename files and save in a new location.

Standard 3

Demonstrate knowledge of word processing.

- Perform basic tasks by using word processing software.
    - Open a new document
    - Print a document
    - Save a document

- Perform primary page layout tasks.
    - Page orientation
    - Page margins
- Perform basic text formatting tasks.
    - Alignment (Left, Right, Center, Justify)
    - Bold
    - Font
    - Font color
    - Font highlight
    - Font size
    - Italics
    - Underline
- Insert and format a table.
    - Insert table
    - Add/delete columns and rows
    - Merge cells
    - Split cells
    - Border/Shading
- Insert and format an image.
    - Insert image
    - Wrap text
    - Adjust size
- Perform a spelling and grammar check on a document.

Standard 4

Demonstrate knowledge of spreadsheets.

- Identify the primary components of a spreadsheet.
    - Define **active cell** as the selected cell ready to input data.
    - Define **cell** as the intersection between a row and a column on a spreadsheet.
    - Define **row** as the horizontal cells identified by numbers.
    - Define **column** as the vertical cells identified by letters.
    - Define **fill handle** as a command that fills data in spreadsheet cells based on an existing pattern.
- Create basic mathematical formulas and functions in a spreadsheet.
    - Define **cell range** as a group of cells within a row and/or column.
    - Define **formula** as any calculation in a spreadsheet.
    - Define **function** as a predefined calculation in a spreadsheet.
- Perform the following formulas in a spreadsheet.
    - Addition
    - Subtraction
    - Division
    - Multiplication

- Perform the following functions in a spreadsheet.
    - SUM
    - MIN
    - MAX
    - COUNT
    - AVERAGE
- Insert a column and pie chart using data from a cell range.
    - Include a title.
    - Include a legend.
        - Define **legend** as the box that contains small samples of each color on the chart as well as a short description of what each color means.

Standard 5

Demonstrate knowledge of presentation programs.

- Apply different layouts to a slide.
    - Title Slide
    - Title and Content
    - Two Content
- Perform basic functions in a presentation.
    - Define **animation** as movement of an object or image within a slide.
    - Define **transitions** as the motion effect of a slide entering a presentation.
- Add images and/or media content to a presentation.

Standard 6

Define primary database terms and identify real-world applications.

- Define **field** as a single piece of data.
- Define **record** as a group of fields and contains all the data about one person, company or item.
- Define **query** as a request for information from a database table.
- Define **table** as a database composed of records and fields that hold data.
- Identify different real-world uses for databases.

Standard 7

Demonstrate knowledge of calendaring

- Create events and/or appointments with the following features:
    - Individual
    - Recurring
    - Location
    - Time Zone
    - Notes
    - Invitations

Strand 5 Performance Skill listed below

STRAND 6

(Creative Communicator) Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals (ISTE 1 and 6).

Standard 1

Understand platform compatibility and define streaming and downloading of digital media.

- Understand platform compatibility.
- Define **streaming** as use of real-time audio and video over the Internet.
- Define **downloading** as saving a file from the Internet or other digital device to be used offline.

Standard 2

Identify primary functions and features of digital media.

- Audio
  - Record
  - Trim
  - Volume level
- Image
  - Crop
  - Brightness/Contrast
  - Export as a variety of file types (i.e. .jpeg, .png, .pdf, .gif)
- Video
  - Record
  - Trim
  - Volume level
  - Add audio track
- Voice
  - Record
  - Trim
  - Volume level

Strand 6 Performance Skill listed below

Performance Skills

Strand 1

- Student will demonstrate individual advancement in key-by-touch proficiency and technique.

Strand 3

- Student will demonstrate the use of one of the defined communication tools to explain the features, benefits, and dangers in online communities.
- Student will demonstrate how to send emails for a variety of purposes and audiences.

Strand 5

- (Innovative Design) Student will demonstrate and use a variety of any productivity programs to develop awareness and solve a problem by creating new, useful, or imaginative solutions (ISTE 1, 2, 3, 4, & 5)

Strand 6

- Student will use digital media to create a project to demonstrate the importance of becoming digitally literate in a digital world.

Digital Literacy Vocabulary List

active cell
adjustment handle
adware
algorithm
animation
anti-virus protection software
application software
attachment
bandwidth
BCC
CC
cell
cell range
central processing unit (CPU)
cloud storage
column
command buttons
computer worm virus
conditional
copyright infringement (privacy)
copyrights
creative commons
cursor
cyberbullying
denial of service attacks
digital citizenship
digital device
digital ethics
digital footprint
digital security
digital wellness
downloading
email
external hard drive
field
file
file management system
fill handle
flash drive
folder
formula
forward
function
hackers
hard drive
hardware
icons
information processing cycle
inline image
input
input device
insertion point
instant messaging
intellectual property
Internet
Internet browser
Internet Protocol (IP) address
Internet service provider (ISP)
key by touch
legend
loop
malware
memory
memory card
menus
modem
netiquette
network
online privacy
online safety
operating system
output
output device
packet
patents
peripheral devices
plagiarism
processing
public domain
query
Random Access Memory (RAM)
ransomware
Read Only Memory (ROM)
record
reply
reply all
router
row
save
save as
search engine
server
signature block
social networking
software
solid-state drive (SDD)
spyware
storage
streaming
subfolder
subject
table
tabs
toolbar
trade secrets
trademarks
transition
Trojan Horse
Uniform Resource Locator (URL)
uniform resource locator (URL)
video conferencing
web authoring
window

STRANDS AND STANDARDS
ELEMENTARY KEYBOARDING

Course Description

This course is designed to help students demonstrate efficient digital input by the end of Grade 5. This begins with competency in keyboarding, appropriate and responsible use of technology, and basic computer science principles. Keyboarding by touch, rather than speed, is introduced in these standards. Keyboarding techniques are foundational to accuracy and speed. This course is aligned to the Utah K-5 Computer Science Standards.

Intended Grade Level	K-5
Units of Credit	0
Core Code	32.02.00.00.210
Concurrent Enrollment Core Code	N/A
Prerequisite	None
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	Elementary Education
	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Elementary Keyboarding

GRADES K-2

By the end of Grade 2, students will be able to demonstrate:

STRAND 1

Students will demonstrate correct keyboarding techniques while using a digital device. *Focus on technique knowledge. It is understood students in these grade levels may not physically be capable of full dexterity or classroom setup may not be permit adequate accommodations for proper technique.*

Standard 1

Students will be introduced to proper keyboarding techniques.

- Fingers curved and orientated to **home row**.
    - Define **home row** as the keys the fingers rest on before typing. These keys are identified as **A, S, D, F, J, K, L,** and **;**
- Sit up straight.
- Feet flat on floor.
- Body centered with the "G" and "H" keys.
- Elbows naturally at sides.

Standard 2

Students will be introduced to home row keys and placement.

- Students will be able to identify the home row keys (A, S, D, F, J, K, L, ;)
- Students will be able to identify which finger strikes the home row keys.
    - Strike **A** with left pinky.
    - Strike **S** with left ring finger.
    - Strike **D** with left middle finger.
    - Strike **F** with left pointer finger.
    - Strike **J** with right pointer finger.
    - Strike **K** with right middle finger.
    - Strike **L** with right ring finger.
    - Strike **;** with right pinky finger.

STRAND 2

Students will be able to select and operate computing devices that perform a variety of tasks.

Standard 1

Students will be able to explore the functions of common hardware and software components of computing systems. **(1.CS.2)**

- Identify the use of a mouse, touch-pad, monitor/touch-screen, and keyboard.
- Identify common software used in a classroom (i.e. Google Docs, Google Slides, Word, PowerPoint, Canvas, Google Classroom, Lexia, etc.)

- Define **software** as programs that run on a computing system, computer, or other computing device.
- Define **program** as a set of instructions that the computer executes to achieve a particular objective.

Standard 2

Students will be able to operate computing devices. **(1.CS.1)**

- Navigate using mouse, touch-pad, and/or touch-screen.

Standard 3

Students will be able to perform basic troubleshooting tasks. **(2.CS.1)**

- Check the device for battery charge and/or power connection.
- Check cord connections.
- Power down and restart.

STRAND 3

Students will be able to explain what a password or pass phrase is and why it is used. (2.NI.1)

Standard 1

Students will be able to explain why people use passwords and pass phrases. **(2.NI.1)**

Standard 2

Students will be able to log on and off devices appropriately.

GRADES 3-5

By the end of Grade 5, students will be able to demonstrate:

STRAND 1

Students will demonstrate proficiency of proper keyboarding techniques.

Standard 1

Students will demonstrate proper keyboarding techniques.

- Sit up straight.
- Feet flat on floor.
- Body centered with the “G” and “H” keys.
- Fingers curved and oriented to **home row**.
    - Define **home row** as the keys the fingers rest on before typing. These keys are identified as **A, S, D, F, J, K, L,** and **;**
- Wrists straight and elbows naturally at sides
- Eyes on copy or screen, not on keys.
- Correct fingers used for keystrokes.
- Key with smooth rhythm and quiet hands.

Standard 2

Students will know and understand the purpose of correct keyboarding techniques.

- Understand the advantages of proper technique.
    - Increases speed.
    - Decreases errors.
- Understand the disadvantages of poor technique.
    - Less productive.
    - Computer related health problems.
        - Musculoskeletal problems
        - Vision problems
        - Repetitive stress injuries
        - Headaches
        - Obesity
        - Stress disorders

STRAND 2

Students will demonstrate key by touch proficiency.

Standard 1

Students will be able to key by touch using correct fingering.

- Define **key by touch** as typing at the computer without looking at the keyboard and/or hands.
- Students will be able to key by touch all alphabet letters.
- Students will be able to key by touch the following keys:
    - Strike **Spacebar** with thumb.
    - Strike **Enter/Return** key with the right pinky.
    - Hold **Left Shift** key when capitalizing right hand letters.
    - Hold **Right Shift** key when capitalizing left hand letters.
    - Strike **Backspace/Delete** key with right pinky.
    - Strike **Tab** key with left pinky.
- Students will be able to key by touch the following punctuation keys:
    - Strike **Period** with right ring finger.
    - Strike **Comma** with right middle finger.
    - Key a **Question mark** by holding Left Shift with the left pinky and strike the question mark key with the right pinky. Release both keys.
    - Key **Exclamation Point** by holding Right Shift with right pinky and strike the exclamation point with the left pinky. Release both keys.
- Students will be introduced to correct fingering when using the numbers keys located on the top row (not the keypad located on the right of the keyboard).

Standard 2

Students will be able to demonstrate proper spacing using common punctuation marks.

- Students will use one space after keying a period, comma, question mark, and exclamation point.

STRAND 3

Students will key by touch from a variety of sources.

Standard 1

Student will key from dictation.

- Students will key by touch alphabet letters, short words, and phrases from dictation.

Standard 2

Students will key from printed materials and digital copies.

Standard 3

Students will compose at the computer.

STRAND 4

Students will demonstrate correct keyboarding techniques using a variety of timed writings.

Standard 1

Students will improve accuracy.

Standard 2

Students will improve speed.

- Students will improve speed on 30-second timed writings for Grades 3-4.
- Students will improve speed on 1-minute timed writings in Grade 5.

Standard 3

Students will set goals and evaluate personal improvement.

- Organize and present collected data to support progress. (4.DA.1)
- Use data to set new goals, predict outcomes, and record results. (4.DA.2)

Standard 4

Students will evaluate proficiency goals.

- **Advanced (4) –** The student knows the keys and keys by touch and demonstrates perfect technique.
- **Meets Expectations (3) –** The student knows the keys and keys by touch.
- **Partial Mastery (2) –** The student looks at the keys most of the time.
- **Little or No Mastery (1) –** The student is dependent on looking at the keys.

STRAND 5

Students will be able to describe how computing devices connect to other components. (3.CS.1)

Standard 1

Students will be able to explain the difference between hardware and software and how they work together as a system to accomplish tasks. **(4.CS.1)**

- Define **hardware** as the physical components that make up a computing system, computer, or computing device.
- Define **software** as programs that run on a computing system, computer, or other computing device.

Standard 2

Students will be able to identify additional components of a computing system.

- Identify printer, USB port, headphones, speakers, projector, camera, etc.
- Identify connectivity (i.e. WiFi, Bluetooth, etc.)

Standard 3

Students will be able to perform basic troubleshooting tasks. **(5.CS.1)**

- Check the device for battery charge and/or power connection.
- Check cord connections.
- Three-finger salute to open Task Manager.
    - Windows Operating System: Ctrl+Alt+Delete
    - Mac Operating System: Option+Cmd+Esc
- Power down.

STRAND 6

Students will be able to describe physical and digital security measures for protecting personal information. (3.NI.1 and 3.NI.2)

Standard 1

Students will be able to create strong passwords and/or pass phrases. **(3.NI.1)**

- Define **password/pass phrase** as a secret word or phrase that allows access to a computer system or service.
- A password or pass phrase should include the following:
    - Minimum of 12 characters
    - Capital letters
    - Lowercase letters
    - Numbers
    - Symbols
    - Phrases

Standard 2

Students will develop personal patterns of behavior to protect information from unauthorized access. **(3.NI.2)**

- Student will be able to log on and off programs and apps appropriately.

STRANDS AND STANDARDS

TEACHING AS A PROFESSION 1

Course Description

A course designed to introduce students to the role and positive influence of an effective educator. Students will explore various careers in education and develop employability skills to become a successful professional. Students will understand the value of multiculturalism and diversity in the classroom and how it enhances individual student learning. Students will identify instructional strategies and understand the role of technology and feedback in student engagement.

Pilot Year	2020-2021
Effective School Year	2021-2022
Intended Grade Level	9-12
Units of Credit	0.5
Core Code	39.02.00.00.001
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	011
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	K-12 Teaching as a Profession

STRAND 1

Students will explore career options and employability skills needed for gaining and maintaining employment in education.

Standard 1

Explore the different roles and benefits in the administrative, core subject, non-core subject and support service careers in education.

- Administrative
  - Superintendent
  - Principal
  - Assistant Principal
- Core Subject Teachers
  - Language Arts
  - Mathematics
  - Science
  - Social Studies
  - Special Education
- Non-Core Subject Teachers
  - Arts
  - Career and Technical Education (CTE)
  - Foreign Languages
  - Health/Physical Education
- Support Services
  - Counselor
  - Librarian
  - Paraprofessional

Standard 2

Identify employability skills in the workplace.

- Define **communication** as the exchange of information, both verbal and nonverbal, between individuals or groups within an organization.
  - Define **verbal communication** as spoken and written words.
    - Email
    - Face-to-face
    - Thank you note
  - Define **nonverbal communication** as visual body language and personal appearance used to convey a message.
- Define **problem solving** as the ability to handle difficult or unexpected situations.
- Define **teamwork** as two or more people working together through idea sharing and thinking to accomplish a common goal.

- Define **critical thinking** as effectively diagnosing problems and identifying possible solutions.
- Define **dependability** as producing consistent work and following workplace policies.
- Define **accountability** as responsibility of employees to complete the tasks assigned in order to achieve the goals of the organization.

Strand 1 Performance Skill listed below

STRAND 2

Students will examine the theories of Gardner and Bloom and how they relate to student learning.

Standard 1

Examine Gardner's Theory of Multiple Intelligences and explore applications for learning.

- Define **verbal-linguistic** as learning through spoken and written words (reading, listening, speaking, and writing).
- Define **mathematical-logical** as learning through reasoning and problem-solving (numbers).
- Define **musical** as learning through songs, patterns, rhythms, instruments, and musical expression.
- Define **visual-spatial** as learning visually and organizing ideas spatially (thinking in images and pictures and "seeing" things in one's mind).
- Define **bodily/kinesthetic** as learning through interaction with one's environment (concrete experiences).
- Define **intrapersonal** as learning through feelings, values and attitudes (understanding other people).
- Define **interpersonal** as learning through interactions with others (working collaboratively and cooperatively).
- Define **naturalist** learning through classification, categories, and hierarchies (picking up on subtle differences).
- Define **existential** as learning by seeing the "big picture" (connecting real world understandings and application to new learning).

Standard 2

Examine Bloom's Taxonomy for 21st Century Learning and explore applications for learning.

- Define **remember** as recalling facts and basic concepts (define, duplicate, list, memorize, repeat, state).
- Define **understand** as explaining ideas or concepts (classify, describe, discuss, explain, identify, locate, recognize, report, select, translate).
- Define **apply** as the use of information in new situations (execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch).
- Define **analyze** as drawing connections among ideas (differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test).
- Define **evaluate** as justifying a stand or decision (appraise, argue, defend, judge, select, support, value, critique, weigh).
- Define **create** as producing new or original work (design, assemble, construct, conjecture, develop, formulate, author, investigate).

Standard 3

Apply Gardner's and Bloom's theories to investigate personal learning preferences.

Strand 2 Performance Skill listed below

STRAND 3

Students will analyze the standard and objective of a lesson plan and effective instructional strategies.

Standard 1

Define standard and objective and examine the role of each in a lesson plan.

- Define **standard** as a concise, written description of what students are expected to know and be able to do at a specific grade level of their education.
- Define **objective** as a brief statement that describes what a student is expected to learn by the end of school year, course, unit, lesson, project, or class period.
- Define **lesson plan** as a daily guide for what students need to learn, howit will be taught, and how learning will be measured.
    - Effective lesson planning will include planning, delivering, reflecting and managing (time and behavior) throughout.

Standard 2

Define instructional strategies and the role they play in student engagement.

- Define **instructional strategies** as techniques used to help students become independent strategic learners.
- Identify how the instructional strategies engage students.
    - Define **cooperative learning** as a technique that allows students to learn from eachother and gain important interpersonal skills.
    - Define **differentiated learning** as tailored instruction to meet individual needs.
    - Define **blended learning** as combining online educational materials and opportunities for interaction with traditional classroom methods.
    - Define **project-based learning (PBL)** as a teaching method where students gain knowledge and skills by working for an extended period of time on an authentic and complex question, problem, or challenge.
- Define **student engagement** as the degree of attention, curiosity, interests, optimism, and passion that students show when they are learning and being taught.

Strand 3 Performance Skill listed below

STRAND 4

Students will discuss the role of technology in the classroom and the effect on student engagement and the learning process.

Standard 1

Explore and discuss education technology that enhances teacher delivery and student learning.

- Discuss the benefits of technology in education.
  - Define **adaptive learning** as programs that adjust based on individual student interactions.
  - Allows students to collaborate with other students.
  - Promotes digital literacy skills for lifelong learning.
- Discuss the challenges of technology in education.
  - Equity and access for students
  - Student distraction
  - Plagiarism and cheating

Standard 2

Review legislation related to internet safety for students.

- Children's Internet Protection Act (CIPA)
  - Define **Children's Internet Protection Act** as an act by Congress to address concerns about children's access to obscene or harmful content over the internet.
  - Understand schools are required to adopt and implement an internet safety policy that addresses:
    - Access by minors to inappropriate matter on the internet
    - The safety and security of minors when using electronic mail, chat rooms, and other forms of direct electronic communications
    - Measures restricting a minor's access to materials harmful to them
- Acceptable Use Policies (AUP)
  - Define **acceptable use policy** as a document which governs students' use of the internet at school.

Strand 4 Performance Skills listed below

STRAND 5

Students will identify the role of feedback in the learning process.

Standard 1

Define and identify the importance of specific, timely, and direct feedback.

- Define **feedback** as information given to the learner about the learner's performance related to standards and objectives.
  - Feedback should identify the following:
    - Where the student is
    - Where the student needs to be
    - How to get the student there
- Identify the types of feedback
  - Teacher-student

    - Written/Verbal
    - Formal/Informal
- Student-teacher
    - Self-evaluation
- Student-student
    - Peer review

Standard 2

Define formative assessment feedback and how it evaluates student learning.

- Define **formative assessment** as an ongoing evaluation of student learning that is administered multiple times during a lesson, unit, or course.
- The formative process allows the teacher to evaluate:
    - Define **comprehension** as the action or capability of understanding something.
    - Define **learning needs** as the gap between what the student knows and what the student needs to know.
    - Define **progress** as forward movement toward a learning objective.

Standard 3

Define summative assessment feedback and how it evaluates student learning.

- Define **summative assessment** as a measurement of student learning at the conclusion of a defined instructional period.
- The summative process allows the teacher to evaluate:
    - Define **competency** as demonstrating learned skills and knowledge as expected.

STRAND 6

Students will identify the role of feedback in the learning process. Students will review legislation related to special populations, identify the various populations (students learning English, Gifted and Talented, and Special Education), and explore multiculturalism and diversity within a school.

Standard 1

Review legislation related to special population.

- Define **Individuals with Disabilities Education Act (IDEA)** as a law that makes available a free appropriate public education to students with a disability enrolled in public education and ensures special education and related services to those children.
- Define **Section 504 of the Rehabilitation Act of 1973** as a law that requires accommodations be provided to students with disabilities to access the general curriculum and activities.
- Define **Individualize Education Program (IEP)** as a written statement developed for each student with a disability who qualifies for special education services, including specially designed instruction and related services.

- Describe the difference between a 504 plan and an IEP.
    - Students with 504 plans are provided accommodations within a general education classroom setting.
    - Students with an IEP receive special education services from a special educator as well as accommodations within a general education classroom setting.

Standard 2

Identify and explore various populations within a school.

- Define **students learning English (ELL)** as students who are unable to communicate fluently or learn effectively in English.
    - ELL students may require specialized or modified instruction in learning the English language and learning in academic courses.
- Define Gifted and Talented as students whose superior academic performance or potential for accomplishment requires a differentiated and challenging instructional model.
    - Define **asynchronous development** as a mismatch between cognitive, emotional, and physical development of gifted individuals.
    - Define **underachievement** as a discrepancy between a student's school performance and their ability that can be influenced by motivation, fear of failure, and/or boredom.
- Define **Special Education (SPED)** as specially designed instruction provided at no cost for the guardian to meet the unique needs of a student with a disability.
    - Define **specially designed instruction** as adapting as appropriate to the needs of an eligible child, including in content, methodology or delivery, to ensure access to the grade-level general curriculum.
    - Define **disability** as physical, cognitive or emotional impairment requiring specially designed instruction and/or related services and supports.
- Explore a variety of accommodations to meet all student needs.
    - Extended time (e.g. tests, due dates, etc.)
    - Reduced workload (e.g. fewer math problems, shorter essay, etc.)
    - Preferential seating (e.g. close to teacher, front of classroom, away from door, etc.)
    - Guided notes (e.g. printed notes, fill in the blank, etc.)
    - Extension activities (e.g. independent study, small group investigations, etc.)

Standard 3

Define multiculturalism and diversity and explore strategies to support a diverse student population.

- Define **multiculturalism** as people from many different cultures learning together in a classroom with mutual respect.
- Define **diversity** as an understanding that each individual is unique and recognizing

our individual differences. These can be the dimensions of:

- Define **gender** as a range of characteristics related to masculinity and femininity.
- Define **race** as a group of people sharing specific physical qualities or characteristics viewed as distinct by society.
- Define **ethnicity** as a group of people sharing a common national or cultural tradition.
- Define **disability** as a physical or mental impairment that substantially limits one or more major life activity.
- Define **sexual orientation** as an identity based on whether someone is attracted to people of a sex different than their own, the same sex, or both sexes (i.e., heterosexual, homosexual, bisexual).
- Define **academic learning needs** as the gap between a learners current knowledge and the knowledge needed to complete or perform a task or set of tasks
- Define **linguistic needs** as providing curriculum in both the primary language and secondary language.

- Identify strategies that support a diverse student population.
  - Celebrate cultural diversity by learning about various cultural traditions.
  - Embrace language differences by incorporating vocabulary from other languages (i.e. sign language, greeting students in another language, etc.).
  - Create a multicultural library of instructional resources from diverse perspectives.
  - Create opportunities for students to share their cultural differences and unique experiences.

Standard 4

Identify outside factors that influence student learning behavior.

- Define **social factors** as the people and relationships with which a student regularly interacts.
- Define **cultural factors** as common beliefs, values, traditions, language, and laws held in common by a nation, a community, or other defined group of people.
- Define **economic factors** as demographics (i.e. education, occupation, income, location) of the home that determine socioeconomic status.
- Explore how different outside factors effect student learning behavior.

Strand 6 Performance Skills listed below

Performance Skills

Strand 1

- Student will conduct an interview with a current administrative, core subject, non-core subject, or support service professional regarding the benefits of their role in education.
- Students will email the professional to set up an appointment, conduct the interview using professional employability skills, and follow-up with a handwritten thank you note to the professional.

Strand 2

- Students will create a reflective artifact (essay, song, art, dance, video, etc.) analyzing their personal learning preference(s). Students will include three examples of how they can or have applied their personal learning preference(s) in their education career.

Strand 3

- Students will design and present a 5-7 minute "how-to" lesson plan (i.e. make a peanut butter sandwich, tie a show, create a ringtone, etc.) that includes a standard and objective and applies an instruction strategy.

Strand 4

- Students will evaluate a piece of technology or software/application for use in the educational classroom and create (vide, infographic, written guide, etc.) a step-by-step technical guide for using that device/software in a lesson.

Strand 6

- Students will create a children's picture book that explores diversity and/or special populations in a way that reinforces multiculturalism and diversity. The book should include a problem, conflict, or issue related to diversity and an appropriate resolution.

Teaching as a Profession 1 Vocabulary

acceptable use policy
accountability
adaptive learning
analyze
apply
asynchronous development
blended learning
bodily/kinesthetic
Children's Internet Protection Act
communication
competency
comprehension
cooperative learning
create
critical thinking
cultural factors
dependability
differentiated learning
disability
diversity
economic factors
ethnicity
evaluate
existential
feedback
formative assessment
gender
gifted and talented
ideologies
Individualized Education Program (IEP)
Individuals with Disabilities Education Act (IDEA)
instructional strategies
interpersonal
intrapersonal
learning needs
lesson plan
mathematical-logical
multiculturalism
musical
naturalist
nonverbal communication
objective
problem solving
progress
project-based learning
race
remember
Section 504 of the Rehabilitation Act of 1973
social factors
socioeconomic status
special education (SPED)
specially designed instruction
standard
student engagement
students learning English (ELL)
summative assessment
teamwork
underachievement
understand
verbal communication
verbal-linguistic
visual-Spatial
summative assessment
teamwork
underachievement
understand
verbal communication
verbal-linguistic
visual-Spatial

Skill Certificate Test Points by Strand

Example table below. Refer to instructions for specifics.

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Teaching as a Profession 1	011	3	8	7	4	6	10					44	38

STRANDS AND STANDARDS
TEACHING AS A PROFESSION 2

Course Description

A course designed to introduce students to career opportunities and the required credentials needed to be a qualified educator. Students will explore educator roles and responsibilities and professional education organizations. Students will identify historic court cases that have impacted the learning environment. Students will use educational theories in developing lesson plans that incorporate multiculturism and diversity, while understanding the role of classroom management procedures. Students will learn to implement instructional strategies and develop learner appropriate activities that inspire each student to enjoy learning.

Piloted Year	2020-2021
Effective School Year	2021-2022
Intended Grade Level	9-12
Units of Credit	0.50
Core Code	39.02.00.00.002
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	012
Test Weight	1.0
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	K-12 Teaching as a Profession

STRAND 1

Students will examine career opportunities, licensing requirements, professional conduct practices, and organizations.

Standard 1

Explore education career options, salaries, required degrees, endorsements, and certifications needed for each position according to the Utah State Board of Education Licensing website.

- Administrative
  - Superintendent
  - Principal
  - Assistant Principal
- Core Subject Teachers
  - Language Arts
  - Mathematics
  - Science
  - Social Studies
  - Special Education
- Non-Core Subject Teachers
  - Arts
  - Career and Technical Education (CTE)
  - Foreign Languages
  - Health/Physical Education
- Support Services
  - Counselor
  - Librarian
  - Paraprofessional
    - Per your Local Education Agency (LEA)

Standard 2

Explain professional roles and responsibilities of administrative, core subject, non-core subject teachers, and support services in the local school environment.

- Define **confidentiality** as the state of keeping or being kept secret or private.
- Define **impartiality** as treating all fair.
- Define **equity** as personal and social circumstances are not obstacles to achieve education potential.
- Define **Family Educational Right and Privacy Act (FERPA)** as a federal law that protects a student's education records.
  - Transcripts
  - Test Scores
  - Behavior Support
- Explore the Professional Educator Conduct outlined in Utah State Board Rule R-277-515-6.

- Explore the Utah Effective Teaching Standards (UETS) on the Utah State Board of Education website.
- Demonstrate professionalism appropriate to students, parents, and colleagues in the workplace.
    - Define **communication** as the exchange of information, both verbal and nonverbal, between individuals or groups within an organization.
    - Define **professional dress** as defined by your position, administration, and/or LEA.
    - Define **workplace conduct** as appropriate behavior and interactions, face-to-face and online, with students, parents, and colleagues before, during, and after school hours.

Standard 3

Explore the role of educational advocacy and the impact of professional educational organizations at local, state, and national levels.

- Administrative
    - Superintendent
        - The School Superintendents Association (AASA)
        - Utah School Boards Association (USBA)
        - Utah School Superintendents Association (USSA)
        - Utah Rural School Association (URSA)
            - This is support for rural superintendents in Utah
    - Principal
        - National Association of Secondary School Principals
        - National Association of Elementary School Principals
        - Utah Association of Secondary School Principals
        - Utah Association of Elementary School Principals
    - Assistant Principal
        - National Association of Secondary School Principals
        - National Association of Elementary School Principals
        - Utah Association of Secondary School Principals
        - Utah Association of Elementary School Principals
- Core Subject Teachers
    - Language Arts
        - National Council for Teachers of English (NCTE)
        - Utah Council for Teachers of English (UCTE)
    - Mathematics
        - National Council of Teachers of Mathematics (NCTM)
        - Utah Association of Mathematics for Teacher Educators (UAMTE)
    - Science
        - National Science Teaching Association (NSTA)
        - Utah Science Teaching Association (USTA)
    - Social Studies
        - National Council for the Social Studies (NCSS)

        - Utah Council for the Social Studies (UCSS)
    - Special Education
        - National Association of Special Education Teachers (NASET)
        - Utah Consortium for Special Education (UCSE)
- Non-Core Subject Teachers
    - Arts
        - National Arts Educators Association (NAEA)
        - Utah Art Educators Association (UAEA)
    - Career and Technical Education (CTE)
        - Association for Career and Technical Education (ACTE)
        - Utah ACTE
    - Foreign Languages
        - American Council on Teaching a Foreign Language (ACTFL)
        - Utah Foreign Language Association (UFLA)
    - Health/Physical Education
        - SHAPE America
        - SHAPE Utah
- Support Services
    - Counselor
        - American School Counselor Association (ASCA)
        - Utah School Counselor Association (USCA)
    - Librarian
        - American Library Association (ALA)
        - American Association of School Librarians (AASL)
        - Utah Education Library Media Association (UELMA)
    - Paraprofessional
        - National Association of Education Office Professionals (NAEOP)
        - Utah School Employees Association (USEA)

Standard 4

Demonstrate knowledge of collaboration and continuous learning as applied to the education workplace.

- Define **collaboration** as two or more people working together through idea sharing and thinking to accomplish a common goal.
- Define **continuous learning** as the process of learning new skills and knowledge on an ongoing basis.
- Define **professional learning communities (PLC)** as a group of educators that meet regularly, share expertise, and work collaboratively to improve teaching skills and academic performance of students.
- Discuss how educators mature during their careers.
    - Personal growth
    - Group study
    - Professional development
    - Professional organizations

Strand 1 Performance Skill listed below

STRAND 2

Students will identify different types of schools and education design.

Standard 1

Identify and define common types of schools and educational designs.

- Compare and contrast the different types of schools.
    - Define **public school** as a school supported by public funds.
    - Define **private school** as a school supported by a private organization or individuals instead of the state and federal government.
    - Define **charter school** as a publicly funded independent school established by parents, teachers, or community groups.
    - Define **online school** as a school using internet connection to receive instruction.
        - Also known as:
            - Virtual school
            - E-school
            - Cyber-school
    - Define **magnet school** as a public school offering special instruction and programs not available elsewhere.

Standard 2

Identify and define common types of educational designs.

- Identify and define common educational designs.
    - Define **common core** as a set of education standards for teaching and testing language arts and mathematics between kindergarten and twelfth grade.
    - Define **standard-based assessment** as measuring proficiency in mathematics, language arts, science, and writing.
    - Define **STEM** as grouping academic disciplines that include science, technology, engineering and mathematics.
    - Define **professional learning communities (PLC)** as a group of educators that meet regularly, share expertise, and work collaboratively to improve teaching skills and academic performance of students.
    - Define **project-based learning (PBL)** as a teaching method where students gain knowledge and skills by working for an extended period of time on an authentic and complex question, problem, or challenge.
    - Define **flipped learning** as a student is introduced to content at home and practices working through it at school.
    - Define **blended learning** as combining online educational materials and opportunities for international and traditional classroom methods.

STRAND 3

Students will examine the theories of Piaget, Maslow, and Erikson and how they relate to student learning.

Standard 1

Identify and define developmental domains.

- Define **cognitive** as the construction of thought process, including remembering, problem solving, and decision-making, from childhood through adolescence to adulthood.
- Define **physical** as the process that starts in human infancy and continues into late adolescent concentrating on gross and fine motor skills as well as puberty.
- Define **social-emotional** as the child's experience, expression, and management of emotions and the ability to establish positive and rewarding relationships with others.

Standard 2

Examine Piaget's theory of cognitive development and explore applications for learning.

- Define **sensorimotor stage** as the cognitive development where infants and toddlers acquire knowledge through sensory experiences and manipulating objects.
    - Age: Birth to 2 years
- Define **preoperational stage** as the cognitive development when kids learn through pretend play but still struggle with logic and taking point of view of other people.
    - Age: 2 to 7 years
- Define **concreate operational stage** as the cognitive development where children become much more adept at using logic.
    - Age: 7 to 11 years
- Define **formal operational stage** as the final cognitive development stage that involves an increase in logic, the ability to use deductive reasoning, and understanding abstract ideas.
    - Age: 12 and up

Standard 3

Examine Maslow's hierarchy of needs and explore applications for learning.

- Deficiency Needs
    - Define **physiological needs** as a condition that something is required or wanted.
        - Physiological needs include air, food, water, shelter, warmth, sleep
    - Define **safety needs** as something that is needed to keep safe from harm.
        - Safety needs include shelter, security, law and order, employment, health stability
    - Define **belonging and love needs** as a person's needs for feeling loved and accepted, both romantic relationships as well as ties to friends and family members.

        - Belonging and love needs include affection, intimacy, family, friends, relationships
    - Define **esteem needs** as a person's needs for internal esteem factors, such as self-respect, autonomy and achievement.
        - Esteem needs include self-esteem, self-confidence, achievement, recognition, status, respect
- Growth Needs
    - Define **cognitive needs** as the desire to know, understand, and solve problems.
        - Cognitive needs include knowledge, meaning, understanding
    - Define **aesthetic needs** as the appreciation and search for beauty, balance, and form.
        - Aesthetic needs include appreciation, search for beauty, balance, form
    - Define **self-actualization** as growth of an individual toward fulfillment of the highest needs, meaning in life.
        - Self-actualization needs include realizing personal potential, self-fulfillment, personal growth, peak experiences
    - Define **transcendence** as putting needs aside to serve something greater than oneself.
        - Transcendence needs include helping others to achieve self-actualization

Standard 4

Examine Erikson's stages of psychosocial development and explore applications for learning.

- Define **trust vs. mistrust** as a child's needs are being met then basic trust is being developed.
    - Stage 1
    - Age: Birth to 1 year
- Define **autonomy vs. shame and doubt** as a child learns to exercise their own will and do things for themselves or they develop doubt in their abilities.
    - Stage 2
    - Age: 2 to 3 years
- Define **initiative vs. guilt** as a child learns to initiate tasks and carry out plans or they develop guilt about their efforts to be independent.
    - Stage 3
    - Age: 3 to 6 years
- Define **industry vs. inferiority** as a child learns to apply themselves to tasks or they feel inferior to others.
    - Stage 4
    - Age: 6 to 11 years
- Define **identity vs. role confusion** as a child refines a sense of self by testing roles to form a single identify or they become confused about who they are.

- Stage 5
- Age: 12 to 18 years

Strand 3 Performance Skill listed below

STRAND 4

Students will identify and analyze how culturally responsive teaching meets the needs of diverse learners, explore landmark court cases and the impact on the learning environment today.

Standard 1

Define multiculturalism and the dimensions of diversity.

- Define **multiculturalism** as people from many different cultures learning together in a classroom with mutual respect.
- Define **diversity** as an understanding that each individual is unique and recognizing our individual differences. These can be the dimensions of:
    - Define **gender** as a range of characteristics related to masculinity and femininity.
    - Define **race** as a group of people sharing specific physical qualities or characteristics viewed as distinct by society.
    - Define **ethnicity** as a group of people sharing a common national or cultural tradition.
    - Define **disability** as a physical or mental impairment that substantially limits one or more major life activities.
    - Define **sexual orientation** as an identity based on whether someone is attracted to people of a sex different than their own (heterosexual), the same sex (homosexual), or both sexes (bisexual).
    - Define **academic learning needs** as the gap between a learner's current knowledge and the knowledge needed to complete or perform a task or set of tasks.
    - Define **linguistic needs** as providing curriculum in both the primary language and secondary language.

Standard 2

Explore landmark court cases that impacted education in the United States and identify how gender, race, and civil liberties were affected.

- Mendez vs. Westminster
    - 1947
    - U.S. District Court, California
    - Outcome: Schools cannot deny admission to a student based on their ethnicity.
- Brown vs. Board
    - 1954
    - United States Supreme Court

        - Outcome: Radical segregation of schools violates the Equal Protection Clause of the 14th Amendment, even if the segregated schools are otherwise equal in quality ("separate educational facilities are inherently unequal").
    - Engel vs. Vitale
        - 1962
        - United States Supreme Court
        - Outcome: Reciting government-written prayers in public schools violates the Establishment Clause of the 1st Amendment
    - Tinker vs. Des Moines
        - 1969
        - United States Supreme Court
        - Outcome: Students have the right to free speech in public schools, unless it disrupts the education process.
    - Title IX of Education Amendment Act
        - 1972
        - Define **Title IX of the Education Amendment Act** as a federal law that prohibits gender discrimination as it pertains to educational funding.
        - Outcome: Provides equity in school activities (most often applied to extracurricular activities-athletics).
    - Lau vs. Nichols
        - 1974
        - United States Supreme Court
        - Outcome: Schools must provide education to students with limited English proficiency under the Civil Rights Act of 1964.

Standard 3

Identify and analyze culturally responsive teaching.

- Define **culturally responsive teaching** as using cultural knowledge, prior experiences, frames or reference, and performance styles or ethnically diverse students to make learning encounters more relevant and effective for them.
- Identify characteristics of culturally responsive teaching as:
    - Positive perspectives on parents and families.
    - Communication of high expectations.
    - Learning within the context of culture.
    - Student-centered instruction.
    - Culturally mediated instruction.
    - Reshaping the curriculum.
    - Teacher as facilitator.
- Explore research-based strategies for working with diverse learnings in the learning community.
    - High expectations
        - Teachers address beliefs that lead to lower expectations of diverse students and persistently teach challenging curriculum.
    - Culturally relevant instruction

        - Associate engaging curriculum with the knowledge, skills, values, and concerns that students bring with them from their home and community.
    - Caring relationships
    - Parent and community involvement
- Identify characteristics of a safe learning environment for all learners.
    - Keep a clean and orderly classroom.
    - Allow students to be openly expressive and encouraging to others.
    - Celebrate student work in different ways.
    - Create a list of guidelines that are "law" (i.e. no name calling, bullying, etc.)
    - Stay calm and in control.
- Explore the factors between academic achievement gaps and diverse learning populations.
    - Define **academic achievement gap** as the disparity in academic performance between groups of students.
    - Common factors that contribute to academic achievement gaps:
        - Teaching related
            - Uncertified and inexperienced teachers
            - Insensitivity to different cultures
            - Poor teacher preparation
            - Low expectations of students
            - Inadequate materials, equipment, and resources (including technology-based resources)
        - Student related
            - Interest in school
            - Level of effort
            - Responsibility for own learning

Strand 4 Performance Skill listed below

STRAND 5

Students will identify components of a lesson plan, explore state approved strands and standards, and identify instructional strategies, technology, and assessment used in the learning environment.

Standard 1

Identify the common components in preparing effective lesson plans and discuss the relationship between lesson plans, scope and sequences, and units of study.

- Define **lesson plan** as a teacher's plan for teaching an individual lesson.
- Common components of a lesson plan include:
    - Objective
        - Define **objective** as a brief statement that describes what a student is expected to learn by the end of the school year, course, unit, lesson, project, or class period.
    - Required materials and equipment
        - Explore recommended instruction materials (RIMS) on the Utah State Board of Education website.

- Anticipatory set
  - Define **anticipatory set** as pre-assessing the learner's prior knowledge, skills, languages, culture, and experience in instructional planning.
- Direct instruction
  - Define **direct instruction** as the presentation of academic content to students by teachers, such as in a lecture or demonstration.
- Guided practice
  - Define **guided practice** as the interactive instruction between teacher and students.
- Formative assessment
  - Define **formative assessment** as an ongoing evaluation of student learning that is administered multiple times during a lesson, unit, or course.
- Independent practice
  - Define **independent practice** as students have a chance to reinforce skills and utilize the new acquired knowledge by complete a task or series of tasks on their own and away from the teacher's direct guidance.
- Summative assessment
  - Define **summative assessment** as a measurement of student learning at the conclusion of a defined instructional period.
- Reflection
  - Define **reflection** as the metacognitive strategy to help teachers and students reflect upon teaching and learning experiences.
- Define **scope and sequence** as an instructional map and calendar to outline the strands and standards, lessons, activities, and assessments of a course.
- Define **unit of study** as a framework that guides students through a process of learning concepts or content.

Standard 2

Explore state board approved strands and standards.

- Navigate the Utah State Board of Education website to locate current strands and standards.

Standard 3

Explore and identify the characteristics and uses of specific types of instructional methods and uses of technology in the learning environment.

- Develop lessons using appropriate instructional strategies for all learners.
  - Define **cooperative learning** as a technique that allows students to learn from each other and gain important interpersonal skills.
  - Define **differentiated learning** as tailored instruction to meet individual needs.

        - Define **blended learning** as combining online educational materials and opportunities for interaction with traditional classroom methods.
        - Define **project-based learning (PBL)** as a teaching method where students gain knowledge and skills by working for an extended period of time on an authentic and complex question, problem, or challenge.
    - Discuss the role of the teacher and student in developing critical thinking skills, essential questions, and comprehension.
    - Explore technology in the learning environment.
    - Compare benefits and limitations of technology in the learning environment.
        - Equity and access for students
        - Improves knowledge retention
        - Encourages individual learning and collaboration
        - Develop workplace skills
    - Describe ethical considerations regarding technology in lesson development.
        - Define **cheating** as acting dishonestly or unfairly in order to gain an advantage.
        - Define **cyberbullying** as the use of electronic communication to bully a person, typically by sending messages of intimidating, embarrassing, or threating nature.
        - Define **plagiarism** as the practice of taking someone else's intellectual property and using it as your own (i.e. copy/paste, images).

Standard 4

Explore assessment and grading options.

- Define **assessment** as the evaluation or estimation of the nature, quality, or ability of someone or something.
- Identify types of questions on an assessment.
    - Multiple-choice
    - Short answer
    - Essay
    - True/False
    - Fill in the blank
    - Ordering
    - Matching
- Evaluate formative and summative assessment for efficacy.
- Explore assessment and grading options.
    - Types of grading options:
        - Grading scale
        - Rubric
- Reflect on improvement plans based on results of assessment.

Strand 5 Performance Skill listed below

STRAND 6

Students will learn strategies and methods to manage the learning environment.

Standard 1

Explore assessment and grading options.

- Define **classroom management** as a variety of skills and techniques that teachers use to keep students organized, orderly, focused, attentive, on task, and academically productive during class.
- Identify common classroom management strategies in the learning environment.
    - Define **classroom culture** as creating an environment where students feel safe and free to be involved.
    - Define **consistency** as steadfast adherence to the same principles, course, form, etc. regardless of bias and/or personality.
    - Define **planning** as the process of being prepared.
    - Define **procedures** as an established or official way of doing something.
    - Define **proximity** as nearness in space, time, or relationship.
    - Define **rapport** as a close and harmonious relationship in which the teacher and students understand each other's feelings or ideas and communicate well.
    - Define **rules** as a set of explicit or understood regulations or principles governing conduct within the learning environment.

Standard 2

Develop classroom rules and procedures.

- Differentiate between rules and procedures.
    - Define **procedures** as an established or official way of doing something.
    - Define **rules** as a set of explicit or understood regulations or principles governing conduct within the learning environment.
- Identify positive reinforcement and negative consequences strategies for rules and procedures.
    - Classroom
        - Positive reinforcement
            - Praise and nonverbal communication
            - Note home
        - Negative reinforcement
            - Phone guardians
            - Restrictions
    - School
        - Positive reinforcement
            - Rewards activities (No Fs, attendance, etc.)
            - Recognitions (Student of the Month)

        - Negative reinforcement
            - Suspension/Expulsion
            - Removal from activities

Standard 3

Create safe learning environments for all students.

- Define **bullying** as unwanted, aggressive behavior among school aged children that involves real or perceived power balance.
- Define **cyberbullying** as the use of electronic communication to bully a person, typically by sending message of intimidating, embarrassing, or threating nature.
- Identify reporting methods and resource for bullying and cyberbullying.
    - Bullying
        - Tell a trusted adult.
    - Cyberbullying
        - Don't respond and don't forward the message.
        - Keep evidence.
            - Record dates, times and descriptions of instance where cyberbullying occurred.
            - Save and print screenshots, emails, and text messages.
        - Block person who is cyberbullying.
        - Tell a trusted adult.
    - Navigate Stop Bullying to locate prevention strategies and resources related to bullying and cyberbullying.
    - Identify the health, safety, security, and emergency procedures outlined in the Utah State Board of Education Board Rule R277-400 of a school learning environment.
        - Navigate the Utah State Board of Education LEA Emergency Compliance and Assurance form to outline the requirements for an Emergency Preparedness and Emergency Response Plan.

Strand 6 Performance Skill listed below

Performance Skills

Strand 1

- Students will create an educational timeline, using education resources and websites, to outline and plan a schedule for their personal career path.
- Students will develop a resume highlighting their personal workplace and employability skills needed for an educational career.

Strand 3

- Students will create a visual artifact that depicts the theory of either Piaget or Erikson for a parent of a developing child.
- Students will create the pyramid of Maslow's eight-level Hierarchy of Needs and incorporate personal examples.

Strand 4

- Students will complete the **ACES Risk Assessment** ACES.
- Students will create an artifact to explore personal culture biases. Artifacts could include personal essay, oral presentations, song, poetry, art, etc.
- Students will research education court cases and present findings. Examples of artifacts could include a mock court trial, debate, TED talk, or a comparison to current issues in education.

Strand 5

- Students will prepare and present a 15-minute lesson based on one approved standard from the Utah State Board of Education (including lesson, activity, formative/summative assessment, and a reflection) in a content area of their choice.

Strand 6

- Students will interview a teacher about their classroom management plan that includes an outline addressing safety, bullying, and expectations for all students.

Teaching as a Profession 2 Vocabulary

academic achievement gap
academic learning needs
aesthetic needs
anticipatory
assessment
autonomy vs. shame and doubt
belonging and love needs
blended learning
blended learning
Brown vs. Board
bullying
charter school
cheating
classroom culture
classroom management
cognitive
cognitive needs
collaboration
common core
communication
concrete operational stage
confidentiality
consistency
continuous learning
cooperative learning
culturally responsive teacher
cyberbullying
differentiated learning
direct instruction
disability
diversity
Engel vs. Vitale
equity
Erikson
esteem needs
ethnicity
Family Educational Right and Privacy Act (FERPA)
flipped learning
formal operational stage
formative assessment
gender
guided practice
identity vs. role confusion
impartiality
independent practice
industry vs. inferiority
initiative vs. guilt
Lau vs. Nichols
lesson plans
linguistic needs
magnet school
Maslow
Mendez vs. Westminster
multiculturism
objective
online school
physical
physiological needs
Piaget
plagiarism
planning
preoperational stage
privacy
private school
procedures
professional dress
professional learning communities (PLC)
project-based learning (PBL)
proximity
public school
race
rapport
reflection
rules
safety needs
scope and sequence
self-actualization
sensorimotor stage
sexual orientation
social-emotional
standard-based assessment
STEM
summative assessment
Tinker vs. Des Moines
Title IX of the Education Amendment Act
transcendence
trust vs. mistrust
unit of study
workplace conduct

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		
Teaching as a Profession 2	012	7	3	7	7	10	6					48	40