CTE Course Strands and Standards Drafts for approval SY24-25

Updated Strand and Standards are organized by the following Career Clusters.

(These numbered items can be clicked on to navigate through these as needed.)

1. Agriculture, Food & Natural Resources

2. Architecture & Construction

3. Arts, Audio/Visual Technology & Communications

4. Business, Finance & Marketing

5. Computer Science & Information Technology

6. Education & Training

7. Engineering & Technology

8. Health Science

9. Hospitality & Tourism – No Courses Reviewed

10. Human Services

11. Law, Public Safety, Corrections & Security

12. Manufacturing

13. Transportation, Distribution & Logistics

14. Other: Work Based Learning

Cluster: Agriculture, Food & Natural Resources		
Pathway: Animal & Veterinary Science		
Course Code Number	Course Name	Summary
30010000050	Agricultural Science I	Reviewed - No changes made
30010000060	Agricultural Science II	Reviewed - No changes made
30020000040	Animal Science I	Reviewed - No changes made
30020000001	Animal Science II	Reviewed - No changes made
30020000072	Equine Science 1	Reviewed - No changes made
30020000074	Equine Science 2	Reviewed - No changes made
30010000010	Guide Dog Training	Reviewed - No changes made
30010000005	Small & Companion Animal Science	Reviewed - No changes made
30020000090	Veterinary Assistant 1	Reviewed - No changes made
30020000095	Veterinary Assistant 2	Reviewed - No changes made
30020000080	Food Products and Processing	New Course
Pathway: Food Science, Dietetics & Nutrition		
34010000150	Food And Nutrition	Added safety protocols, more food born illnesses and allergens protocols, definitions to common cooking equipment, updated measuring techniques, new cooking terms, updated performance skills

STRANDS AND STANDARDS
FOOD PRODUCTS & PROCESSING

Learning that works for Utah
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Course Description

Students will learn basics in food safety, selection and grading of animal carcasses and wholesale cuts for specific applications, identification and processing of retail and wholesale cuts of meat by species, fabrication of processed meats, and current industry issues.

Intended Grade Level	9-12
Units of Credit	1.0
Core Code	30.02.00.00.082
Concurrent Enrollment Core Code	30.02.00.13.082
Prerequisite	--
Skill Certification Test Number	124
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1 or	Agriculture (CTE/General)
Endorsement 2	Animal Science & Technology

ADA Compliant: Month/year

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.

Performance Skills
- Student 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.

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.

Performance Skills
- 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 appropriate safety practices in agricultural processing work settings.

Standard 1
Implement or demonstrate safety practices related to agricultural processing and work environment.
- Appropriate personal protective equipment
- Operating conditions and appropriate safety devices
- Protocol and safety prevention methods for using knives
- First aid techniques

Standard 2
Identify and demonstrate health and hygiene requirements for food handling permit.
- Proper handwashing technique and personal protective equipment
- Equipment cleaning and sanitation

STRAND 4
Students will demonstrate basic food safety practices.

Standard 1
Investigate food-borne illness, how they are contracted, symptoms, and prevention.
- Storage of food
- Danger zone
- Bacterial growth (FATTOM)

Standard 2
Develop food safety plans
- Hazard Analysis and Critical Control Point (HACCP)
- Standard Sanitary Operating Procedures (SSOPs)
- Conditions of a recall

STRAND 5
Student will elaborate on inspection and regulations related to the food processing industry

Standard 1
Differentiate regulations and inspection within the industry.
- Inspection types (e.g.: federal, state, custom exempt, retail exempt)
- Functions of inspections
- Role of different agencies within the food processing industry (e.g.: FSIS, AMS, USDA)

Standard 2
Describe and identify label requirements.
- Parts of a label
- Safe handling label
- Specialty labeling (natural, organic, antibiotic free, etc.)
- Package marked NOT FOR SALE

STRAND 6
Students will outline procedures to assign quality and yield grades to food products according to industry standards.

Standard 1
Compare major wholesale and retail cuts of beef and their purpose

Standard 2
Compare major wholesale and retail cuts of pork and their purpose

Standard 3
Compare major wholesale and retail cuts of lamb/goat and their purpose

Standard 4
Compare major wholesale and retail cuts of poultry and their purpose

Standard 5
Compare major wholesale and retail cuts of edible and nonedible byproducts and their purpose

STRAND 7
Students will analyze the harvesting and processing methods of animals

Standard 1
Identify the steps in the harvesting process
- Methods of stunning
- Exsanguination
- Evisceration
- Dehiding or dehairing
- Carcass chilling

Standard 2
Evaluate a carcass
- Muscle groups
- Bones
- Groups

Standard 3
Describe the processing of product
- Grinding
- Curing
- Dehydration
- Reforming

Standard 5
Assess methods of packaging
- Packaging for different scenarios
- Oxidation

STRAND 8
Explain processing in the egg industry

Standard 1
Grade eggs
- Grading
- Sizing
- Candling

Standard 2
Process unshelled eggs
- Liquid and further processed eggs

Standard 3
Explore careers in the poultry processing industry

STRAND 9
Explain processing in the dairy industry

Standard 1
Describe how milk products are produced, processed, and graded
- Grades
- Production

Standard 2
Process milk products
- Cheese
- Ice cream
- Other milk products

Standard 3
Explore careers in the dairy industry

STRANDS AND STANDARDS
FOOD AND NUTRITION

Learning that works for Utah
CTE®

Course Description

This course is the foundational course in the Culinary Pathway and Food Science, Dietetics and Nutrition Pathway. Experiences will include food safety and sanitation, culinary techniques, food selection, and basic nutrition with a focus on 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	N/A
Prerequisite	N/A
Skill Certification Test Number	340
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Family Consumer Sciences (General/CTE)
Endorsement 2	Culinary Arts
Endorsement 3	Food Science/ Nutrition

STRAND 1
Students will consistently demonstrate food & kitchen safety procedures and sanitation techniques.

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 the knife correctly, using the claw hand position on the 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 manufacturer 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 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 the 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 the appropriate use of gloves.
  - Single-use gloves.
  - Wash hands before putting on gloves.
  - Change gloves when they get dirty, torn, or changing tasks.
  - Wear gloves when handling ready-to-eat (RTE) foods.
  - Wear a 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, Hepatitis A, Botulism.
  - Populations at most risk: Young Children, Older Adults, and Immune Compromised.
  - 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, to- fu, 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°
  - Ground Meats: 155 F

- Whole Poultry 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, change 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 a food item containing an allergen comes in contact with another food.
- The 9 major food allergens include: tree nuts, eggs, milk, soy, wheat, peanuts, fish, sesame, and shellfish
  - 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, and 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 that has previously held raw meat, poultry or seafood.
- Serving food: no bare-hand contact with RTE food.
  - Cleaning and Sanitizing
    - Cleaning: removes food and other dirt from surface.
    - Sanitizing: 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.

Performance Skills
- Complete FCCLA Step One.
- Complete food safety instruction and an assessment comparable to that required for a Food Handlers Permit.

STRAND 2
Students will apply the skills of kitchen equipment and management.

Standard 1
- Identify various types of kitchen equipment.
  - serrated knife
  - chef's knife
  - paring knife
  - strainer
  - cutting board
  - turner
  - Straight Edge Spatula
  - 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 manufacturer 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 moisture, helps foods cook more evenly, and prevents splattering.
  - Microwave cooking does not brown foods or give it a crispy crust.

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 or measured using the water displacement method.
  - Flour is spooned into a dry measuring cup and leveled off.
  - Sugar/Salt is scooped and leveled off
  - Butter is measured using the markings on the wrapper one stick/cube is generally ½ cup.
  - Eggs are measured one at a time in a separate container.
  - 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.
- A Standard Set of Dry measuring cups includes: 1 Cup, ½ Cup, 1/3 Cup, ¼ Cup

- A Standard Set of measuring spoons includes: 1 Tablespoon, 1 teaspoon, ½ teaspoon, and ¼ teaspoon.

   - Use measuring spoons for measurements less than a ¼ cup.

- Identify equivalents.
   - 3 t. = 1 T.
   - 4 T. = 1/4 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: Work sugar and fat together until the mixture is soft and fluffy
- Cut-In: Cut fat into flour with a pastry blender or two knives
- Fold-In: 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: Beat rapidly to introduce air bubbles into food
- Knead: To work dough until smooth and elastic which further mixes ingredients and develops gluten.
- Dice: Cut into an equal sided cube of various sizes.
- Dredge: To coat heavily with flour, breadcrumbs, or corn meal.
- Flour: To sprinkle or coat with a powdered substance often with flour, crumbs or seasonings.
- Peel/Pare: To remove the skin or rind off fruits or vegetables.
- Mise en place: French for "to put into place". Gathering all necessary tools and measuring/preparing ingredients for a recipe.

Performance Skills
- Demonstrate proper measuring and mise en place while preparing a recipe.
- Demonstrate preventative practices related to kitchen safety and sanitation procedures.

STRAND 3
Students will identify the sources and functions of carbohydrates and apply appropriate food preparation techniques.

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 sugars include: glucose(grains, fruits & vegetables), lactose(dairy products), sucrose(table sugar), maltose(grains), and fructose(fruit).
      - Glucose is also known as blood sugar
    - These include natural sugars and refined sugar products.
    - Added sugars should be limited in the diet.
  - Complex carbohydrates are starches. These include whole grains, refined grains, cereal products, dried beans, rice and pasta.
    - Complex starches break down into simple sugars during the digestion process.
    - Refined grains should be limited in the diet.
    - Fiber is a type of complex carbohydrate.
  - The primary function of carbohydrates is to provide energy.
    - Carbohydrates provide 4 calories per gram.
  - 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 (especially the peels and skins), whole grains, legumes, nuts and seeds.

Standard 3
Apply food selection and preparation guidelines related to quick & yeast breads, grains and pasta.
- Quick breads: Breads made using instant leavening agents and are mixed to create limited gluten development.
  - Use instant leavening agents (baking soda, baking powder, or air & eggs)
- Examples of quick bread include: muffins, pancakes, waffles, biscuits, cornbread, and fruit bread.
- Yeast Breads: Bread made using yeast as a leaving agent and are kneaded to create maximum gluten development.
  - Examples of yeast breads include: rolls, bread sticks, and bread.
- 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 conventional (not instant) rice.
  - Bring water to a boil, add rice, cover the pan and reduce the heat to a simmer.
  - Preparation Ratio: 2:1 - 2 cups water to 1 cup rice.
  - Cooked Ratio: 1:3 - 1 Cup uncooked rice to 3 cups cooked rice
- Types of pasta.
  - Fresh Pasta: made from scratch using a simple dough recipe, rolled and cut by hand or a pasta maker or mold.
  - Dry Pasta: dough pushed through a mold or cutter and dried for several days.
  - Pasta Substitutes: Pasta substitutes for dietary restrictions such as: vegetable pasta, quinoa, and chickpea etc.
- 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.
  - Preparation Ratio: Use enough water to cover the pasta by several inches.
- Cooked Ratio: 1:2 – 1 cup uncooked pasta to 2 cups cooked pasta.

Performance Skills
- Actively participate in the preparation of a nutrient-dense carbohydrate food.

STRAND 4

Students will identify the sources and functions of proteins and lipids and apply appropriate food preparation techniques.

Standard 1

Identify proteins, their sources, and functions.
- The primary function of protein is to build and repair body tissues.
- Protein provides 4 calories per gram.
- 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 soybeans/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.
- Eggs perform various functions in recipes such as adding texture, aeration, and formulation. This may affect substitution options for eggs in recipes.
- A few of the 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 preparation 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.
  - Milk replacements such as; almond milk, soy milk or rice milk are comparable with cow milk in regards to nutritional value and are a viable substitute for people with special dietary needs.

Standard 4

- Lipids (fats & oils) provide 9 calories per gram.
- Identify the functions of lipids:
  - Carrier for vitamins A, D, E, and K.
  - Reserve supply of energy.
  - Promotes healthy skin.
  - Satisfies hunger and helps one feel full longer.
  - Promotes normal cell growth.
  - Protects internal organs from shock and injury.
  - Heat regulation and insulation for the body.
  - Adds flavor to foods.
- 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.

Performance Skills

- Actively participate in the preparation of a nutrient-dense protein food.
- Actively participate in the preparation of a low-fat or fat-substitution food item or utilize a healthier cooking method to reduce fat use. (air-fry, grill, or bake etc.)

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.

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 clot properly.
  - Vitamin E: Protects membranes of white and red blood cells.

Standard 2

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

- Macro Mineral: Are needed in greater quantities in the body.
  - Calcium(Macro mineral): Builds strong bones and teeth. Calcium deficiency causes bones to become weak this is called osteoporosis. Good sources are found in dairy products.
- Micro/Trace Mineral: Usually needed in small amounts but are critical to health.
  - Iron(Micro/Trace mineral): 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.
- Electrolytes: Minerals that help maintain fluid balance in the body, maintain the heartbeat and help muscle and nerve action.
  - Sodium(Electrolytes)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(Electrolytes)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.
- Athletes or anyone physically active needs to drink higher quantities of water, particularly in hot environments (heat of the day).
  - Electrolyte balance and carbohydrate replacement may needed for moderate to high-intensity activities lasting longer than 60 minutes.

Standard 4

Apply food selection and preparation guidelines related to fruits and vegetables.
- Fruits and vegetables contain no cholesterol and are low in calories, fat, and sodium.
- Always wash fresh produce to remove pesticides and dirt that may remain on the skin.
- 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 (oxidation) 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.

Performance Skills

- Actively participate in the preparation of a nutrient-dense produce food.

STRAND 6
Students will explore healthy nutrition guidelines.

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 portion sizes as defined by a nutrition facts label. Nutrition facts labels are based on a 2,000-calorie diet.
    - 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% lipids—9 calories per gram.
        - No more than 10% should be from saturated fats.
- Limit calories from added sugars and saturated fats, and reduce sodium intake.
    - Reduce empty calorie foods. Empty-calorie foods are those that are high in calories, sodium, and saturated fats with very little nutrient value.
- Include physical activity as part of a 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. "Make every bite count."
    - Grains—Choose 100% whole grain. Make at least half of the grains consumed whole grain.
    - Protein—Choose a variety of foods from complete and incomplete protein sources. 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 in low fat dairy products.
    - Oils – Choose vegetable oils and naturally occurring oils in foods like seafood and nuts.

Performance Skills
- Plan and evaluate a one-day menu based on healthy nutrition guidelines.

Performance Skills

Strand 1

Complete FCCLA Step One.

Strand 1

Complete food safety instruction and an assessment comparable to that required for a Food Handlers Permit.

Strand 2

Demonstrate proper measuring and mise en place while preparing a recipe.

Strand 2

Demonstrate preventative practices related to kitchen safety and sanitation procedures.

Strand 3

Actively participate in the preparation of a nutrient-dense carbohydrate food.

Strand 4

Actively participate in the preparation of a nutrient-dense protein food.

Strand 4

Actively participate in the preparation of a low-fat or fat-substitution food item or utilize a healthier cooking method to reduce fat use. (air-fry, grill, or bake etc.)

Strand 5

Actively participate in the preparation of a nutrient-dense produce food.

Strand 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 differ ence 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

Skill Certification 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		

Cluster: Architecture & Construction		
Pathway: Architectural Design (CAD)		
Course Code Number	Course Name	Summary
38-01-00-00-041	Architectural Design 1 (formerly CAD Architectural Design 1)	Name Change; Habitat for Humanity alignment removed. More detailed and specific performance skills added.
38-01-00-00-042	Architectural Design 2 (formerly CAD Architectural Design 2)	Name Change; Greater detail added for Architectural design history and cost estimation. More detailed and specific performance skills added.
38-01-00-00-043	Architectural Design 3 (formerly CAD Architectural Design 3)	Name ChangeGreater detail added for Architectural design history and cost estimation. More detailed and specific performance skills added.

STRANDS AND STANDARDS
ARCHITECTURAL DESIGN 1

Course Description

The first in a sequence of courses that prepare individuals for careers in the Architecture, Engineering, and Construction (AEC) industry. This course includes instruction in 2D or 3D Computer-Aided Design (CAD) software to draw a small residential home with an emphasis on blueprint reading.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.041
Concurrent Enrollment Core Code	38.01.00.13.041
Prerequisite	None
Skill Certification Test Number	631
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Architectural Design

STRAND 1
Careers in Architecture, Engineering, and Construction (AEC)

Standard 1
Understand the responsibilities associated with different positions within the AEC industry.
- Architect
- Engineer
- Designer: Architectural, Interior, etc
- Drafter/CAD Operator.
- Contractor: General, Concrete, Framing, Plumbing, Roofing, etc.
- Building inspector/official
- Loan/mortgage officer

Standard 2
Understand the education, training, and certification needed for each of the occupations in Strand 1 Standard 1.
- Traditional college/university
- Apprenticeship
- Trade school

Standard 3
Identify 21st century skills needed for successful AEC careers.

Performance Skill
Student can create a personal plan to become an Architect, Engineering, or Contractor in the state of Utah.

STRAND 2
Mathematics, Measuring Conventions, and Scale

Standard 1
Perform basic arithmetic functions using fractions and decimals.
- Add
- Subtract
- Multiply
- Divide

Standard 2
Convert between fractions and decimals.

Standard 3
Convert between and within metric and imperial measurements.

Standard 4
Make and record basic measurements using the following tools
- Ruler
- Measuring Tape
- Architect Scale
- Engineering Scale

Standard 5

Commonly used Industry calculations:

- Area
  - Square footage of a house
- Material Estimation
  - Research cost per square foot in your local area.
- Acerage
  - Acre = 43,560 ft2
- Stairs
  - Rise (individual and total)
  - Run (individual and total)

Performance Skill

Student can accurately measure to 1/16" and to a millimeter.

Student can add, subtract, multiply, divide, and convert in fractions and decimal units.

Student can convert between and within metric and imperial units.

Student can calculate common industry measurements (Strand 2 Standard 5).

STRAND 3

Reading and Interpreting Residential Construction Documents

Standard 1

Understand the following aspects of residential construction drawings/plans:

- General Notes and Labels
- Title Block
  - Format
  - Necessary Info
- Alphabet of Lines
- Scale
- Dimensions
- Commonly used symbols/icons
  - Floor plans
    - Doors
    - Windows
    - Bathroom Fixtures
      - Toilet/Water Closet
      - Bathtub
      - Sink/Lavatory/Vanity
      - Shower
    - Appliances
      - Refrigerator
      - Stove/Oven/Range/Cooktop
      - Dishwasher
      - Washing Machine
      - Dryer
  - Electrical/ mechanical plans
    - Switch(s)
    - Duplex 110v receptacle outlet

- GFCI Outlet
- 220V Outlet
- Ceiling mounted light
- Smoke Detector
- CO2 Detector
- Water heater
- Furnace
- Others as needed

Standard 2
Read and interpret residential home drawings that include:
- General notes
- Site plan
- Foundation
- Floor plans
- Elevation drawings
- Electrical plans
- Building cross and wall sections
- Stair details

Performance Skill
Student can read and understand residential construction drawings used in the AEC industry.

STRAND 4
Architectural Sketching

Standard 1
Proper sketching techniques.
Create freehand sketches using paper, pencil, and an eraser (without the benefit of a straight edge, compass, or template) which is neat, clear, and smudge-free.
Demonstrate the use of lines as they are drawn according to the alphabet of lines.
Understand and use accepted dimensioning practices for sketches.

Performance Skill
Student can sketch a proportional drawing to convey a general layout

STRAND 5
Architectural Planning using CAD/BIM software

Standard 1
CAD/BIM Software
- Navigating a CAD software interface.
- Proper use of wall, room, door, and window types, common floor materials, and construction terminology
- Proper placement of components including kitchen, bathroom, and laundry features.
  - Kitchen types
    - Corridor (Galley, Hallway)
    - One Wall

- L-shape
- U-shape
- Island
- Peninsula
  - Bathroom types
    - Half Bath (Powder Room)
    - ¾ Bath
    - Full Bath
- Use of lines as they are drawn according to the alphabet of lines.
- Fully dimension the plan.
- Use of leaders and notes using the correct text height and text style.
- Placement and use of title block information.
- Placement and use of general and specific notes.

Standard 2
Drawing a Foundation plan
- Understand the different types of foundations.
  - Slab on grade
  - Crawl space
  - Basement

Standard 3
Drawing Elevation plans
- Proper dimensioning
- Proper Annotations
- Material Symbols
  - Masonry
  - Log
  - Siding
  - Roofing

Standard 4
Drawing a Roof plan
- Identify roof types
  - Gable
  - Gambrel
  - Shed
  - Hip
  - Dutch hip
  - Flat
- Pitch
- Slope
- Common roofing materials
  - Asphalt shingles
  - Metal
  - Slate
  - Tile
- Construction terminology
  - Rafter

- Valley
- Ridge
- Truss
    - Chord
    - Web
- Eave
- Soffit
- Fascia
- Drip edge

Standard 5

Drawing a Site plan
- The Building
    - Dimensions
        - Size
        - Location
- Property boundaries
    - Property description
- North Arrow
- Utilities
- Easements and Setbacks
- Flat work
    - Sidewalk
    - Driveway
    - Curb
    - Gutter

Performance Skill

Student can reproduce a floor plan.
Student can reproduce a site plan.
Student can reproduce an elevation.
Student can reproduce a foundation plan.

STRAND 6

Identify the components of a typical wall section.

Standard 1

Identify the components of the following building systems:
- Foundation
    - Footings
    - Stem walls
    - Slab
    - Porch cap
    - J bar
    - Rebar
    - Anchor bolt
- Engineered Floor
    - Sill plate

- Floor joists
- Sub-floor
- Rim Joist
- Exterior walls
  - Exterior & interior materials
  - Insulation
  - Doors
  - Windows
- Interior walls
  - Partition
  - Plumbing
  - Bearing
- Framing
  - Top plate
    - Single
    - Double
  - Sole plate
  - Treated Sill plate
  - Header
  - Stud
  - Sheathing
  - Fire Blocking

Performance Skill

Student can Identify the individual components of a wall section

Technology & Engineering Workplace Skills

- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use (or not use) personal electronic devices.
- Maintain a high standard of industrial hygiene by:
  - adopting strong habits of professional dress and personal hygiene,
  - wearing the appropriate personal protective equipment,
  - adopting the habit to "clean as you go", and
  - guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:
  - understanding and complying with established safety procedures,
  - watching for and speaking out when potential hazards and concerns are observed, and
  - actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with an awareness of and respect for global diversity and cultural differences.
- Exhibit initiative and leadership while maintaining a flexible and adaptable attitude.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
  - addition, subtraction, multiplication, division,
  - fraction to decimal as well as decimal to fraction conversions, and

- using decimal places.
- Understand mathematical concepts such as:
  - ratios and proportions,
  - rounding and tolerance ranges,
  - engineering notation, and
  - metric equivalents.
- Demonstrate an ability to think critically and creatively to solve problems and develop improvements to products and processes.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship

Skill Certification 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		
CAD Architectural 1	631										

STRANDS AND STANDARDS
ARCHITECTURAL DESIGN 2

Learning that works for Utah
CTE®

Course Description

The second in a sequence of courses that prepare individuals for careers in the Architecture, Engineering, and Construction (AEC) industry. This course includes instruction in 3D Computer Aided Design (CAD) software to design and model a small residential home with an emphasis on residential methods and materials of construction, codes, and Building Information Modeling (BIM).

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.042
Concurrent Enrollment Core Code	38.01.00.13.042
Prerequisite	Architectural Design 1
Skill Certification Test Number	632
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Architecture

ADA Compliant: August 2023

STRAND 1
Architectural Design and History

Standard 1
Identify the historical influences that contributed to current home styles.

Standard 2
Recognize different American architectural styles
- Farmhouse
- Rambler/Ranch
- Cape Cod/Bungalow
- Prairie
- American Colonial
- Victorian
- Queen Anne
- Mid-century Modern
- Federalist
- Craftsman

Standard 3
Discuss current trends in architecture.
- Net-zero housing
- 3D printed
- Modular construction
- Affordable Housing
  - Apartments
  - Town homes
  - Condos
  - Tiny Homes

Performance Skill
Student can identify common home styles and use them in an original home design.

STRAND 2
Cost of Residential Housing

Standard 1
Discuss the cost of building a residential home.
- Materials Cost
- Labor Cost
- Property cost
- Planning and Permitting
- Potential added amenities
- Housing market
- Maintenance

Standard 2
Compare the initial and ongoing costs associated with different types of construction.
- Stick Framing

- Brick Veneer
- Panel Systems

Performance Skill
Student can estimate the total cost of a small out building (approx. 200 sq ft.).

STRAND 3
Room and Space Planning

Standard 1
Discuss factors that are important in the design of the following rooms or areas:
- Living Room
- Great/Family Room
- Entry/Foyer
- Porch
- Patio or Deck
- Bedroom
- Kitchen
- Bathroom
- Storage
- Garage
- Laundry
- Mechanical Room

Standard 2
Discuss accessibility requirements for good functional utility.
- Traffic flow
- Storage
- Layout

Standard 3
Identify the areas or zones of a residential floor plan.
- Common zones in residential homes
  - Habitable
  - Non-Habitable
- Common areas of a residential home
  - Public
  - Private
  - Service or work Areas

Performance Skill
Student can create a basic layout of a residential home.

STRAND 4
Students will identify the basic considerations in using the International Residential Code (IRC).

Standard 1
Understand basic regulations concerning home design and construction.

- Discuss International Residential Code (IRC) implications for a residence.
- Discuss FHA minimum standards for a residence.
- Understand the existence of local zoning restrictions.
- Understand the existence of variance and covenants
    - HOA
    - CCR

Standard 2
Understand why we have codes and how to apply them to design.

Standard 3
Identify local ordinances relating to site development.

Standard 4
Identify code requirements that deal with health and safety.
- Fire safety
- Egress
- Ventilation
- Natural Light

Standard 5
Identify code requirements relating to utilities.
- Electrical
    - Placement of outlets
    - Voltage of outlets
    - Placement of switches
    - Bathroom fans
- Plumbing
    - Size of tub
    - Water Closet location
- Energy efficiency
    - R-value
    - U-value

Performance Skill
Student can create a house plan follows local codes and ordinances.

STRAND 5
BIM/CAD Modeling Techniques

Standard 1
Navigate the BIM/CAD software interface
- Create and use the different views and how they are navigated
- Adjust views through view ranges and line styles
- Define visibility/ graphics overrides and object styles
- Start a new project and create levels and grids to reference
- Create walls and adjust their settings
- Understand wall types and the structure of walls
- Modify elements

- Place components such as doors, windows, and components
- Create floors, ceilings, and roofs
- Create curtain walls
- Create stairs
- Use model/component groups
- Create room elements such as tags, fill plans, and schedules
- Use a title block family to create sheets

Performance Skill
Student can navigate and proficiently use a BIM/CAD software to create a model.

STRAND 6
Architecture/Construction Documents

Standard 1
Identify and create commonly used documents used in the Architecture/Construction industry:
- Cover Sheet with elevation or rendering
- All four elevations at the correct scale
- Dimensioned floor plan
  - Can include electrical or have separate electrical plan
- Dimensioned foundation and basement plan
  - Can include electrical or have separate electrical plan
- Cabinet and millwork elevations
  - Millwork dimensioning standards
- Typical wall section
- Building section
- Stair detail/section
- Framing details
- Dimensiones Site plan
  - Setbacks
  - Utilities
  - etc.
- General Notes

Performance Skill
Students can create a complete set of plans for an affordable, single-family dwelling based on your local housing market using BIM software. The home should include a basement and/or second floor.

Technology & Engineering Workplace Skills
- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use (or not use) personal electronic devices.
- Maintain a high standard of industrial hygiene by:
  - adopting strong habits of professional dress and personal hygiene,
  - wearing the appropriate personal protective equipment,
  - adopting the habit to "clean as you go", and
  - guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:

- understanding and complying with established safety procedures,
- watching for and speaking out when potential hazards and concerns are observed, and
- actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with an awareness of and respect for global diversity and cultural differences.
- Exhibit initiative and leadership while maintaining a flexible and adaptable attitude.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
  - addition, subtraction, multiplication, division,
  - fraction to decimal as well as decimal to fraction conversions, and
  - using decimal places.
- Understand mathematical concepts such as:
  - ratios and proportions,
  - rounding and tolerance ranges,
  - engineering notation, and
  - metric equivalents.
- Demonstrate an ability to think critically and creatively to solve problems and develop improvements to products and processes.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship

Skill Certification 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		
CAD Architectural 2	632	5	10	12	9	23	NA	NA	NA	59	

STRANDS AND STANDARDS
ARCHITECTURAL DESIGN 3

Course Description

The third in a sequence of courses that prepare individuals for careers in the Architecture, Engineering, and Construction (AEC) industry. This course includes instruction in 3D Computer Aided Design (CAD) software to model a small commercial building with an emphasis on commercial methods and materials of construction, codes, and Building Information Modeling (BIM).

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.043
Concurrent Enrollment Core Code	38.01.00.13.043
Prerequisite	Architectual Design 2
Skill Certification Test Number	633
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Architecture

STRAND 1
Structural Materials in Light Commercial Construction

Standard 1
Understand the use of Masonry
- CMU wall
- Tilt-up concrete
- Platform
- ICF Block

Standard 2
Understand the use of Steel
- Columns
- Beams
- Metal Studs

Standard 3
Understand the use of Wood
- SIP panels
- Wood stud framing
- Beams
  - Glulam
  - LVL
  - Micro lam

Standard 4
Understand the use of Glass
- Curtain walls
- Store fronts

Performance Skill
Student can identify different materials used in a building structure.

STRAND 2
Students will identify the basic considerations in using the International Building Code (IBC) .

Standard 1
Identify basic building occupancies based on their use and how that affects construction types, materials, and building size.

Standard 2
Zoning

Standard 3
Identify code requirements to provide adequate fire safety.
- Fire and smoke protection
- Passive fire protection (construction techniques)
- Active fire protection (sprinklers)

Standard 4

Identify code requirements to provide life safety.
- Egress requirements to get people out
- Accessibility to get people in
- Building safety to protect people from falling

Standard 5

Parking lot layout
- Required green space
- Useable space

Performance Skill

Student can create a design that considers and follows the IBC.

STRAND 3

ADA Requirements

Standard 1

Restrooms
- Handicap stall size
- Grab bars
- Sink clearance
- Insulated hot water lines

Standard 2

Traffic flow
- Entrances and exits
- Door swing access
    - Full swing

Standard 3

Public Service
- Countertop heights
- Accessibility

Performance Skill

Student can create a design that is ADA accessible.

STRAND 4

Light Commercial Design using BIM Software

Standard 1

Develop a full set of commercial architectural construction documents that include the following:
- Fully annotated sheets with dimensions, notes, tags, and schedules.
- Sheet set of typical architectural documentation needed for a commercial construction project.
- Floor Plans & Section Views
- Exterior & Interior Elevations
- Ceiling Plans

- Roof Plan
- Place site components such as trees, plants, people and other items to detail out the project model.
- Detailed, ADA compliant restrooms

Standard 2
Demonstrate proficiency completing the following concepts:
- Creating a title block
- Importing CAD information
- Modifying CAD information
- Creating a Site plan
- Place plumbing fixtures
- Customize curtain walls (if needed)
- Provide stairs and circulation
- Add detail to the site using site elements

Performance Skill
Student can create a complete set of drawings for a light commercial occupancy (such as business, educational, or mercantile) that fits within a 2 ft. cube at ¼" or ⅛" scale using BIM software.

STRAND 5
Professional Presentation of Model

Standard 1
Renderings
- Virtual
  - Static drawings
  - Walkthrough
- Hand drawn
- Slide deck

Standard 2
Physical Scale Concept Model
- 3D printing
- Foam core/chipboard/butter board
- CNC
  - Laser
  - Router

Performance Skill
Student can create and give a presentation on their light commercial building

Technology & Engineering Workplace Skills
- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use (or not use) personal electronic devices.
- Maintain a high standard of industrial hygiene by:
  - adopting strong habits of professional dress and personal hygiene,
  - wearing the appropriate personal protective equipment,
  - adopting the habit to "clean as you go", and

- guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:
  - understanding and complying with established safety procedures,
  - watching for and speaking out when potential hazards and concerns are observed, and
  - actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with an awareness of and respect for global diversity and cultural differences.
- Exhibit initiative and leadership while maintaining a flexible and adaptable attitude.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
  - addition, subtraction, multiplication, division,
  - fraction to decimal as well as decimal to fraction conversions, and
  - using decimal places.
- Understand mathematical concepts such as:
  - ratios and proportions,
  - rounding and tolerance ranges,
  - engineering notation, and
  - metric equivalents.
- Demonstrate an ability to think critically and creatively to solve problems and develop improvements to products and processes.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship

Skill Certification 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		
CAD Architectural 3	633										

Cluster: Arts, Audio/Video Technology & Digital Media		
Pathway: Broadcasting & Digital Media		
Course Code Number	Course Name	Summary
40.01.00.00.040	Digital Audio 1	Updating Strands and Standards to better align and meet the changing needs of industry.
40.01.00.00.045	Digital Audio 2	Updating Strands and Standards to better align and meet the changing needs of industry.
40.01.00.00.048	Radio Production 1	New Course as per advisory board needs to be split from Audio.
40.01.00.00.049	Radio Production 2	New Course as per advisory board needs to be split from Audio.
Pathway: Graphic Design & Communication		
40.13.00.00.012	Commercial Photography 1	Update strands and standards to shift necessary skills of students to become more attainable and better aligned to the industry than they currently are.
40.13.00.00.015	Commercial Photography 2	Update strands and standards to shift necessary skills of students to become more attainable and better aligned to the industry than they currently are.
40.13.00.00.016	Commercial Photography 3	New course with new strands and standards to better prepare students with necessary skills to prepare for industry.

STRANDS AND STANDARDS
DIGITAL AUDIO 1

Course Description

This course is designed to provide students with the basic knowledge and skills related to general audio recording and production. This course combines instruction and assignments that provide students with hands-on experiences.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.01.00.00.040
Concurrent Enrollment Core Code	N/A
Prerequisite	None
Skill Certification Test Number	816
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary 6-12
Required Endorsement(s)	
Endorsement 1 or	Audio Video Production
Endorsement 2	Mulitmedia

ADA Compliant: Month/year

STRAND 1
Students will explore audio related job titles and different types of audio production.

Standard 1
Job titles and employment opportunities.
- Producer
- Front of House (FOH) Engineer
- Recording Engineer
- Mixing Engineer
- Monitor Engineer
- Theatrical Engineer
- Mastering Engineer
- Sound Designer
- Foley Artist
- Etc.

Standard 2
Students will understand types of audio production.
- Live music performance
- Recording a studio album or EP
- Podcasts
- Post-Production
- Film/TV sound
- Audio Book
- Foley
- Etc.

STRAND 2
Students will explore the basics of sound and acoustics.

Standard 1
The basics of sound and acoustics.
- Frequency
- Amplitude
- Harmonics
- Sound Treatment/Proofing

STRAND 3
Students will demonstrate understanding of signal path and basic mixing and recording techniques.

Standard 1
Signal Path; students will demonstrate proper equipment setup for recording audio.
- Inputs/Outputs
- Preamps
- Mixing Boards
- DAW
- Sample Rate
- Bit Depth

Standard 2
Students will demonstrate audio mixing using a mixing board or DAW (Digital Audio Workstation).
- Gain
- Compression
- Panning
- Distortion
- EQ

STRAND 4
Students will demonstrate proper setup and use of recording equipment.

Standard 1
Identify various types of audio cables and connectors.
- ¼"
- ⅛"
- MIDI/USB
- XLR
- TRS/TS
- Balanced
- Unbalanced

Standard 2
Students will Identify common microphone diaphragm types.
- Dynamic
- Condenser
  - Phantom Power

STRAND 5

Students should collaborate and produce different types of audio.

Standard 1

Publication Selection – Students will identify the proper distribution outlet that is best suited for their content.
- Spotify
- Apple
- YouTube
- SoundCloud
- Social Media
- Etc.

Standard 2

Based on classroom resources, students should explore different types of audio and radio productions.
- Recording studio album or EP
- Live music concert
- Music production
- Episodic podcast
- Series of related video blogs
- TV/Film sound design

STRAND 6

Students will be able to understand and obey basic copyright laws applicable to all media.

Standard 1

Define the laws around media recording and production.
- Define copyright
- Define Fair Use
- Define Public Domain

STRAND 7

Students will understand the importance of career readiness skills as it relates to participating in either TSA, SkillsUSA, Utah Broadcast Awards, or any other related CTSO.

Standard 1

Understand the basics of a job related to audio.
- Participate in a CTSO competitive event related to audio
- Watch a documentary on someone who succeeded in this industry and develop a three- to-five-minute presentation
- Interview someone who works in the field you would like to work in. Develop a three-to- five-minute presentation
- Job shadow a person who works in the field you would like to work in. Develop a written report about your experience

Performance Skills:

Students can record clean audio with basic equipment, avoid clipping, perform basic editing, and export high quality audio for the chosen area of focus.

Workplace Skills:

The following workplace skills should be discussed, taught, and re-enforced in the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability
- Legal Requirements and Expectations

Skills Certificate Test Points by Strand:
Updated after the State Skills Exam is reviewed.

STRANDS AND STANDARDS
DIGITAL AUDIO 2

Learning that works for Utah
CTE®

Course Description

This course is designed to provide students with the knowledge and skills related to audio recording and production. The course builds upon Digital Audio 1 with an emphasis on skill building and assembling a portfolio.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.01.00.00.045
Concurrent Enrollment Core Code	N/A
Prerequisite	Digital Audio 1
Skill Certification Test Number	817
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Audio Video Production

ADA Compliant: Month/year

STRAND 1

Students will fill the role and responsibilities of one or several of the following job titles.

Standard 1

Job titles to explore while working on an audio project.

- Recording Engineer
- Front of House (FOH) Engineer
- Mixing Engineer
- Music Producer
- Monitor Engineer
- Theatrical Engineer
- Mastering Engineer
- Foley Artist
- Sound Designer

Standard 2

Students will produce one or more of the following projects.

- Live music performance
- Recording a studio album or EP
- Podcasts
- Soundtrack and foley for a film or TV Show
- Audio commercial
- Audio book

STRAND 2

Students will demonstrate correct use of audio recording equipment and develop a recording workflow.

Standard 1

Demonstrate Digital Audio Workstation (DAW) workflow.

- File management
- Create project
- Import audio files
- Manage multiple sources/tracks of audio
- Export audio
- Export types (MP3, AIF, WAV, FLAC)

Standard 2

Identify elements of audio.

- Decibel
- Clipping
- Reverb
- Panning

STRAND 3
Students will demonstrate proper setup and use of recording equipment.

Standard 1
Identify various types of audio equipment.
- Analog vs Digital Mixers
- DI Box
- Snake and Stage Boxes
- Optical Fiber

Standard 2
Students will Identify common microphone pickup patterns.
- Cardioid
- Hyper-Cardioid
- Omnidirectional
- Bi-directional/Figure 8
- Shotgun

STRAND 4
Students will assemble a portfolio demonstrating various skills related to audio production.

Standard 1
Explore audio production.
- Apply for an internship
- Help someone setup equipment for a show or studio recording
- Learn how to use a piece of equipment you have never used before
- Using any equipment available, record interesting sounds in your classroom or neighborhood

STRAND 5
Students should collaborate and produce different types of audio.

Standard 1
Publication Selection – Students will identify the proper distribution outlet that is best suited for their content.
- Spotify
- Apple
- YouTube
- SoundCloud
- Social Media

Standard 2
Based on classroom resources, students should select a distribution platform and collaborate to produce one or several of the following:
- Produce a multiple episode podcast
- Produce the audio and soundtrack for a film
- Produce a studio album or EP
- Produce a live music concert

STRAND 6
Students will be able to understand and obey basic copyright laws applicable to all media.

Standard 1
Practice correct usage of copyright laws.
- Right to reproduce, manipulate and distribute
- Plagiarism

STRAND 7
Students will understand the importance of career readiness skills as it relates to participating in either TSA, SkillsUSA, Utah Broadcast Awards, or any other approved CTSO event.

Standard 1
- Participate in a CTSO competitive event related to audio
- Plan for your future career
- Apply for internships with recording studios
- Identify the components of an employment portfolio
- Complete a survey for employment opportunities
- Create a job application
- Assemble your employment portfolio
- Interview someone who is working in your field of interest

Performance Skills:
Students should assemble a portfolio demonstrating equipment use and management, recording skills, basic editing, and publishing high quality audio.

Workplace Skills:
The following workplace skills should be discussed, taught, and re-enforced in the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability
- Legal Requirements and Expectations

Skills Certificate Test Points by Strand:
Updated after the State Skills Exam is reviewed.

STRANDS AND STANDARDS
RADIO PRODUCTION 1

Course Description

This course is designed to provide students with the basic knowledge and skills related to Radio Broadcasting. Students will create audio programming intended to be distributed through traditional radio, online radio, or distributed through podcasting.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.01.00.00.048
Concurrent Enrollment Core Code	N/A
Prerequisite	None
Skill Certification Test Number	Coming Soon
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Audio Video Production

ADA Compliant: Month/year

STRAND 1
Students will explore radio related job titles and different types of audio production.

Standard 1
Job titles and employment opportunities.
- Station Manager
- Program Director
- Music Director
- On-Air Personalities
- Promotions Director
- Intern
- Music Producer
- Mixing Engineer
- Foley Artist

STRAND 2
Students will explore the basics of sound, signal path and basic sound mixing.

Standard 1
The basics of sound and acoustics.
- Frequency
- Amplitude

Standard 2
Signal Path - Students will demonstrate proper equipment setup for recording audio.
- Inputs/Outputs
- Preamps
- Mixing Boards
- DAW (Digital Audio Workstation)
- Sample Rate
- Bit Depth

Standard 3
Identify elements of audio in recording or when using a DAW
- Decibel
- VU Meter
- Panning
- Clipping
- Threshold
- Reverb

STRAND 3
Students will demonstrate proper setup and use of recording equipment and produce a variety of radio content.

Standard 1
Identify various types of audio cables and connectors.
- ¼"
- ⅛"
- MIDI/USB
- XLR
- Balanced
- Unbalanced

Standard 2
Create different types of audio production.
- Create am AM/FM radio program
- Live sports broadcast
- Broadcast and record a live music performance
- Recording a studio album or EP
- Podcast
- Commercial and promotional content
- Soundtrack and foley for a film or TV Show
- Recorded Spot | PSA | Commercial | Promotion

STRAND 4
Students will create promotional content for their radio station or products.

Standard 1
Students will identify and create different types of promotional material for their radio show, station, or radio event.
- Station ID
- Sweepers
  - Drop
  - Bumpers
- Posters
- T-Shirts
- Commercials
- PSA
- Social Media Posts
- Logos

STRAND 5
Students should collaborate and produce different types of audio.

Standard 1
Publication Selection – Students will identify the proper distribution outlet that is best suited for their content.
- Terrestrial AM/FM or Internet Radio
- Podcast Distributor
- Spotify
- Apple
- YouTube
- SoundCloud
- Social Media

Standard 2
Based on classroom resources, students should explore different types of audio and radio productions.
- Recording studio album or EP
- Live music concert
- Create music loops
- Episodic podcast
- Series of related video blogs
- TV/Film soundtrack production

Standard 3
Prepare yourself to enter the professional field of radio by learning more about it.
- Watch a documentary on someone who succeeded in this industry. Share with your class what you learned.
- Interview someone who works in the field you would like to work in. Share with your class what you learned.
- Job shadow a person who works in the field you would like to work. Share with your class what you learned.

STRAND 6
Students will be able to understand and adhere to basic copyright laws applicable to all media.

Standard 1
Define the laws around media recording and production.
- Define copyright
- Define Fair Use
- Define Public Domain

STRAND 7

Students will understand the importance of career readiness skills as it relates to participating in either TSA, SkillsUSA, Utah Broadcast Awards, or any other approved CTSO.

Standard 1

Understand the basics of a job related to radio production or broadcasting.

- Participate in a CTSO competitive event related to radio.
- Watch a documentary on someone who succeeded in this industry and develop a three- to-five-minute presentation.
- Interview someone who works in this field. Develop a three-to-five-minute presentation.
- Job shadow a person who works in this field. Develop a written report about your experience.

Performance Skills:

Students can record, edit, and export high quality audio for use in promotional content, podcasts, or radio shows.

Workplace Skills:

The following workplace skills should be discussed, taught, and re-enforced in the course:

- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability
- Legal Requirements and Expectations

Skills Certificate Test Points by Strand: Coming soon!

STRANDS AND STANDARDS
RADIO PRODUCTION 2

Learning that works for Utah
CTE®

Course Description

This course is designed to provide students with a deeper understanding of the knowledge and skills needed in radio broadcasting. Students will create audio programming intended to be distributed through traditional radio, online radio, or distributed through podcasting. The course builds upon Radio Production 1 with an emphasis on skill building and assembling a portfolio.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.01.00.00.049
Concurrent Enrollment Core Code	N/A
Prerequisite	None
Skill Certification Test Number	Coming Soon
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Audio Video Production

STRAND 1
Students will identify and explain the history of radio and the regulation of audio broadcasting.

Standard 1
Identify and explain the historical impact of the following:
- FM vs AM
- ASCAP
- BMI
- Community Standards
- Federal Communications Commission (FCC)

Standard 2
Identify and explain the difference between sponsors and advertisers.
- Commercial vs Non-Commercial
- Underwriting
- Public Service Announcement (PSA)

STRAND 2
Students will demonstrate correct use of audio recording equipment and develop a recording workflow.

Standard 1
Demonstrate Digital Audio Workstation (DAW) workflow.
- File management
- Create project
- Import audio files
- Manage multiple sources/tracks of audio
- Export audio
- Export types (MP3, AIF, WAV, FLAC)

Standard 2
Students will Identify common microphone diaphragm types.
- Dynamic
- Condenser
  - Phantom Power

Standard 3
Demonstrate correct microphone placement for different audio recording situations.
- Dialogue
- Interview
- Sound Effects
- Music Performance
- Instrument Recording
- Ambient Recording

STRAND 3
Students will develop show management and broadcasting skills.

Standard 1
Students will develop their voice.
- Identify and develop a "voice" or "style" for all forms of media

Standard 2
Identify and demonstrate storytelling skills.
- Storytelling in live format
- Storytelling in pre-recorded or podcast format

Standard 3
Students will develop and practice interview skills.
- Research topic or background of interviewee
- Prepare appropriate questions
- Maintain a conversation
- Edit interview while maintaining accuracy and correct context

STRAND 4
Students will assemble a portfolio of individual and collaborative work demonstrating various skills related to radio production for both commercial and non-commercial programming.

Standard 1
Create multiple types of radio content.
- Create a promo for a commercial podcast or radio program
- Create a promo for a non-commercial podcast or radio program
- Plan and develop a regular radio show
- Plan and produce a live sport broadcast
- Work with an artist to produce and record an EP or album than can be played on the radio
- Plan, promote, and produce a radio event or live concert
- Create a collection of beats or loops
- Create foley sound effects for live radio or a video

Standard 2
Publication Selection – Students will identify the proper distribution outlet that is best suited for their content.
- Terrestrial AM/FM or Internet Radio
- Podcast Distributor
- Spotify
- Apple
- YouTube
- SoundCloud
- Social Media

STRAND 5
Students will be able to understand and adhere to basic copyright laws applicable to all media.

Standard 1
Practice correct usage of copyright laws.
- Right to reproduce, manipulate and distribute
- Plagiarism
- Fair Use
- Public Domain

STRAND 6
Students will understand the importance of career readiness skills as it relates to participating in either TSA, SkillsUSA, Utah Broadcast Awards, or any other approved CTSO.

Standard 1
Understand the basics of a jobs related to radio production or broadcasting.
- Participate in a CTSO competitive event related to radio
- Plan for your future career
- Apply for internships with recording studios
- Identify the components of an employment portfolio
- Complete a survey for employment opportunities
- Create a job application
- Assemble your employment portfolio
- Interview someone who is working in your field of interest

Performance Skills:
- Students should assemble a portfolio that demonstrates recording, editing, and exporting audio skills.
- Plan and promote a radio show or event related to radio or live performance for use in a promotion content or podcast for radio show.

Workplace Skills:
The following workplace skills should be discussed, taught, and re-enforced in the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability
- Legal Requirements and Expectations

Skills Certificate Test Points by Strand: Coming soon!

STRANDS AND STANDARDS
COMMERCIAL PHOTOGRAPHY 1

![Learning that works for Utah CTE]

Course Description

An introduction to the field of commercial photography. This course will cover concepts, including but not limited to, purchasing a digital camera, image capture, image editing, and image output. This course will also feature Adobe Photoshop and Adobe Lightroom; their features and use. These concepts will enable the student to be more knowledgeable and prepared to enter the field of commercial photography.

CAMERA REQUIREMENT: It is recommended that students have access to a Digital SLR camera. At a minimum, cameras must use removable memory cards and have adjustable mode settings. Mobile devices may be used to complete some, but not all, of the listed objectives.

SOFTWARE REQUIREMENT: Adobe Photoshop or Photoshop Elements, Adobe Lightroom

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.13.00.00.12
Concurrent Enrollment Core Code	40.13.00.13.012
Prerequisite	N/A
Skill Certification Test Number	537
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Commercial Photography
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1: Capture

Students will employ proper equipment, exposure, lighting modification, and optional accessories to capture photographic images utilizing compositional concepts and narratives.

Standard 1: Exposure

Students will navigate camera functions to create images with accurate exposure for their intended purpose.

- Exposure Triangle
  - Aperture
  - Shutter Speed
  - ISO

Standard 2: Composition

Students will represent compositional elements in their photographic work to develop visual literacy.

- Line (leading lines, static (horizontal/vertical), and dynamic lines (diagonal))
- Space (positive/negative, simplicity)
- Texture (visual)
- Framing (literal and subliminal)
- Rule of Thirds (engaging the viewer)
- Perspective
  - Linear (horizon line, vanishing point)
  - Atmospheric (foreground, middle ground, background)
  - Point of View (bird's eye, worm's eye, eye-level)
- Pattern and Repetition
- Balance
  - Symmetry vs. Asymmetry
  - Visual Weight
  - Proportion, Scale, Size
- Focal Point / Point of Emphasis (color, texture, size, contrast, light, pattern, etc.)
- Color and Mood

Standard 3: Explore Meaning and Context

Students will explore narrative and meaning as it relates to their photographic work.

- Generating Ideas (mood/vision board based on location, theme, client, or prompt, developing personal style ("aesthetic"), personal interests, branding, relevance, resonance, etc.)
- Sequencing and Storytelling (W's: what, why, when, where, who, how)
- Self-Reflection (analyze, evaluate, critique)

Performance Skills

- Compose photographic images that demonstrate successful use of various composition elements.
- Demonstrate proper use of the exposure triangle when photographing.
- Analyze, evaluate, and critique own photographic work for self-reflection and improvement.

STRAND 2: Edit

Students will be able to use photo editing software to enhance images.

Standard 1: Transfer

Students will transfer images successfully to access them from other devices for editing purposes.

- Camera --> Memory Card --> Computer
  - Card --> Computer
  - Phone --> Computer
  - Computer --> Online

Standard 2: Editing

Students will employ editing tools in Adobe Photoshop or Lightroom to refine their photographic work.

- Global Adjustments (entire image)
  - Exposure, color, contrast, effects
  - Cropping
- Local Adjustments (selected parts of image)
  - Masking & Touch-up Tools (healing, clone stamp)

Performance Skills

- Submit and demonstrate an intentional and successfully edited photo including exposure, color, adjustments, and contrast.

STRAND 3: Output

Students will be able to save/export their photographic work in the appropriate size, resolution, format and mode for a variety of platforms. (Primary focus will be on DIGITAL output during Photo I. Print will be covered in depth in Photo II & III) Students will store their images in the appropriate location for future access.

Standard 1: Output Size, Resolution, Format, Mode for Location

Students will be able to save/export their photographic work in the appropriate size, resolution, format, and mode for a variety of platforms.

- To Digital Devices
  - 72 Pixels per Inch (PPI)
  - Format: JPG
- To Print
  - 300 DPI
  - Format: JPG, TIFF
- To Archive
  - Save to cloud, local computer, external drive
  - Keep original file and format

Performance Skills

- Submit a photo through a digital device.
- Submit a photo for print with the correct resolutions and formats.
- Save/store a photo to an archive source.

STRAND 4: Connect

Students will develop ideas in connection to other photographers selected by students as relatable and relevant to their own photographic interest.

Standard 1: Draw Inspiration from other Photographers

Students will develop ideas in connection to other photographers by analyzing, evaluating, and critiquing the significance of their selected photographers' work.

- Intro to Relevant Photographers (explore a variety of photographic styles)
- Analyze, evaluate, critique photographic works.

Performance Skills

- Select photographers who are relatable and relevant to their own photographic interests.
- Analyze, evaluate, and critique photographic works.

STRAND 5: Career Path

Students will explore an introduction to a variety of career paths in the photography industry. Students will develop fundamental work skills through their own photographic process.

Standard 1: Industry Knowledge

Students will explore career paths in the photography industry related to their personal interests.

Standard 2: Work Skills

Students will develop work skills through their own photographic process.

- Collaboration, teamwork, communication, problem-solving, critical thinking, dependability, and accountability.
- Legal Expectations (copyright and plagiarism basics)

Performance Skills

- Take photographs in the genre/interest that meets the genre expectations.
- Submit original work for all projects.

STRAND 6: Portfolio

Students will construct a digital portfolio to demonstrate their development in aesthetic literacy through the compositional elements. The portfolio will serve as an assessment of student understanding through hands-on, process-based learning of each concept listed.

Standard 1: Composition (Digital) Portfolio

Students will curate a personal digital portfolio to demonstrate their development in aesthetic literacy through compositional elements.

- Student-selected projects/work (book, online portfolio, social media page, presentation).

Standard 2: Printed Work (optional)

Students will display their work through local events.

Performance Skills

- Create a digital portfolio of student work.
- Display high-quality photographic works.

STRAND 7: SkillsUSA – Level 1

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 1.

Standard 1

- Understand and demonstrate the attitude of cooperation.
- Develop awareness of cultural diversity and equality issues.
- Demonstrate effective communication with others.
- Apply team skills to a group project.
- Identify and apply conflict resolution skills.

Standard 2

- Understand and demonstrate the ability of being resourceful and innovative.
- Discover self-motivation techniques and establish short-term goals.
- Measure/modify short-term goals.
- Review a professional journal and develop a three- to five-minute presentation.

Standard 3

Plan for your future career.

- Complete a self-assessment and identify individual learning styles.
- Define future occupations.
- Identify the components of an employment portfolio. List proficiency in program competencies.
- Complete a survey for employment opportunities.
- Create a job application.
- Assemble your employment portfolio.
- Employability skills: evaluate program comprehension.

Standard 4

Understand and demonstrate the ability to manage a project.

- Apply team roles/skills to a group project. (graphic artist, project manager, subject matter expert/editor, programmer, etc.)
- Observe and critique a meeting.
- Demonstrate business meeting skills.
- Explore supervisory and management roles in an organization.
- Identify and apply conflict resolution skills.
- Demonstrate evaluation skills.
- Manage a project and evaluate others.

Performance Skills

Attend a SkillsUSA (or other CTSO) meeting at your school.

Skill Certification 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		

STRANDS AND STANDARDS
COMMERICAL PHOTOGRAPHY 2

Learning that works for Utah
CTE®

Course Description

This course is designed for students who want to further enhance their photographic knowledge and abilities. It is an application of the skills learned in Digital Photography with an emphasis on professional jobs and assignments used in commercial photography. A portfolio of each student's work is expected at the end of the course.

CAMERA REQUIREMENT: Since there is an industry standard for this type of work, access to a DSLR camera is required for Commercial Photography course. Schools may provide necessary equipment to complete the course.

SOFTWARE REQUIREMENT: Adobe Photoshop or Photoshop Elements, Adobe Lightroom.

Intended Grade Level	10-12
Units of Credit	0.5-1.0
Core Code	40.13.00.00.015
Concurrent Enrollment Core Code	40.13.00.13.015
Prerequisite	Commercial Photography 1
Skill Certification Test Number	539
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Commercial Photography

STRAND 1: Capture

Students will capture photographic images by employing proper equipment, exposure, light modification, and optional accessories.

Standard 1: Exposure

Students will employ the basic functions of the mirrorless camera to create photographic works.

- Exposure Triangle
    - Aperture
    - Shutter Speed
    - ISO
- Types of cameras advantages/disadvantages
    - Mirrorless
    - Film
    - DSLR
    - Phone/Mobile
- Camera settings
    - White Balance
    - Image Quality (RAW, JPG)
    - Histograms

Standard 2: Lenses

Students will employ the basic functions of interchangeable camera lenses to create photographic works.

- Lens Comparison
    - Wide Angle (short focal lengths)
    - Normal/Standard (mid-range focal lengths)
    - Telephoto (longer focal lengths)
    - Macro Lenses
- Benefits and disadvantages of prime and zoom lenses.

Standard 3: Lighting

Students will construct, manage, and modify various lighting arrangements to achieve desired lighting effects in indoor and outdoor settings.

- White Balance
    - Color cast from various lighting
    - Auto White Balance setting vs. gray card
- Artificial/Natural Light
    - Sources of Light
    - Creative Uses
- Outdoor Photography
    - Light control/modification
    - Time of day
    - Color cast & shadows
- Indoor Photography
    - Light sources: window, artificial light, studio lighting
    - Light control/modification
    - Indoor color temperature/cast of various lighting

- Studio Lighting
  - Studio lighting setup (key light, fill light, hair/accent light, continuous light, strobe light)
  - RAFT Light control/modification (reflectors, diffusers, barn doors)
  - 4 Lighting Formations: Butterfly, Loop, Rembrandt, Split
  - Camera settings for studio lighting.

Standard 4: Visual Elements

Students will employ a variety of visual techniques to create visually engaging photographic works.

- Visual Organization
  - Wide, medium, tight formula on same subject
  - Dynamic Symmetry (grouping, head space, etc.)
  - Posing techniques (people, products)
  - Leave crop room (Portraits)
- Light/Shadow
  - Effects of lighting/shadow placement
- Black & White Photography
  - Visualizing B/W conversion of tonsil range
  - Adjustments for B/W vs. color
  - Contrast, value scales, zones

Standard 5: Explore Meaning and Context

Students will construct meaning, and identify context, in their photographic work. They will employ intentional practices to develop a personal photographic aesthetic.

- Generating Ideas (mood/vision board based on location, theme, client, and prompts, developing personal style ("Aesthetic"), personal interests, branding, relevance, resonance, etc.)
- Sequencing/Storytelling (W's: what, why, when, where, who, how?)
- Self-Reflection (analyze, evaluate, critique)

Performance Skills

- Demonstrate proper use of the exposure triangle and white balance when photographing.
- Take a photograph using the appropriate lens for the appropriate setting.
- Construct various lighting arrangements to achieve desired lighting effects in a studio setting.
- Manage natural lighting to achieve desired results outdoors.
- Choose and utilize the correct white balance for appropriate environments.
- Produce visually engaging photos using different elements.
- Plan and execute a photographic idea by gathering inspiration from other photographers.
- Analyze, evaluate, and critique own photographic work.

STRAND 2: Edit
Students will be able to use photo editing software to enhance images.

Standard 1: Photoshop
Students will employ editing tools in Photoshop to refine their photographic image(s)
- Adjustment Layers
  - Layer masks vs. Quick masks
  - Tonal (histogram, curves)
  - Color (color balance, black and white adjustment)
- Tools & Techniques
  - Compare healing brushes (spot vs. clone)
  - Crop tool (WxHxRES, positioning, spacing)
  - Image dimensions & size
  - Content aware
- Compositing and Layer Organization
  - Opacity
  - Blending modes (screen, multiply, etc.)
  - Order & Alignment

Standard 2: Lightroom
Students will employ Adobe Lightroom to refine photographic image(s)
- Import / Albums / Export
  - Culling
  - Organization
  - Export
- Develop / Edit Module
  - Exposure Adjustments
  - Color Adjustments
  - Cropping
  - Batch Editing
  - Healing
  - Masking
- Presets

Performance Skills
- Enhance images by using Photoshop tools and techniques.
- Enhance images by using Lightroom tools and techniques.

STRAND 3: Output

Students will be able to save/export their photographic work in the appropriate size, resolution, format and mode for digital and print platforms. Students will develop a system for storing, accessing, and archiving their images

Standard 1: Location Settings

Students will manage photographic files and their output qualities.

- To Print
  - Contact Sheet
  - 300 dpi
  - Format: TIFF, PDF, JPG, PSD
- Image Quality
  - Resolution, Compression

Performance Skills

- Output high quality photographic files.

STRAND 4: Connect

Students will develop ideas in connection to historical photographers.

Standard 1: Draw Inspiration from Historical Work

Students will develop ideas in connection to other photographers and their contributions throughout history.

Performance Skills

- Review historical work to draw inspiration.

STRAND 5: Career Path

Students will explore an introduction to a variety of career paths in the photography industry and develop fundamental work skills while implementing their own projects.

Standard 1: Industry Knowledge

Students will develop industry knowledge to understand career options and best practices in the business of photography.

- Explore careers in photography
- Ethics & Legal Expectations in Photography
  - Compare copyright, fair use, and public domain.
  - Photo editing/manipulation (advertising, photojournalism, etc.)
  - Model releases, licensing, contracts, forms.

Standard 2: Work Skills

Students will further develop fundamental work skills through their own photographic process.

- Collaboration, teamwork, communication, problem-solving, critical thinking, dependability, and accountability.

Performance Skills

- Submit original work for all projects.
- Demonstrate ethical practices when capturing, editing, and publishing photographic works.

STRAND 6: Portfolio/Present

Students will construct both a digital and print portfolio to demonstrate their development in technical literacy and style as it pertains to photography. The portfolio will serve as an assessment of student understanding through hands-on, process-based learning of each concept listed.

Standard 1: Technical Portfolio
Students will construct a digital and/or print portfolio to demonstrate their development in technical literacy as it pertains to photography.
- Student Selected Projects/Work (book, Online portfolio, social media page, presentation)

Standard 2: Stylistic Portfolio
Students will construct a digital and/or print portfolio to demonstrate their understanding of professional photographic styles.
- Student-selected projects/work (book, online portfolio, social media page, presentation).

Standard 3: Present
- Students will present their photographic work to others through exhibitions or other events.

Performance Skills
- Create a digital and print photographic portfolio.
- Display high-quality photographic works through exhibitions or other events.

STRAND 7: SkillsUSA – Level 2

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 2.

Standard 1
- Understand and demonstrate reliability.
- Determine individual time management skills.
- Explore what's ethical in the workplace or school.
- Demonstrate awareness of government.
- Demonstrate awareness of professional organizations and trade unions.

Standard 2
- Understand and demonstrate responsiveness.
- Define the customer.
- Recognize benefits of doing a community service project.
- Demonstrate social etiquette.
- Identify customer expectations.

Standard 3
- Understand resiliency.
- Discover self-motivation techniques and establish short-term goals. • Select characters
- of a positive image.
- Identify a mentor.

Standard 4
- Understand and demonstrate workplace habits.
- Participate in a shadowing activity.
- Explore workplace ethics: codes of conduct. Recognize safety issues.
- Perform a skill demonstration. Exercise your right to know.

Standard 5
- Understand and develop initiative.
- Develop personal financial skills.
- Develop a business plan.
- Investigate entrepreneurship opportunities.

Standard 6
- Understand and demonstrate continuous improvement.
- Conduct a worker interview.
- Demonstrate evaluation skills.
- Examine ethics and values in the workplace.
- Develop a working relationship with a mentor.
- Construct a job search network.

Performance Skills

Join SkillsUSA (or other CTSO) chapter at your school.

Skill Certification 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		

STRANDS AND STANDARDS
COMMERCIAL PHOTOGRAPHY 3

Learning that works for Utah
CTE®

Course Description

This course is designed for students to develop their skills and knowledge towards a professional level of competency in commercial photography. Students will develop knowledge and skills in the following areas: technical camera work, composition, digital editing and manipulation, Adobe Photoshop, Adobe Lightroom, connecting with the community through real-world experiences, development of a professional portfolio, and workplace skills.

CAMERA REQUIREMENT: It is recommended that students have access to a Digital SLR camera. At a minimum, cameras must use removable memory cards and have adjustable mode settings.

SOFTWARE REQUIREMENT: Adobe Photoshop or Photoshop Elements, Adobe Lightroom.

Intended Grade Level	11-12
Units of Credit	0.5-1.0
Core Code	40.13.00.00.016
Concurrent Enrollment Core Code	40.13.00.13.016
Prerequisite	Commercial Photography 2
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	Commercial Photography

ADA Compliant: Month/year

STRAND 1: Mentorship

Students will work with a mentor for 40 hours over the duration of the course (industry partner or education professional) to develop mastery in photographic workflow to produce and complete real-world projects.

Standard 1: Capture

Students will demonstrate mastery in capturing photographic images by employing proper equipment, exposure, light modification, and optional accessories.

- Camera
- Lenses
- Lighting
- Composition
- Exploring Meaning and Context

Standard 2: Edit

Students will demonstrate mastery in transferring and editing photographic images.

Standard 3: Output

Students will demonstrate mastery in the use of appropriate file resolution, size, formatting, and modes for output of their images to digital and/or print media outlets.

Performance Skills

- Demonstrate mastery and professionalism through the multi-step process of photographic workflow.
- Work closely with a mentor for 40 hours over the duration of the course to gain knowledge and industry experience in producing real-world projects.

STRAND 2: Connect
Students will continue to form connections to the photography industry.

Standard 1: Career Path
Students will develop high-level industry-specific skills through hands-on service-learning outside of classroom time, arranged by CTE and instructors from within the school or greater community.

Standard 2: Industry Knowledge
Students will understand best practices and next steps as a professional photographer through creating a business plan.
- Ethics and Best Practices
  - Model Releases, Licensing, Contracts, Forms, copyright protections and processes.
- Basic Organizational Structures
  - DBA, LLC, SCORP, W2, Freelancing, Contracted, Salaried, In-House

Standard 3: Work Skills
Students will develop strategies for marketing their skills in the photography industry.
- Collaboration, teamwork, communication, problem-solving, critical thinking, dependability, accountability, and legal requirements/expectations
- Professional Preparation
  - Resume Development
  - Industry Trends & Outlooks
  - How to Break into the Industry
  - Take risks in entrepreneurial opportunities
- Branding and Self-Promotion (vision & mission)
  - Web Presence (Social Media Strategies and Content Creation)
  - Competitive edge/advantages

Standard 4: Customer Service
Students will demonstrate high quality customer service skills when completing real-world projects.
- Identify and solve a customer/client's needs to the customer/client's satisfaction
- Understand the client/customer
- Professional demeanor, attitude, and language.

Performance Skills
- Develop and execute a professional plan using best practices for a career in the photography industry.
- Complete a photographic project with quality customer service for a client or customer.

STRAND 3: Portfolio

Students will create polished portfolios and a professional plan to demonstrate their photography knowledge, skill, and experience to prepare in entering the commercial photography industry.

Standard 1: Cumulative Professional Portfolio

Students will develop, curate, and design polished digital and print portfolios to demonstrate their photographic knowledge, skill, and experience.

- Student-Driven cumulative portfolio (digital and print) representing their strongest commercial and fine art work.
- Finalized professional plan
  - Mock-up forms, releases, and contracts
  - Resume
  - Letter of Recommendation from mentor/internship
  - Branding Materials

Performance Skills

Based on school resources, students will work together with industry partners or a school mentor to complete the following objectives:

- Independently complete real-world photographic work with industry partners or school programs.
- Independently problem-solve real-world photographic scenarios with industry partners or school programs.

STRAND 4: SkillsUSA – Level 3

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
Participate in a Utah SkillsUSA (or other CTSO) competition representing your school.

Skill Certification 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		

DRAFT

Cluster: Business, Finance & Marketing		
Pathway: Finance		
Course Code Number	Course Name	Summary
32.02.00.00.216	Business Office Specialist	Made the Business office specialist course more brand agnostic so that the school or teacher can decide which programs they want to teach the strands and standards with. Bolded key terms and concepts and rearranged the course strands and standards
32.01.00.00.001	Business Math & Personal Finance	Name and major revisions of the course
32.02.00.00.150	Digital Business Applications	Small changes with the alignment to the advertising & sales
32.02.00.00.200	Economics	Minimal Changes to the Strands and Standards. Brought back some of the theorist information that had been cut in the last revision for better alignment with university programs
37.01.00.00.002	Influencer & Content Marketing	Brand New Course all new content in the Marketing Pathway
37.01.00.00.260	Sports & Recreation Marketing	Name change and Revised courses strands and standards to add the inclusion of outdoor recreation which is a high-demand industry in Utah
37.01.00.00.220	Real Estate	Revised with small changes to formatting and order

STRANDS AND STANDARDS
BUSINESS OFFICE SPECIALIST

Course Description

This course applies advanced concepts and principles using word processing, spreadsheets, and electronic slideshow software. Students may have the opportunity to obtain industry certifications through either Google, Microsoft, and YouScience. The certification is recognized worldwide as the best method for employers to validate computer skill proficiency. Students will integrate the applications learned. This course builds on skills included in Digital Literacy.

Intended Grade Level	9-12
Units of Credit	.5
Core Code	32.02.00.00.216
Concurrent Enrollment Core Code	32.02.00.13.216
Prerequisite	None
Skill Certification Test Number	251
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business & Marketing (CTE/General)
Endorsement 2	Business & Marketing Info Management L1

Strand 1

Students will be able to identify common features and organize files across a variety of software programs.

Standard 1

Demonstrate these common functions in software applications.

- Cut
- Copy
- Paste
- Undo
- Redo
- Save
- Modify print settings
- Export as PDF
- Find
- Find + Replace
- Spell check
- Zoom
- Format and edit text options
    - Font Style
    - Font Color
    - Font Size
    - Bold
    - Italicized
    - Underline
- Apply various font styles and font sizes to the text within a document
- **Headers:** located in the margin area at the top of a page. This information is repeated on each page and thus enables the reader to easily navigate the document.
- **Footers:** located in the margin area at the bottom of a page. This information is repeated on each page and thus enables the reader to easily navigate the document.
- Apply advanced text options using **superscript, subscript,** and capitalization (lowercase, uppercase, title case)
- Insert hyperlinks
- Insert symbols and special characters
- Identify the difference between Save and Save As.
    - **Save** is a command that creates an original file and location or updates changes made in a document while keeping the original file name and location.
    - **Save As** is a command that creates a copy of a current document and allows the user to rename and/or relocate the document.

Standard 2

Demonstrate best practices for 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

Identify and navigate through common software application screen components
- Locate the various toolbars, menus, and document window
- Utilize the ruler to edit a document
- Explain the purpose of the status bar
- Identify and explore the different options within the navigation pane
- Apply and edit the different zoom options
- Utilize the scroll bars to navigate through a document
- Identify the purpose for different graphic objects (WordArt, image/picture, shapes, and text boxes)
- Apply and edit different graphic object formats (size and position, text wrapping, borders and shading, shape fill/outline, rotate/flip)

STRAND 2

Students will explore word processing software and the many practical and creative applications for both personal and career development

Standard 1

Apply and format basic editing and formatting tools within a document
- **Built-in styles:** combinations of formatting characteristics that you can apply to text to quickly change its appearance. For example, applying the Heading 1 style might make the text bold, Arial, and 16 point, and applying the Heading 2 style makes text bold, italic, Arial, and 14 point.
- **Paragraph options:** Paragraph formatting commands are in the Home → Paragraph group. Left to right, from the top, you find buttons to add bullets and numbers, apply indents, and short paragraphs, show the paragraph mark, align paragraphs, adjust line spacing, change the background color, and add borders.
- **Tabs:** used for aligning text in a word processor by moving the cursor to a predefined position
- **Background:** color/page color
- **Watermark:** a faint design made in some paper during manufacture that is visible when held against the light and typically identifies the maker
- **Paragraph Spacing**: determines the amount of space above or below a paragraph
- **Vertical Text alignment:** determines the position of the text within a section of a document relative to the top and bottom margins
- **Horizontal Text alignment:** positions the text evenly between the margins on either side of the page.
- **Paragraph Indent options:** (left, right, hanging, and first line)
- **Text bullets and numbering:** (customize and list levels)
- **Format images:** size & rotation, text wrapping, color adjustments, borders

Standard 2

Identify, and define functions used to review, navigate and edit a document

- **Thesaurus:** to explore alternative words. Lists words in groups of synonyms and related concepts.
- **Format painter:** lets you copy all of the formattings from one object and apply it to another one
- **Bookmark:** used to help navigate through a document. A bookmark is a feature that lets you tag words, pictures, charts, or other objects to quickly find and view them again later.

Standard 3

Modify a table within a document through the use of insert, delete, and select the entire table.

Define the parts of a table.
- **Rows:** horizontal alignment of data
- **Columns:** vertical alignment of data
- **Cells:** part of a table where a row and column intersect and leave a field to enter text into
    - Size, merge, and split cells within a table
- Enhance the appearance of a table using borders, shading/color, and styles
- Align text within a table and a cell (top, bottom, right, left, center) Use icons for test
- Sort data within a table
    - **Alphabetically:** the order of the letters of the alphabet
    - **Numerically:** sorted by numbers

Standard 4

Insert references appropriately to a document. **References** provide the information for readers to identify and retrieve each work cited in the text. Cover the following references and when it is important to use each one. Commonly used in formal reports, thesis papers, project reports, and business plans
- **Cover page:** represents the main highlighted part of your document that contains the document title, pictures, company logo, or information about the document file.
- **Table of contents:** listing all the headings in the document in outline order, as well as the page number that each heading appears on.
- **Citations:** the way you tell your readers that certain material in your work came from another source and gives your readers the information necessary to find that source again. Citations may include Information about the Author(s) or Editor(s). The Title of the Work. The Publisher. The Date published.
- **Footnote:** appears on the bottom of the page that contains the sentence to which it refers.
- **Endnotes:** are listed at the end of the paper on separate pages
- **Bibliography:** list of sources referred to in a document
- **Caption Properties:** the text identifies or describes the object with which it is associated an image, textbox, and figure
- **Comments:** useful when needing to make note of something that requires attention or needs fixed, or provide additional information to others reading the document.

Standard 5

Format and customize page layout options within a document.
- **Templates**: predefined page layout, fonts, margins, and styles to enhance productivity
- **Margins:** the blank spaces that line the top, bottom, and left and right sides of a document.

- **Section breaks:** used to divide the document into sections, change the layout or formatting in one section of your document
- **Page breaks:** mark the point at which one-page ends and the next page begins
- **Page orientation:** portrait (vertical) or landscape (horizontal) layout
- **Page numbers** within a document
- **Columns** within a document (multiple columns, spacing between columns, lines between columns)

Performance Skills

Use word processing software to create a real-world project. Encourage students to create a project with personal interest to promote the use and exploration of word processing programs for individual use.

- Create a Report, Newsletter, Brochure, Blog post, Magazine Article, or Infographic

STRAND 3

Students will explore spreadsheets and the careers that use them. Spreadsheets can be used to solve problems that require organization, calculation, scheduling, and other work-related needs.

Standard 1

Identify, define and modify cells, worksheets, and workbooks in a spreadsheet program. Include customizing, formatting, and layout options; creating, opening, importing and exporting, copying, and moving worksheets in a workbook.

- **Workbooks:** a single spreadsheet
- **Worksheets:** a group of worksheets, identified by tabs at the bottom of a worksheet.
- **Cell References:** A definition in a cell that refers to the contents of another cell
- **Formula bar:** a field at the top of a spreadsheet that shows the contents of the current cell and allows you to create and view formulas.
- **Name box:** lets you select cells or ranges by entering a reference or range name.
- **Sheet Tabs:** Reference labels on a workbook that identifies the data inside the worksheet.
- File formats for spreadsheets
  - .xls, csv
- Edit and customize text formatting
  - Merge & center
  - **Wrap text:** a command that formats the text in a cell to wrap a line underneath each other.
  - Align text
- Edit and customize **Number formatting:** to change the appearance of a number within a cell to reflect the type of information being displayed.
  - General
  - Currency
  - Accounting
  - Date & time
  - Decimal
- Apply and modify styles to cell
  - Wrap text
  - Cell styles
  - Cell alignment

- Apply and manage view options
  - **Freeze panes:** keeps specific rows or columns visible when you scroll in the worksheet.
  - **Split window:** you can view two areas of a sheet by splitting it into separate panes where you can scroll in both panes independently.
  - **Zoom:** changes the scale of a worksheet. When you want to see more or less of a worksheet, use Zoom to increase or decrease the magnification.
  - Continue a series or pattern into neighboring cells using the **fill handle:** a feature used to extend and fill several numbers, dates, or text to other cells.
- Edit and customize cell size (row height, column width,)
- **AutoFit:** automatically adapts to appropriate height and width based on font size.

Standard 2
Manage Data to create, format, and modify tables, charts, and graphs
- Insert, move, delete, and copy a worksheet **range:** a collection of cells
- Utilize **named range:** naming a range of cells.
- Manipulate data in worksheets
  - **Auto Fill:** when entering a predictable series, it will automatically enter data.
  - paste options
- **Sort and filter** data within a worksheet
  - **Ascending:** from A-Z or from the smallest number to largest.
  - **Descending:** from Z-A or from largest number to smallest.
  - Multiple fields
- Create charts
  - **Line chart:** displays data points connected by straight lines and shows information (trends) that changes over time.
  - **Pie chart:** displays data in a circular graph showing the percentage of the whole.
  - **Column chart:** displays rectangular bars to show a comparison between categories.
- Modify and format charts
  - Add **data series:** a row or column of numbers that are entered in a worksheet and then used to plot a chart.
  - Add and modify **chart elements:** this makes your chart easier to read such as chart titles, legends, and data labels.
  - Apply **chart layouts:** contains the information for the structure and design of the various graphs.
  - Apply **chart styles:** adjusts the format of several chart elements all at once.
- Summarize data visually
  - **Sparklines:** tiny chart in a worksheet cell that provides a visual representation of data.
  - **Conditional formatting:** changes the appearance of a cell range based on a condition.

Standard 3
Differentiate and apply formulas and functions

FORMULA SYNTAX		
START	FUNCTION	ARGUMENTS
=	SUM	(A1+A2)

- **Formulas vs. Functions**
  - **Formula:** an expression that operates on values in a range of cells or a cell. For example, =A1+A2+A3, which finds the sum of the range of values from cell A1 to cell A3.
  - **Function** predefined formulas in Excel. For example: =SUM(A1:A3). The function sums all the values from A1 to A3.
- Insert cell references
  - **Relative reference:** a cell reference is a relative reference, which means that the reference is relative to the location of the cell.
  - **Absolute reference:** a reference that is "locked" so that rows and columns won't change when copied.
  - **Mixed references:** only part of the reference is fixed, either the row or the column, and the other part is relative.
- Coding functions including

SUM	=SUM(A1=A2)
IF STATEMENTS	=IF(B2>=50, "PASS", "FAIL")
MAX	=MAX(C3:C8)
MIN	=MIN(C3:C8)
COUNT	=COUNT(B4:B8)
COUNTIF	=COUNTIF(A2:A13, "collar")
VLOOKUP	=VLOOKUP(C5,B4:D10,2)
HLOOKUP	=HLOOKUP(C5,A9:A12,3)

- Apply **total rows style:** a preset style for totals.
- View in **show formula** mode: displays formulas and functions in the worksheet.
- Error messages
  - **Formatting Error ######**
  - **Name Error (#NAME?)**
  - **Value Error (#VALUE!)**
  - **Division Error (#DIV? 0!)**
  - **Null Error (#NULL!)**
  - **Reference Error (#REF!)**

Performance Skills

Use spreadsheet software to problem-solve and create a real-world project. Encourage students to create a project with personal interest to promote the use and exploration of spreadsheet programs for individual use.
- Create a budget, invoice, chart, or order form.

STRAND 4
Students will explore and create a slideshow to learn essential communication for real-world and office applications.

Standard 1
Identify, define and modify a slideshow by learning the essentials needed for the modern-day office.
- Customize slideshow:
    - **Modify placeholders:** a preformatted container on a slide for content (text, graphics, or video). The preset formatting makes it easier to format slides consistently.
    - **Modify layout**
    - **Size:** change the size of the slide(s)
    - **Theme:** preset formatting of a slideshow in text size, colors, placement, and graphic features.
    - **Font style**
    - **Format background**
- Edit basic **slide master/theme builder:** this is the top slide in a hierarchy of slides that stores information about the theme.
- Arrange and title **Sections:** to organize your slides into meaningful groups
- Insert and edit objects
    - **Picture**
    - **Table**
    - **Chart**
    - **Diagram/SmartArt:** is a visual representation of your information and ideas
    - **Sound**
    - **Video**
- Slide management
    - **Insert**
    - **Move**
    - **Delete**
    - **Reuse: obtain slide(s) from another slideshow**

Standard 2
Demonstrate and use enhanced tools to make slideshows more engaging to the audience.
- Apply custom **animation effects:** Applied to text, images, or graphics that move when entering or leaving a slide for added emphasis.
    - Entrance
    - Emphasis
    - Exit
    - Motion path
- Apply a **transition:** the visual effect that occurs when you move from one slide to the next during a presentation to a slide(s) within a slideshow
- Edit animation **timing:** the time that it takes for an object to enter or exit the slide.
- **Slide order**: rearrange the slides
- **Format images and shapes:**
    - **Size & rotation**
    - **Text wrapping - formatting words around an image**
    - **Color adjustments**

- **Borders**
- Insert
  - Screenshots + screen clippings
  - **Hyperlinks**: a link from a file or document, typically activated by clicking on a highlighted word or image on the screen
  - **Action buttons:** an object on a slide that performs an action when clicked
  - **Speaker notes:** notes visible in the presenter view but not the audience
- Add **alt text** to graphic elements for accessibility: tells a screen reader what is in the image
- Configure slideshow options
  - **Set up timings:** slide(s) move on a chosen amount of seconds to the next slide
  - **Presentation view:** allows a presenter to preview the slide before it is seen by the audience.
  - **Loop:** to play the slideshow again without stopping
  - **Speaker notes:** help you remember what to say when you present. Print them, or use Presenter view to see your notes, while the audience sees only your slides.

Performance Skills

Use slideshow software to communicate and create a real-world project. Encourage students to create a project with personal interest to promote the use and exploration of slideshow software.
- Use slideshow software to create a slideshow(s), demonstrating professional quality design following generally accepted slideshow guidelines that include:
  - Transitions with automatic timing
  - Custom animations
  - Objects (charts, diagrams, tables, sound, video)
  - Hyperlinks and action buttons
  - Speaker notes, handouts, and outlines

Strand 5

Students will identify the courses that will help them to be a pathway completer as well as potential careers as an office administrator, executive assistant, project manager, information clerk, and many more.

Standard 1

Business, Finance and Marketing Pathways
- Identify the "Explorer" courses offered at your school
- Identify the "Concentrator" courses taught at you school
- Identify the "Completer" course for the Business, Finance and Marketing Pathways

Standard 2

Explore the Certifications, Degrees and Tech college programs in your local region

Certifications available through your school
- Utah BOS Skills certification
- Microsoft Office Specialist certification

- Adobe Creative Associate certification

Degrees Available in your local region
- Associate degree in Business Administration, Business Information, Business Technology
- Most state colleges offer a bachelors in Business Management, Human Resource Management
- Masters in Business Administration
- Western Governors University
  - MBA
  - Business Management
- University of Utah: Certificate in Digital Literacy
- MTEC, Ogden/Weber Tech, Uintah Basin Tech
  - Digital Media
- BTech: Business Technology
- UVU Marketing and Digital Marketing
  - Professional Sales Certificate
- USU Huntsman Business School

Standard 3

Careers in Business Administration
- Explore current job postings in this field to introduce students to the fact that this is a high wage high demand field. There are many options that are available based on different strengths.

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		

STRANDS AND STANDARDS
SMALL BUSINESS MATH & STARTUP

Course Description

This course is designed to teach concepts, knowledge, and skills that will create the ability to solve mathematical problems in order to start a small business. This will enable students to advance from the idea of a small business to the steps and decision-making needed to be a successful business owner. This course can be counted for .5 CTE elective credits.

Intended Grade Level	10-12
Units of Credit	.5
Core Code	32.01.00.00.001
Concurrent Enrollment Core Code	32.01.00.13.001
Prerequisite	None
Skill Certification Test Number	236
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business & Marketing (CTE/General)
Endorsement 2	Business & Marketing Essentials

ADA Compliant: Month/year

STRAND 1

Business Idea

Students will explore feasible and viable business options for their local community.

Standard 1

Explore business start-up ideas that could work in your local community and determine where there is an opportunity in the local market.

- Use the Utah Department of workforce services website to explore the economic information for your community.
- Use census or other community data to determine potential areas of growth. i.e aging population may need more medical care. Birth rates and vital statistics can predict market trends.
- Changes and growth predictions from University studies such as the University of Utah's Kem C. Gardner Policy Institute.

Standard 2

Examine the various formats of today's start-up businesses and the costs associated with each. Include the following.

- **Retail business**: a business that buys goods from wholesalers, manufacturers, or other retailers and then sells to a consumer for a profit.
  - Rent or lease
- **e-Commerce**: a business model where the buying and selling of products or services take place on the internet
  - Online website costs
  - Shipping & Packaging cost
- **Subscription-based**: a business model in which customers pay a recurring fee (usually weekly, monthly, or annually) in exchange for a company's product or service.
  - Boxed subscriptions in make-up, clothing, food, and education
  - Manufacturing & Packaging cost.
- **Direct to the consumer:** a business that sells its products directly to consumers without going through an intermediary or retailer.
  - Avoiding the middle man in retail
  - Wholesalers/Manufacturers shipping to consumers directly. During the Covid19 pandemic meat suppliers pivoted to sell directly to families vs restaurants and grocery stores.
  - Helps maintain higher profit margins
- **Consumer to Consumer (C2C)**: a business model where private individuals buy from and sell to each other, generally in an online environment. (eBay, Craigslist, Etsy, Facebook Marketplace)
  - Advertising or boosting through the site.
- **Consignment:** a business model in which a retailer (consignee) pays a seller (consignor) for merchandise after the item sells.
- **Business to Business (B2B):** a business model in which a business creates and sells products or services to another business.

Standard 3

Conduct market research to determine profit and sustainability potential in the industry. To be a viable business there should be a demand or a need for the product or service and not an over-saturated market, potential for profit.

- **Cost of Goods Sold (COGS):** The cost of producing the products that are sold by a company. It includes the input costs, materials, labor, and overhead costs associated with each unit of product sold.

* Cost of Goods Graphic place here

- **Profit Margins**: The amount of profit, usually expressed as a percentage, that a company makes per item sold.
  - (revenue – cost of goods sold)/revenue = profit margin
- **Distribution Channels:** The path a product takes to reach the final buyer. Distribution channels may include intermediaries such as wholesalers and retailers, or they may be direct to consumers.
  - Cost of transportation, air, sea, land, delivery
- Location availability
  - Analyze business locations for optimal foot traffic
  - Space requirements
    - Virtual, Office Space, Warehouse, Loading docks, Parking

Performance skills

- Analyze the cost of goods sold and profit margin for a specific business idea or industry
- Present on your start-up business idea that shares your research of the community, industries, and business needs.

STRAND 2

Funding your business

Students will identify and estimate the costs associated with funding a start-up business.

Standard 1

Illustrate and provide examples of the costs commonly associated with starting a small business

- **Location**
  - Local real estate marketing

- Mall Kiosk
- Storage facilities
- Booth at a fair
- **Website**
  - URL Address or free version
  - Graphic Designer or web design
  - Hosting fees
- Construction or building labor
  - Building new vs remodeling
- Product Inventory
- Equipment

Standard 2

Explain how the break-even point can be used to show how long it takes for a startup business to become profitable.

- **Fixed Cost**: Expenses that stay the same regardless of production output
  - Fixed Cost = Total Cost – (Variable Cost Per Unit * Units Produced)
- **Variable Cost**: Expenses that vary depending on the number of units produced.
  - Total Variable Costs = Cost Per Unit x Total Number of Units.
  - Cost Per Unit may include direct labor cost, raw materials, shipping costs, manufacturing overhead, etc.
- **Sales Price**: Price charged per unit or service to a customer
- **Break-Even Point**: The point at which a company's total revenues equal total costs. The break-even point can be calculated in two ways: 1- determining how many units need to be sold, or 2- determining the number of sales in dollars needed to break even.
  - Calculating the Break Even Point in Units
    - Fixed costs/(sales price per unit - variable cost per unit)
  - Calculating the Break Even Point in Sales Dollars
    - Fixed costs/contribution margin
    - Contribution margin = (sales price per unit - variable cost per unit)/sale price per unit

Standard 3

Identify the sources commonly used to raise funds for a business start-up.
- Describe Investors including the following types of investors.
  - **Debt financing**: Borrowing money that must be paid back to the creditor with interest. The creditor does not have any additional claim on the company.
  - **Equity financing:** Raising capital by selling shares of the company
  - Crowdfunding: A method of financing by raising capital from a large number of people, generally via the internet (Kickstarter, Indiegogo, GoFundMe)
- Explain business loans and the prerequisite to be approved.
  - SBA loans:
    - Loan payments
    - Interest rate: Dependent on credit score
    - **Amortization**: Paying off a debt by scheduled, regular payments. Each payment has a specified amount that goes toward the principal balance, as well as interest.
  - Business Credit Cards

- Explain that personal savings and/or loans from family and friends can have advantages and disadvantages.
  - Can cause family conflict or strain
  - Should keep some savings and personal income until the business gains profitability.
  - When self-funding, consider all household expenses until you may become profitable.
    - I.e. Mortgage, groceries, insurance car payments
- Start-up grants
  - Research local, state, and federal organizations that support small businesses

Performance Skills (Choose two)
- Calculate when you would break even on your start-up cost
- Compare two different loan options for a small business by analyzing the amortization schedule.
- Compare an equity financing option versus a debt financing option at various points in a business life-cycle. I.e. 6 months, 1 year, and 3 years.

STRAND 3
Registering and protecting your business
Students will understand the various methods used to establish and protect a business, including the cost associated with those decisions.

Standard 1
Setting up and registering your business
- Business license requirements
  - City permits and zoning
  - State and Federal tax IDs
    - **Employee Identification Number (EIN)**: A Federal Tax Identification number used to identify a business entity.
  - Registering your business name

Standard 2
Filing patents, copyrights, and trademarks for your business
- **Patents**: An exclusive right granted to protect an invention.
- **Copyrights**: The legal rights given to an owner of a creative work that protects the work from unauthorized use. Copyright is automatically granted upon the creation of the creative work in a tangible form of expression.
- **Trademarks:** A symbol, word, or phrase that is legally registered or established by use as representing a company or product.

Standard 3
Types of business including cost, liability issues, tax benefits, and regulations.
Provide examples for each basic form of ownership:
- **Sole Proprietorship:** A sole proprietorship is the simplest and most common structure chosen to start a business. It is owned and run by one individual with no distinction between the business and you, the owner. The owner is entitled to all profits and is responsible for all your business's debts, losses, and liabilities.

- **Partnership:** an arrangement between two or more people to oversee business operations and share its profits and liabilities.
- **Corporation:** is legally a separate and distinct entity from its owners. Corporations possess many of the same legal rights and responsibilities as individuals.It has limited liability, which means that its shareholders are not personally responsible for the company's debts. It may be created by an individual or a group of people with a shared goal.
  - **Limited Liability Company (LLC):** is a business structure in the U.S. that protects its owners from personal responsibility for its debts or liabilities. Limited liability companies are hybrid entities that combine the characteristics of a corporation with those of a partnership or sole proprietorship.
  - S-Corporation
  - C-Corporation

- Identify characteristics, advantages, disadvantages, and examples of a **Franchise Agreement:** A contract in which a franchisor grants a franchisee the right to operate the business
- **Non-Profit:** does not earn profits for their owners. All of the money earned by or donated to a non-profit organization is used in pursuing the organization's objectives and keeping it running.

Standard 4
Identify and compare common business insurance needs based on industry.
- Reasons to insure a business
  - **Liability**: Being responsible for something that happens in your business operations
  - Asset Protection

- Common types of business insurance
  - **Liability insurance**: General Liability Insurance protects your company if you cause injury or damage to others.
  - **Workers compensation:** A type of insurance that covers workers who are injured or become disabled as a result of their job.
  - **Accidental Death & Dismemberment (AD&D):** Insurance that covers fatal and nonfatal accidents involving dismemberment or loss of eyesight or hearing.
  - **Data Breach**: Helps protect your business from the impacts of a cyber attack or data breach.
  - **Commercial Property or Business renters insurance**: Protects the physical assets of a business
  - **Commercial Auto:** A type of auto insurance that covers vehicles used for business purposes.

Standard 5
Describe the measures used in securing a business.
- Explain the importance of security policies and safety precautions for a business.
- Describe internal and external theft in a retail business.
  - **Internal theft**: also known as employee theft, consists of any stealing, embezzlement, fraud, or taking of business property without permission.
  - **External theft**: often called shoplifting, break-ins, robberies, or other acts by persons with no connection to the business.

- Discuss methods of **loss prevention** as any actions taken to reduce the amount of theft, breakage, or wastage in a business. This includes poor record-keeping and inventory management.

- Identify essential checks and balances when accepting payments from customers
  - Cash handling policies and procedures
  - Counting down cash drawers before and after use.
  - Two people calculating deposits

Performance Skill (Choose 2)
- Compare insurance coverage required for many types of businesses, including retail, food/service, and recreation.
- Research the steps to registering your business on a local, state, and/or federal level
- Analyze the advantages and disadvantages of registering your business as each of the types of business ownership.

STRAND 4
Business Operations
Students will explore the cost associated with receiving payments, as well as hiring, training, and retaining employees.

Standard 1
Outline the decisions a business owner should consider before opening a business
- **Point of Sale** (POS) system: hardware or software that enables your business to make sales
  - **Forms of payment**
    - Cash, credit cards, digital wallet apps, and mobile payment apps
    - Fees for using each
  - Invoicing for B2B
  - Accounting Software
- Determine sales/service hours
  - Business Hours
  - Number of staff members
- Distribution or shipping cost
  - Cost added to purchase
  - Cost by weight, size, and quantity
  - Cost by speed
- Supply chain management
  - Delivery times
  - B2B vendors for manufacturing and packaging inputs

Standard 2
Discuss the human resource needs to begin a business
- Staffing a start-up
  - Essential positions to begin various forms of business.
  - Required skills and certifications
  - Job sites and Job descriptions
- **Hiring Paperwork**: New hire paperwork includes all the documents that organizations use to begin an employment offer, intake new team members
  - W-4, I-9
  - Background checks

- Employee policies and procedures.
  - Discuss the importance of employee standards and training

Standard 3

Discuss the employee cost associated with running a business.
- Determine labor cost by position
  - Wage should match the education, skill, and experience level of the employee
  - **W-2 employee**: paid through their employer's payroll and have their payroll taxes withheld throughout the year
  - **1099 employee:** an independent contractor, Freelancers, consultants, self-employed workers, and sole proprietors are common types of 1099 employees
  - Wage vs Salary

- Describe the difference between Net and Gross pay
  - **FICA cost**: US Federal Payroll Tax. FICA stands for Federal Insurance Contributions Act and is a combination of Social Security (6.2%) and Medicare (1.45%) taxes.
  - Unemployment tax

Standard 4

Hiring and training and retention cost
- Competitive wages
- **Benefit packages:** a collection of non-wage compensation that supplements an employee's salary
  - Retirement
  - Sick Day
  - Vacation time
  - Insurance
- Training cost

Performance Skill
- Analyze and interpret sales for staffing a business
- Compare POS systems and credit fees
- Calculate payroll for a two week pay period using a simple spreadsheet
- Compare local job opportunities pay, and benefits

STRAND 5

Business Budget

Students will understand the reasons that a business budget is needed and the categories, cost, and value of sales projections.

Standard 1

Determine the revenue for sales or services
- Determine the sources of **revenue** (the amount of money brought into the company, typically by selling goods, products, or services) for your business

- Explore the product offerings for various business types.
  - Apparel
  - Food
  - Retail products

- Explore service offerings for various types of service businesses
  - Tourism services
  - Medical services
  - Personal Care services
  - Consultant services

- Determine the markup of each of your products or services and set the prices to maintain a predetermined profit margin.
  - **Markup rate:** the difference between a product's selling price and cost as a percentage of the cost

Standard 2
Projecting expenses for your business:
- Investigate common expenses for your business
  - Marketing cost
  - Facility cost
  - Maintenance cost

*New graphic

  - Equipment cost
    - Buying New vs Used
  - Variable cost vs fixed cost

Standard 3
Determine prices of your products and services to reflect the intended profit margin.
- Read and understand a **profit and loss (P&L) statement:** a summary of the revenues, costs, and expenses incurred during a specified period, usually a quarter or fiscal year.
- Use the P&L statement to make business decisions and predictions about your future business opportunities
  - Use the P&L to make decisions about staffing, purchasing, growth, and cost-cutting decisions.

Performance Skill
- Build a business budget for a small business
- Analyze a Profit & Loss Statement from a similar small business

STRAND 6
Using Credit

Students will examine the use of credit in funding and operating a small business.

Standard 1
Credit Worthiness
- Discuss the purpose and role of credit.
- Explain the value of building and maintaining a healthy credit rating, including elements of **creditworthiness**: the likeliness that a person will not be able to pay back a loan. This is determined by a person's character, capacity, capital, collateral, and conditions.

Standard 2
Cost of Credit
- Explore various aspects of business credit card options, including
  - **interest rate**: Expressed as a percentage of the borrowed amount that the individual agrees to pay to be given a loan.
  - **annual fees:** a set amount paid annually on a credit card in addition to the agreed-upon interest rate. The range is between $95 to $500 a year.
  - **rewards programs:** a benefit to choosing one credit card over another.
    - Earning cash back, points, or miles on every purchase.
    - Redeem rewards for money-saving opportunities like travel bookings, statement credits, and online shopping credits.
    - Many rewards credit cards don't charge an annual fee.

- Describe why a business would use a credit card in the operations of a business.
  - Discuss **appropriate and inappropriate uses of credit cards** for business expenses.
  Appropriate uses include
    - Buying inventory
    - Travel expenses
    - To protect from identity theft
    - Separating business credit and individual accounts
    - Bankruptcy consequence to credit
  Inappropriate use of a small business credit card
    - Overspending
    - Paying more for items than using a debit card or cash that is available
    - Using a business credit card for personal use

Standard 3
Extending Credit
- Many industries offer credit and allow customers to pay after receiving products. B2B relationships often offer Net 30, discounts for payments to encourage paying sooner than later.

Performance Skill
Research business credit card offers and rewards programs from various sources
Examine the difference in the cost of a business purchase made using credit vs. cash

STRAND 7
Federal and Local Regulations
Students will be able to Identify and describe government agencies that regulate business:

Standard 1
Discuss the federal laws and agencies and how they impact on small businesses.
- **OSHA** (Occupational Safety and Health Administration)
  - Applies to all businesses with more than 11 employees. Ensures a safe working environment.
- **EEOC** (Equal Employment Opportunity Commission)
  - If you have 100 or more employees, or if you are a federal contractor with at least 50 employees and at least $50,000 in government contracts, you are required to complete and submit an EEO-1 Report to the EEOC and the U.S. Department of Labor every year.
- **FTC** (Federal Trade Commission)
  - Under the law, claims in advertisements must be truthful, cannot be deceptive or unfair, and must be evidence-based.
  - A business that averages less than $1,000,000 in sales of human food plus the market value of human food that is manufactured or processed. Should
- **HIPAA** (Health Insurance Portability and Accountability Act)
  - The HIPAA Privacy Rule for the first time creates national standards to protect individuals' medical records and other personal health information
- **FERPA** (Family Educational Rights and Privacy Act)
  - Important for any educational business. The Family Educational Rights and Privacy Act (FERPA) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education
- **FLSA** (Fair Labor Standards Act) establishes minimum wage, overtime pay, recordkeeping, and child labor standards affecting full-time and part-time workers in the private sector and in Federal, State, and local governments.
- **ADA** (Americans with Disabilities Act) The ADA requires that small businesses remove architectural barriers in existing facilities when it is "readily achievable" to do so. Readily achievable means "easily accomplishable without much difficulty or expense."

Standard 2
State Regulations and City Ordinances. Explore the sales licenses needed for the businesses included.
- Understand necessary licenses/permits to do business in a variety of industries, including at-home businesses in your local area
  - Sales licenses needed for door-to-door sales
  - Contractor license
  - Medical license
  - Service licenses (cosmetology, massage, tattoo)
  - **Food handlers permit:**

- Explore local city zoning ordinances and business licensing requirements
  - City noise ordinances
  - Zoning requirements
- Construction and building permits
  - Passing local inspections such as building, fire, and safety inspections

Standard 3

Explore online regulations/best practices for the following areas.
- Securing your website
  - **HTTP:** Not secured website
  - **HTTPS**:   Secured website.
  - Secure payments
- Online Cookies or data collection disclosure
- Privacy Policy best practices
- Terms of Use best practices

Performance Skill

Compare and contrast local business regulations and requirements to open a business in two neighboring cities
Identity federal agencies and organizations that regulate a business

Skill Certification 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		

For a year-long math course continue the second semester by teaching the General Financial Literacy strands and standards.

STRANDS AND STANDARDS
DIGITAL BUSINESS APPLICATIONS

Learning that works for Utah
CTE®

Course Description

Students will explore business applications through the lens of a sales and advertising career. This is a project-based course that will result in students being able to create a digital portfolio that will show understanding and utilize common business applications including; Business tools and programs, business safety and security, business communications for internal and external use, and the importance of applications in global business.

Intended Grade Level	9-12
Units of Credit	.5
Core Code	32.02.00.00.150
Concurrent Enrollment Core Code	32.02.00.13.150
Course is written for	9th and 10th grades
Skill Certification Test Number	215
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Business & Marketing (CTE/General)
Endorsement 2	Business& Marketing Info Management L1

Performance Skill

"Begin with the End in Mind" -Stephen Covey

This course is project-based and meant to provide students with basic digital skills used in Sales and Advertising.

Students will create an online portfolio. Each will include at least 5 of the following performance skills:

- Create a survey using form creation software
- Create a sales advertisement using the online image and graphic design applications.
- Create a shared calendar for sales and advertising promotions.
- Create infographics for a product or service
- Create an audio advertisement for a podcast highlighting a product or service.
- Create a 60-second video advertisement for a product or service
- Create a presentation for a new product or service
- Create a travel itinerary for a global business trip

STRAND 1

Tools and Programs

Students will explore the various tools and programs used in sales and advertising

Standard 1

Describe the need for sales and advertising professionals to use a variety of business applications. Include the following basic tools and programs.

- **Mobile devices:** used for communication, scheduling, marketing, social media post, and general daily organization while on the go and away from the office.
- **Laptops:** used to connect to networking systems for presentations and for the ability to work remotely.
- **Tablets:** often used for presentations and for signature collection on contracts and sales documents.

Standard 2

Introduce and describe when the following programs would be used in sales and advertising careers.

- **Word Processing:** used in a variety of marketing and sales documents from product specifications, and contracts to simple flyers
- **Spreadsheets:** Used to organize sales and service data such as contact information, invoices, and documents that need calculation or numeric information.
- **Presentations:** Used in sales and advertising to show a client the plan or process that a sales representative needs to communicate.
- **Adobe PDFs**: Used to preserve a signature from clients or customers when closing a sale or agreeing to a business transaction.
- F**orms & Surveys:** Used to create online questionnaires with multiple question types.

STRAND 2

Safety and Security in Business Applications

Students will understand the importance of privacy, security, and protecting a company's intellectual property.

Standard 1

Review and evaluate ethical issues pertaining to the use of images, trademarks, and copyrights

- **Acceptable use policies**: a document that outlines a set of rules to be followed by users or customers of a set of computing resources, which could be a computer network, website or large computer system.
- **Code of ethics**: A guide of principles designed to help professionals conduct business honestly and with integrity.

Standard 2

Understand common threats to business security

- **Malware**: malicious software, is a blanket term for any kind of computer software with malicious intent.
- **Phishing attacks**: the fraudulent practice of sending emails purporting to be from reputable companies in order to induce individuals to reveal personal information, such as passwords and credit card numbers.
- **Ransomware:** a type of malicious software designed to block access to a computer system until a sum of money is paid.
- **Spyware**: software that enables a user to obtain covert information about another's computer activities by transmitting data covertly from their hard drive.

Standard 3

Understand the importance of securing sensitive business information

- **Trade secrets:** Formulas, patterns, or methods used to produce a creative work or product that is generally not known outside the company.
- **Patents:** The legal right granted to an inventor.
- **Copyright:** The exclusive legal right given to the creator of works printed, posted, published, filmed, or recorded.
- **Intellectual property:** A creative work or idea for which an individual has ownership rights.

STRAND 3

Business Communications (Internal)

Students will understand the common channels and applications used to communicate in the sales and advertising industry.

Standard 1

Demonstrate and describe the appropriate situations to use essential forms of communication in sales and advertising.

- **Email:** Professional correspondence
- Call/Voicemail: Recording that informs clients and business partners of important information when you are not available to answer the call.
- Text/ Messaging Systems: Sent and received by mobile phone number
- TTY Systems: A special device that lets people who are deaf, hard of hearing, or speech-impaired use the telephone to communicate, by allowing them to type text messages.

Standard 2

Describe the need to access shared work in a professional business setting. Emphasize the importance in terms of efficiency, workflow, and communication.

- **Calendars/Scheduling software:** Software that allows businesses and professionals to manage appointments & bookings
- Shared document services: online programs that allow businesses and professionals to share files, synchronize, and collaborate while storing information on a cloud-based system.
- **Virtual Meetings**: real-time interactions that take place over the Internet using integrated audio and video, chat tools, and application sharing
- Customer Database: a collection of information including contact information

STRAND 4

Business Communications (External)

Students will create a variety of print, video, and audio advertisements and understand the impact advertising has on a business's ability to reach customers and grow their business.

Standard 1

Print Media

Identify the different types of print media used in both traditional and digital advertising.

- Content Creation in the form of advertising in print publications
- Product or Sales Brochures used in the sales process to communicate products and service features.
- Sales Flyers that incorporate a QR code. These can be implemented in print publications and in social media posts.
- **Infographics**: Used to show versus tell large amounts of information in a visually appealing and concise manner.
- Sales and Advertising Posters
- **Blog**: a website where someone regularly records their thoughts or experiences or talks about a subject.
- **Social Media**: Connect with the target audience through various print materials

Standard 2

Video

Demonstrate how businesses are innovating with a variety of video, and live streaming advertisements to grow their business.

- Video or Vlog: Grab attention or retain customers with enhanced material
- **Webinar:** An event hosted live over the internet
- Animation: Digital images that move to draw attention to a sales advertisement. Often used in social media and email marketing.
- Presentation: A visual demonstration strategy to initiate a sale of a product or service
- **Social Media:** Used to gain attention, build authority, and reach potential customers

Standard 3

Audio

Provide examples of how streaming and online platforms use audio ads in today's sales and marketing. Describe the ability of celebrities to and influencers build careers through this advertising medium.

- **Radio Ads:** an audio recording used to promote business and services, often includes music or special songs called jingles.
- **Podcast:** An On-Demand Broadcast intended to entertain, educate, motivate, or inspire its audience.

STRAND 5

Business Globalization

Students will understand the impact and advantages of technology relating to the globalization of business.

Standard 1

Discuss the ways that teams are able to collaborate using digital technologies working within a global environment.

- **Translation Software:** an application that is used to speed up the process of changing sales and advertising information into another language. This includes closed captions for the hearing impaired.
- **Currency Conversion:** The rate at which one country's money is exchanged for another country's money. 1 Dollar = _____ Euros/ Pesos /Yen

Discuss the difference in time zones and the need to convert times for scheduling meetings.

> Example: Communicating with an international team

Provide examples of when a salesperson would need to adapt their process of doing business to integrate important customs and cultural differences.

Standard 3

Describe the use of technologies to navigate the business world.

- Use online mapping software to schedule sales calls or business-to-business visits.
- Calculate the time and mileage for a business trip

STRAND 6

Sales and Advertising Careers in the Marketing Pathway

Students will identify the courses that will help them to be pathway completers as well as potential careers in sales and advertising.

Standard 1

Describe the purpose of the CTE Marketing Pathway to help students to explore post-secondary options for a career in sales and advertising.

Using your school's courses describe an ideal way that students could become a Marketing pathway concentrator or completer.

> Identify the "Explorer" courses offered at your school
> Identify the "Concentrator" courses taught at your school
> Identify the "Completer" course for the Marketing Pathway

Standard 2

Certifications, Licenses, and Degrees in Sales and Advertising

Highlight opportunities in your local area for sales and advertising careers.

- Weber State Sales College
- UVU Marketing and Digital Marketing
  - Professional Sales Certificate

- USU Huntsman Business School
- Ensign College
    - Digital Marketing Certificate (Associates degree)
- MTECH, Ogden/Weber Tech, Uintah Basin Tech
    - Digital Media
    - Digital Marketing & Analytics
- SLCC
- Snow College
    - Associate of Science Business Degree
- Business & Marketing Education at USU, UVU, and SUU
- Utah Technical University
- University of Utah: Certificate in Digital Literacy (includes a digital marketing course)
- Western Governors University
    - MBA
    - Business Management

Standard 3

Careers in Sales and Advertising

Explore current job postings in this field to introduce students to the fact that this is a high wage high demand field. There are many options that are available based on different strengths.

Skill Certification 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		

STRANDS AND STANDARDS
ECONOMICS

Learning that works for Utah
CTE®

Course Description

Economics is a social science that studies how people satisfy unlimited wants and needs with scarce resources. Characteristics of the market economy of the United States and its function in the world will be explored. Students will learn methods of applying economics to one's life.

Note: This course is a Core elective, which may be offered for either 0.5 or 1.0 units of social studies or career and technology education (CTE) credit.

Persons who teach this course would be required to have a social studies, business, or marketing composite endorsement, or an economics endorsement. The credentials of the instructor do not determine the credit options for students. Students may decide to take this class for social studies or business/marketing credit (but not all). However, to generate CTE add-on dollars, a social studies teacher must also have an approved CTE endorsement.

Intended Grade Level	10-12
Units of Credit	.05
Core Code	32.02.00.00.200
Concurrent Enrollment Core Code	32.02.00.13.200
Prerequisite	None
Skill Certification Test Number	450
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Social Studies
Endorsement 2	Business & Marketing (CTE/General)
Endorsement 3	Business & Marketing Essentials

STRAND 1
Introduction to Economics
Students will understand the importance of making economic decisions as it relates to individuals, businesses, governments, societies, and nations.

Standard 1

Define **economics** using the main idea that wants and needs are unlimited, but resources are limited, resulting in scarcity.
- Define the following terms.
  - **wants**: is something that is desired
  - **needs:** is something needed to survive

- Identify the **productive resources/factors of production** and give examples of each:
  - **human resources/labor:** is the group of people who work for an organization, business sector, industry, or economy
  - **natural resources/land:** are materials and energy that occur naturally and are used in economic activities, often called raw materials.
  - **capital resources:** these are resources that have been made by humans and are not naturally occurring.
  - **entrepreneurship:** when an individual that has an idea acts on that idea, usually to disrupt the current market with a new product or service

Define the following terms and provide relatable examples.
- **Goods:** items that add some kind of benefit to the lives of the people who consume the profit.
- **service:** an intangible act or use for which a consumer, firm, or government is willing to pay.
- **Scarcity:** when the demand for a resource is greater than the supply of that resource, as resources are limited

Standard 2
Compare and contrast the study of microeconomics to macroeconomics.
- **Microeconomics:** the branch of economics that studies the behavior of individuals and businesses and how decisions are made.
- **Macroeconomics**: the branch of economics that studies the performance of economies and changes in economic output, inflation, interest and foreign exchange rates, and the balance of payments.

Standard 3
Illustrate the concepts of opportunity cost and trade-offs using the production possibilities curve.
- Define the following terms.
  - **Opportunity cost**: the value of what you have to give up in order to choose something else
  - **Trade-off:** implies the exchange of one thing to get the other.
  - **Production Possibilities Curve**: portrays the cost of society's choice between two different goods.
- Give examples of opportunity costs and trade-offs as they apply to individuals, businesses, governments, societies, and nations.

Standard 4

Explore how economic systems use the three basic economic questions.
- Three Economic Questions
    1. **What?** What will be produced?
    2. **How?** How will it be produced?
    3. **Who?** Who will consume what is produced?

- Define the following economic systems and explain how they answer the three economic questions. Provide examples used in countries around the world.
    - **Traditional economy:** is a system in which the development and distribution of goods and services are determined by customs, traditions, and time-honored beliefs.
    - **Command economy:** is an economy in which production, investment, prices, and incomes are determined centrally by a government.
    - **Market economy:** an economic system in which production and prices are determined by unrestricted competition between privately owned businesses
    - **Mixed economy:** an economic system of resource allocation, commerce, and trade in which free markets coexist with government intervention.

Standard 5

Discuss various economic theories and the economists who developed those theories as they relate to market economies.
- Explain Adam Smith's theories of the invisible hand and laissez-faire.
- Explain Karl Marx's and Frederick Engels' theories on socialism and communism.
- Discuss modern-day economists and their recent economic theories.

Define these concepts:

Productivity: a measure of output per unit of input

Specialization: a business or people focus on producing one or a few parts of an entire product

Performance Skills
- Apply opportunity costs to a personal economic decision
- Report on two different countries that represent two different economics systems.

STRAND 2

Supply and Demand

Students will understand the concepts of supply and demand for decision-making.

Standard 1 Demand

Explore and define terms related to demand.
- **Demand**: the consumer's willingness and ability to buy a product or service at a given price.
- **Law of demand:** a fundamental principle of economics that states that at a higher price, consumers will demand a lower quantity of a good.
- **Demand Curves:** a demand curve is a graph depicting the relationship between the price of a certain commodity and the quantity of that commodity that is demanded at that price.
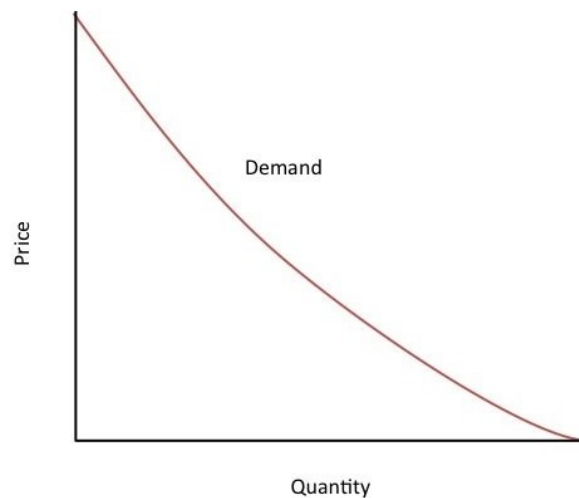
Explain and illustrate (using graphs) the difference between a movement along the demand curve versus a shift of the demand curve.
- **Movement**: A change in the price of a good or service causes a movement along a specific demand curve, and it typically leads to some change in the quantity demanded, but it does not shift the demand curve.
- **Shift**: changes in a determinant of demand that shift the demand curve resulting in a change in demand.

Describe the **determinants that cause a shift in demand.**
- consumer tastes & preferences
- market size
- Income
- price of complementary goods
- price of substitute goods
- consumer expectations

Standard 2 Supply

Explore and define terms related to supply.
- **Supply:** the producer's willingness and ability to produce a product or service at a given price.
- **Law of supply**: a fundamental principle of economics that states that at a higher price, producers will supply a higher quantity of a good.

- **Supply Curves:** a supply curve is a graph depicting the relationship between the price of a certain commodity and the quantity of that commodity that is supplied at that price.
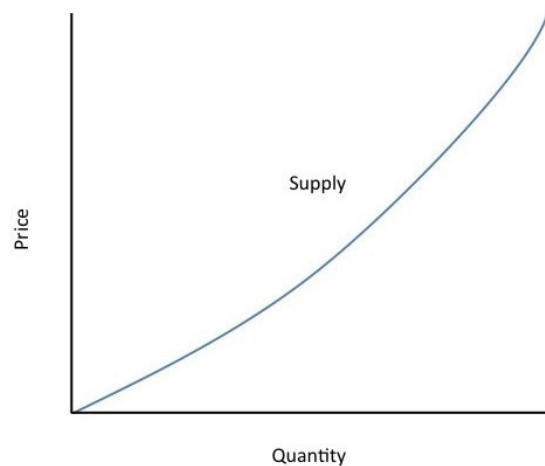
Explain and illustrate (using graphs) the difference between a movement along the supply curve versus a shift of the supply curve.

- **Movement:** A change in the price of a good or service causes a movement along a specific supply curve, and it typically leads to some change in the quantity supplied, but it does not shift the supply curve.
- **Shift**: changes in a determinant of supply that shift the supply curve resulting in a change in supply..

Describe the **determinants that cause a shift in supply.**

- price of resources
- govt. regulations
- technology
- competition
- price of related goods
- producer expectations

Standard 3 Equilibrium
Define the following terms:

- **Equilibrium**: the point where the demand curve and the supply curve intersect; the price and quantity where the quantity demanded equals quantity supplied.
- **Shortage:** a market condition when the quantity supplied of a good is less than the quantity demanded.
- **Surplus**: a market condition when the quantity supplied of a good is greater than the quantity demanded.
- **Price Ceiling**: a legally established maximum price for a good or service.
- **Price Floor**: a legally established minimum price for a good or service.

Explain and illustrate (using graphs) how movements, shifts, and disequilibrium pricing affect equilibrium.

Standard 4 Price Elasticity

- Define the following terms:
  - **Elastic**: a demand condition in which consumers are responsive to a change in price.
  - **Inelastic:** a demand condition in which consumers are not very responsive to a change in price.

- Describe the determinants that affect elasticity.
  - Availability of **substitutes,** the goods that are used in place of each other.
  - Good's share of the budget
  - Luxury vs. Necessity
  - Time (Can I delay the purchase?)
  - Breadth of market

Performance Skill
- Use supply and demand schedules to plot curves on a graph to determine the market equilibrium price and quantity.
- Predict how changes/shifts in either supply or demand will affect the market price.

STRAND 3
Microeconomics

Students will understand that resources and goods/services are allocated by voluntary exchange and that economic markets are characterized by competition, incentives, and private property rights.

Standard 1
Define markets and explain how they allocate scarce resources.
- Define the following terms:
  - **Market**: where buyers and sellers make exchanges
  - **Goods:** tangible items of value that can be exchanged
  - **Services**: work that supports a business but does not produce a tangible commodity
- Describe how voluntary exchange between households, businesses, and governments creates a circular flow of money, products, and resources.
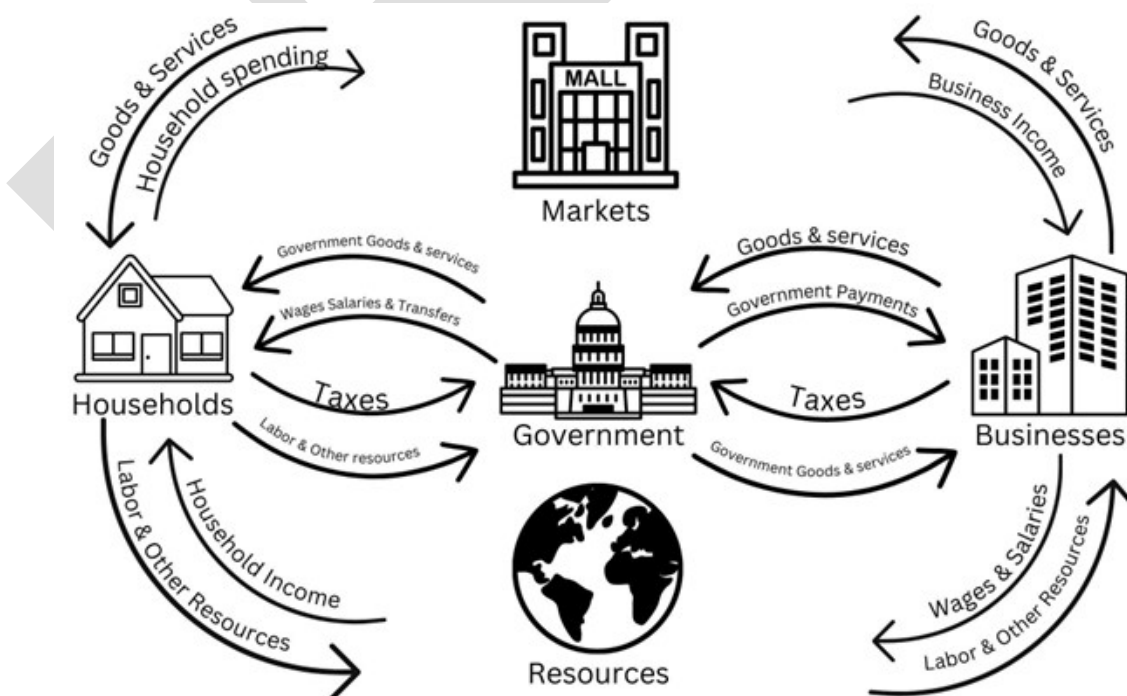
Standard 2

Determine why incentives, competition, voluntary exchange, and private property rights are important components of market economies.

- Define the following terms:
  - **Incentives:** a positive reward for behaving a certain way or making a choice
  - **Competition**: the rivalry among businesses to sell their goods and services to buyers
  - **Voluntary exchange**: when buyers and sellers willing trade goods, and services, effort, and money with an expectation of being better off as a result
  - **Private property rights:** ownership of resources and products by individuals and businesses
  - **Profit motive**: an incentive of businesses and individuals to make more in revenue than expenses
- Describe the advantages of competition among households/consumers as well as among producers/businesses.

Standard 3

Explore the role of entrepreneurs, businesses, and producers in market economies.

- Define, compare, and contrast the different forms of business organizations:
  - **Sole proprietorship:** a business owned by one person
  - **Partnership**: a business owned by two or more individuals
  - **Corporation:** a business organization managed on behalf of its owners who provide funds
- Define and identify how businesses raise capital:
  - **Debt financing:** when a business borrows money to be paid back with interest at a later date
  - **Equity financing**: when a business sells shares to investors to raise capital
- Determine how businesses earn a profit by creating value in their product (i.e. good, service, or idea).
  - Define these terms
    - **Added Value:** the difference between the price of a product and the cost of producing it
    - **Revenue**: business income, meaning the money generated from business activities
    - **Cost:** business expense, meaning the money expended on business activities
    - **Profit:** occurs when a business has more revenue than expenses

Standard 4

Discuss and demonstrate how marginal analysis is used to make production decisions.

- Define the following terms:
  - **Marginal Analysis**: decision-making that involves comparing marginal revenue with marginal costs
  - **Fixed Cost (FC):** costs that are constant regardless of levels of production
  - **Variable Cost (VC):** costs that vary with different levels of production
  - **Total Cost (FC+VC)**: all fixed costs plus all variable costs
  - **Average Total Cost (ATC)**: total costs divided by units produced
  - **Marginal Cost (MC):** the cost added by producing an additional unit of output
  - **Marginal Revenue (MR)**: the revenue gained by producing an additional unit of output
  - **Law of Diminishing Marginal Returns**: the principle that as more and more variable resources are added to a fixed amount of other resources, the additional amount produced begins to decrease
  - **Profit Maximization:** businesses often use marginal analysis to find a production point where the total profit is highest

- Demonstrate how a business might apply marginal analysis (compare marginal benefit to marginal cost).

Standard 5

Compare different **market structures,** defined as the characteristics of a market in which businesses compete.
- List the characteristics of the four market structures:
    - **Perfect competition:** a large number of businesses all producing the same product at the same price in the market
    - **Monopolistic competition:** a number of businesses all producing similar but not identical products in the market
    - **Oligopoly:** a few businesses supply most or all of the products in a market
    - **Pure Monopoly:** only one seller in the market
- Identify business sectors that illustrate each of the market structures.
- Explain the role of **anti-trust laws**, which ban unlawful mergers and business practices, as they apply to market competition.
    - The Sherman Antitrust Act
    - The Clayton Act
    - The Federal Trade Commission Act
- Explain **barriers to entry,** described as factors that can prevent or impede newcomers into a market or industry sector, and limit competition.
    - Start-up costs
    - Technology
    - Government Licensing
        - Patents
        - Trademarks
        - Copyrights

Performance Skill

- Apply marginal analysis to an economic choice a student must make (e.g., buying a car, deciding on plans after high school, and selecting a college/university)
- Construct and explain a circular flow model demonstrating the process of voluntary market exchange among businesses/producers, households/consumers, and government.

STRAND 4

Macroeconomics

Students will recognize the role of money and how fiscal and monetary policies assist individuals and groups in pursuit of economic well-being.

Standard 1

Describe the functions of money and explain the role of government and financial institutions
- Define the following forms of exchange:
    - **Barter**: Exchange of a type of goods or services for another, without the use of money.
    - **Credit:** An agreement between a lender and borrower. A system where goods and services are received for a deferred rather than an immediate payment.
    - **Money:** Any item widely accepted as payment for goods and services.

- Define the three functions of money:
  - **Medium of Exchange:** Money acts as an intermediary instrument to facilitate transactions between agents (individuals, firms, banks).
  - **Store of Value:** An asset that keeps its value.
  - **Unit of Account:** a measure of value or price

- Recognize the **six characteristics of money:**
  - Durability
  - Portability
  - Divisibility
  - Stability
  - Acceptability
  - Uniformity
- The **value of money,** which is defined by its purchasing power
- Discuss different forms of money (commodity, fiat, digital), including foreign exchange.
- Define **money supply** as the total volume of currency held by the public at a particular time.

Standard 2

Identify the four phases (peak, expansion/recovery, contraction/recession, and trough) of the business cycle and examine the role of economic indicators in determining the level of business activity.

Describe common phases of the business cycle:
- **Peak:** A phase in the Business Cycle where GDP experiences its highest level. This is considered the economy's peak.
- **Trough:** marked by conditions like higher unemployment, layoffs, declining business sales and earnings, and lower credit availability
- **Contraction/recession:** Marked by economic growth beginning to weaken. Companies stop hiring as demand fall and then begin laying off staff to reduce expenses.
- **Expansion:** Money is cheap to borrow, businesses build up inventories again and consumers start spending. GDP rises, per capita income grows, and unemployment declines.
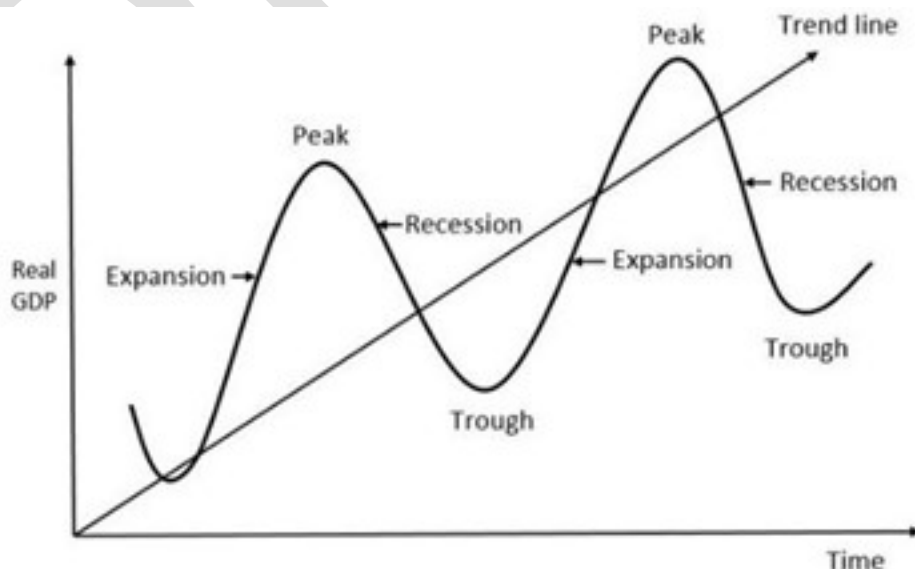
Define **Gross Domestic Product (GDP):**
- Describe how **GDP is measured**, meaning Consumer Spending + Investment + Government Spending + Net Exports = GDP, and how it can indicate:
  - **Recession**: a decline in real GDP for two consecutive quarters.
  - **Recovery:** growth in real GDP for two or more consecutive quarters. Averaging between 4-5 years. Recovery is typically accompanied by a rise in employment and consumer confidence.

Define the following in relation to GDP
- **Aggregate Supply:** the total level of output producers are willing and able to supply at alternate price levels in a given time period. ceteris paribus
- **Aggregate Demand:** the total quantity of output demanded at alternative price levels in a given time period. ceteris paribus

Define **labor force:** All persons over age 16 who are either working for pay or actively seeking paid employment.
- Demonstrate that the **unemployment rate** is defined by this equation.
- Discuss the different types of unemployment as frictional, structural, cyclical, and seasonal.

Define **inflation and deflation**, the factors leading to both, and how each is measured.
- **Inflation:** an increase in the average price level of goods and services.
- **Deflation:** a decrease in the average price level of goods and services.

Discuss other economic indicators and define the **Consumer Price Index (CPI):** a measure of changes in the average price of consumer goods and services.

Standard 3
Describe how policymakers use **fiscal policy,** defined as government taxing and spending, to accomplish their goals regarding the U.S. economy.
- Explain John Maynard Keynes' theories on economic stabilization through government intervention
- Discuss the **main economic goals of the United States:**
  - Providing **public goods, ensuring competition**
  - Dealing with **externalities**
  - Promoting **economic stability, security, and growth**
- Discuss the pros and cons of deficit spending and national debt
- Examine the different types of taxes governments use to raise revenue
  - **Progressive**: a tax system in which tax rates rise as income rises.
  - **Regressive:** a tax system where the average tax burden decreases with income.
  - **Proportional**: a tax that takes the same percentage of income from all income groups.
- List the various taxes that governments levy
  - **Income tax:** a tax levied on the wages, salaries, dividends, interest, and other income a person earns throughout the year.
  - **Property tax**: a tax paid on property owned by an individual or other legal entity, such as a corporation
  - **Sales tax:** a consumption tax imposed by the government on the sale of goods and services.

- Explain how fiscal policy is used to expand or contract an economy and how government policies impact business cycles, consumer confidence, inflation, and savings rates.

Standard 4

Define how the **Federal Reserve,** defined as the Central Bank of the United States Government, and how monetary policy is used to control the fluctuation of the money supply.
- Explain the **responsibilities of the Federal Reserve** (i.e., supervise and regulate banks, administer monetary policy, and provide financial services for the U.S. government and member banks).
- Examine how the Federal Reserve uses **monetary policy** tools to stimulate the economy or control inflation.
  - **Discount rate:** the rate of interest charged by the Federal Reserve banks for lending reserves to private banks.
  - **Reserve ratio**: the ratio of bank reserves to its total transactions deposits.
  - **Open Market Operations** as buying & selling government securities

- Explain how monetary policy is used to expand or contract an economy and how Federal Reserve policies impact business cycles, employment, consumer confidence, inflation, and savings rates.

Performance Skills

Students will understand business cycles and be able to describe the impact of fiscal and monetary policy to expand or contract the economy through a presentation, report, or reflection essay.

STRAND 5

Students will understand the economic impact of a changing global economy.

Standard 1

Summarize the costs and benefits of international trade.
- Define the following terms related to international trade
  - **Imports:** goods and services that are purchased from other countries.
  - **Exports:** goods and services that are sold to other countries.
  - **Balance of Trade**: the difference in value between a country's imports and exports.
- Examine the impact of a country's balance of trade on its Gross Domestic Product and **standard of living** which is defined as the level of wealth, comfort, material goods, and necessities available to a certain socioeconomic class or geographic area.
- Define and analyze the impact of **barriers to trade**
  - **Tariffs**: is a tax imposed by a government on goods and services imported from other countries.
  - **Quotas**: a government-imposed trade restriction that limits the number or monetary value of goods that a country can import or export during a particular period.
  - **Embargoes:** a government order that restricts commerce or exchange with a specified country, usually as a result of political or economic problems.

Standard 2

Explore the use of absolute advantage and comparative advantage to make trade decisions.
- Define these terms
  - **Absolute advantage:** The ability of a country to produce a specific good with fewer resources than other countries.
  - **comparative advantage**: The ability of a country to produce a specific good at a lower opportunity cost than another country.
- Explain how comparative advantage is used in analyzing trade decisions.

Standard 3

Explore the effects of **currency exchange rates** on international trade and travel.
- Explain and calculate currency conversions.
- Discuss how a country's imports and exports can be impacted by currency fluctuations.

Standard 4

Examine the challenges that nations and the world face as economies throughout the world develop and change.
- Discuss how political systems and economies in many countries are changing.
- Study the role of the U.S. in today's global economy.

Performance Skills
- Evaluate a current scenario involving trade between two countries.
- Explain and calculate currency conversions for a potential business trip.

STRAND 6

Economic Careers in the CTE BFM Pathways-Students will identify the courses that will help them to be pathway completers as well as potential careers in Economics and investing.

Standard 1

Describe a BFM pathway and the course offering at your school that allow students to become pathway completer. Utah BFM CTE pathways

    Identify the "Explorer" courses offered at your school

    Identify the "Concentrator" courses taught at your school

    Identify the "Completer" course for a BFM Pathway

Standard 2

Degrees Available in Economics

Explore the potential programs in your region that are associated with economics.
- Economics
- International Finance or Banking
- Business Management
- Accounting

Standard 3
Careers in Economics
Explore current job postings in this field to introduce students to the fact that this is a high wage high demand field.

Skill Certification 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		

STRANDS AND STANDARDS
INFLUENCER & CONTENT MARKETING

Learning that works for Utah
CTE®

Course Description

The focus of this course is for students to gain an understanding of the skills, aptitudes, and thought processes necessary to create a successful marketing campaign using the principles of influencer and content marketing. Through analyzing content, targeting a specific audience in social media, Learning user-friendly design and video applications, creating and implementing effective content strategies, and examining the relationship between brands and influencer marketing. Students taking Influencer and Content Marketing should be able to participate in DECA or FBLA career and technical student organizations (CTSO). These CTSO's curriculum and activities are USBE approved for all Utah marketing courses.

|	
Intended Grade Level	10-12
Units of Credit	.05
Core Code	37.01.00.00.002
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	413?
Test Weight	.05
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	BFM (CTE/General)
Endorsement 2	BFM Essentialss & BFM Info Man L1

ADA Compliant: Month/year

STRAND 1

Students will analyze influencer marketing and the communities that influencers are able to build through social media.

Standard 1

Define who an influencer is and discuss examples of how social media transformed this career.

- Discuss how Influencers have been part of marketing from the beginning. TV celebrities, sports stars, and politicians have all been influencers. Social Media has changed the career to include anyone that has a passion or expertise and a platform.
    - **Influencer profile:** either a persona (made-up) or an authentic individual that reflects a certain personality, value, and belief system. Used to gain followers and create a community for a variety of topics through social media.
    - **Examples:** Politicians, Community Advocates, Authors, Artists, Designers, Celebrities, and Governments.

- **Digital Assets**: generally anything that is created and stored digitally. Ex. images, video, written content, and ownership rights.
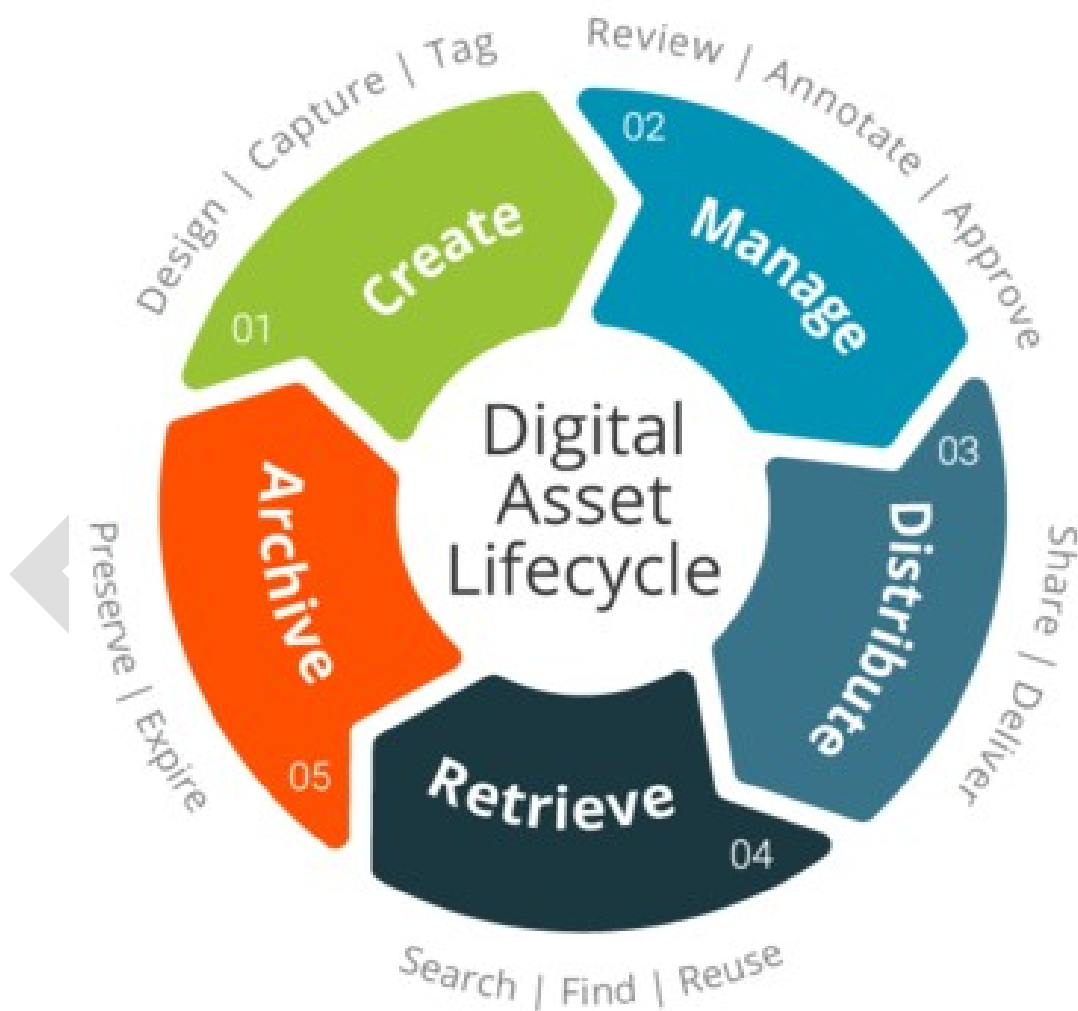
- **Digital Branding:** the process of using digital assets to create an online brand identity that can be expressed on virtually any digital channel, like your website, social media profiles, digital ads, and content marketing.
- **Influencer Community**: made up of people who are active on social media and have built up a following with their topics.
- **Influencer Content:** digital assets created to reach new or larger audiences by leveraging the credibility and social followings of influencers.
- **Reach** The number of people who see your content
- **Engagement Measurements**
  - Impressions: The number of times your content is displayed
  - Engagement: The number of interactions your content received from users (likes, comments, shares)
- **Trends/Trending:** Popular strategies

Standard 2

Discuss how people can be impacted by influencers in both the positive and negative in buying or other social behaviors.

- **Positive/Negative Influencers:** understand the widespread influence they have, and the power they have to build up and elevate, or tear down.
  - Influencers should act much like corporations and consider their social responsibility when creating content. An influencer should vet all their sources and make sure they are not making misleading or inaccurate statements.
- **Organic:** naturally generated followers, content, or posts that occur in your social media feed without the influence of paid distribution.
  - Compare with Paid Media (defined and covered in Strand 6)

- **Cause Influencer/Marketing:** A partnership between an influencer and a non-profit or a business (for profit) that seeks to promote social good by using the influencer's reach. Used to also increase an influencer's reach and build credibility.

- **Borrowed Equity:** Sharing the influence or credibility of a brand or another influencer to increase the reach and/or credibility of your brand.

Performance Skill ideas

- Create content for a club, class, team, CTSO, or community project
- Create a vision board that demonstrates an influencer or brand persona.
- Analyze a recent social movement and how influencers have contributed to the cause.

STRAND 2
Students will identify traits and characteristics that describe various types of influencers and brands.

Standard 1
Discuss how a brand determines the influencers that they want to work with. Brands use influencers to market their products. The process of selecting the appropriate influencer starts by defining their target audience. This is often done by a community manager for the brand.
- **Target audience/marketing:** A specific group or niche to which marketing is intended to appeal and affect
- **Community Manager:** Individual responsible for growing, developing, and maintaining relationships between brands, digital community, and/or influencers.

Standard 2
Describe how Influencers decide to be associated with a brand.
- **Buyer Persona:** Representation of your ideal customers based on data and research
- **Marketing Segmentation:** The process of dividing a market of potential customers into specific groups based on specific characteristics and differences.
- **Marketing Agencies:** a service provider that creates or runs your influencer-based marketing
- **Influencer Agent:** a representative that connects influencers with partnerships and brands.
- **Tagging brands:** Naming a company or individual in an official and trackable manner
- **Campaign objectives:** goals and specific desired outcomes of a marketing campaign

Standard 3
Discuss the importance of developing professional relationships with Brands.
- **Content Marketing:** creating and distributing material online intended to be part of goal-based campaigns and strategies
- **Licensing Content:** An agreement that allows others to reuse or republish existing content.
- **Influencer Contracts:** An agreement between an influencer and a brand that details deliverables and payment.
- **Professionalism:** Behaving in a manner appropriate for business relationships
- Participative anthropology: The act of studying a community by immersing oneself into the community being studied.

Performance Skill
- Explore what kind of influencer you are and what you look for in an influencer.
- Examine contract for a brand ambassador or influencer
- Reach out to a local brand or to a local influencer

STRAND 3
Students will learn simple graphic design applications and video editing software to use in creating effective content.

Standard 1
Describe basic design principles that are essential to creating effective digital content.
- Rule of Thirds: a guideline in composition that uses two lines vertically and horizontally to divide an image into nine equal portions and four intersection points.
- White Space: empty or negative space around design elements that increase readability

- Repetition: Using design elements multiple times in one layout
- Readable font/typeface
- Proper lighting
- Royalty vs Royalty free stock images and video
- Evaluate the quality of images and sound

Standard 2

Explore user-friendly design applications that are available to your students. i.e. Canva, Piktochart, Adobe Express, and others that provide pre-sized templates and easy-to-use designs.
- Beginner influencers often use these tools to start growing followers. Some of the simplest forms of content are the following:
- **Static content**:
  - Meme
  - Images
  - Blogs
  - Current Trends

Standard 3

Explore animation and video editing applications that allow you to create dynamic content that engages the target audience.
- Describe basic camera frames in a video.
  - Close up
  - Establishing shot
  - Medium shot
  - Wide shot
- Describe basic camera movements
  - Pan
  - Tracking
  - Zoom in/out
- Camera Angles
  - Low
  - High
  - Direct
- Moving content
  - **Short Form**
    - Reels
    - Stories
    - Under 1 min, videos
    - Current Trends
  - **Long Form**
    - Videos
    - Animation
    - Webinars
    - Live Streaming
    - Cameo (Personalized Messages)
    - Current Trends

Standard 4

Discuss with students the need to repurpose content to drive engagement on different social media platforms.

Each varies by content and demographics. Look up the most current statistics.
- Instagram: photos and other visual media
- Pinterest: Tutorial, product, and consumer-focused visuals to drive conversion.
- LinkedIn: B2B-focused networking and brand building.
- Facebook: Conversation-driven interactions between pre-existing relationships.
- Tik Tok: Short form 30 sec. - 1 min.
- YouTube: Long-form 3 min. or longer
- Twitter: Copy content, dialogue, comments, breaking news

Performance Skill
- Create static content for a marketing campaign
- Create moving content for a marketing campaign
- Adapt content for one social media platform to be used on a different platform.

STRAND 4

Students will create copy, write content for influencers and demonstrate effective copywriting skills, for various content and email automation systems

Standard 1

Explore the types of copy used in social media posts.
- **Captions**: A written description of a photo, video, or another post that may include text, hashtags, mentions, and emojis. Often used to drive engagement.
- Using AI to help with the workload of content creation. Evaluate how much and how often you use it. Especially if the copy doesn't reflect your brands voice.
- **Call To Action** (CTA): Asking the viewer to do something or encouraging action.
- **Blogs/Vlogs**: Blogs are written content posted to a website and often organized into categories or archives. Vlogs are short for video blogs. Vlogs often depict what is happening for a moment in the creator's life.
- Posts
- Backlinks

Standard 2

Explore paid ads and the importance of ad creation for brands.
- Titles
- Meta Descriptions
- Keywords
- Clickbait

Standard 3

Describe the process of pitching to a work with a brand.

- **UGC (User Generated Content):** any content — text, videos, images, reviews, shares, mentions, reposts, etc. — created by people (fans), rather than brands.

- Emailing a brand
  - What you as an influencer can offer the brand

Performance Skill (Choose Two)
- Writing an email to a brand
- Creating a paid ad for a brand
- Create a caption and a description for a video

STRAND 5
Students will understand the way influencers use engagement KPIs to meet Content creation goals.

Standard 1
Define and describe engagement KPIs for social media posts.
- **Key Performance Indicators (KPIs):** A measurement that tells you how a post or piece of content is performing
- **Reach:** The number of people that see your content

Key Engagement KPIs
- Reach KPIs
  - Followers/Subscribers
  - Views
- Impressions
  - Likes
- Engagement
  - Comments
  - Retweets/Shares
  - Conversions

Standard 2
Provide examples of the connection between KPIs and SM posting goals. Use the SMART goal structure to make goals specific, measurable, attainable, relevant, and timed.

Set goals by platform
- Instagram:
- Facebook:
- Twitter:
- Pinterest
- LinkedIn
- Youtube
- Tik Tok

Standard 3
Explore additional tools for management, scheduling, and other aspects of the posting.
- Understand social media algorithms and how they changed frequently
- Explore Scheduling Apps

- Interpret the analytics for websites
- Use planning sites for the aesthetics of your feed
- Compare and contrast various posting management websites

Performance Skill

- utilize personal branding, content creation principles, and engagement KPIs to make content creation goals for a campaign. (45 days)

STRAND 6

Students will successfully create and implement an effective content marketing strategy.

Standard 1

Explain the difference in different media or content that are used in marketing campaigns.

- **Content Marketing:** a marketing technique of creating and sharing content to attract a target audience to help them convert to customers.
- **Owned Media**: any content owned and controlled by a brand or influencer, such as content posted on a blog, website, or social media channel.
- **Earned Media:** any material that is written about a brand or influencer that the business hasn't paid for or created themselves. Fans of an influencer will recommend and tag influencer accounts.
- **Paid Media:** marketing that you pay for and includes PPC advertising, branded content, and display ads.

Standard 2

Share examples of a cross-platform campaign that uses utilizing a campaign brief to advertise for a brand.
Campaign Briefs

- **Campaign overview.** Include the campaign title, budget, dates it will run, and campaign type.
  - **Compensation.** Payment agreement such as cash, commission, product, or a combination?
  - **Campaign tasks.** Specific details are needed in the post if any.   This includes the platform, type of content, hashtags to use, and a broad description of what you expect from the post. Typically influencers have creative control over the content.
  - **Brand assets.** Include any photos, logos, or specific branding needed, and specific product messaging.
  - **Content rights.** If the brand will pay the influencer to amplify the content and obtain license rights which includes the length of the licensing agreement and specific details of how the brand will repurpose the content.

*Same influencer on multiple platforms visual here.

Performance Skill

- Create a cross-platform campaign to advertise a local business, brand, CTSO, or upcoming school event as an influencer. Should include at least 3 different platforms and various content types.

STRAND 7

Students will examine the various levels of influencers, Mega, Macro, Micro, and Nano. They will determine the best influencer to implement their content marketing strategy.

Standard 1

Define and give examples of influencer types.

- **Mega**: 1 million + followers
- **Macro:** Someone with 50,000 to 1 million followers
- **Micro:** Someone with 10,000 to 50,000 followers
- **Nano**: Someone who has between 1,000 and 10,000 followers
- (Insert graphic to illustrate influencers?)
- **UGC Websites**: The industry is changing constantly. Websites include but are not limited to Upfluence, Insense, Grin, etc.

Standard 2

Describe the various ways an influencer can monetize their social media presence.

- **Paid by Content & platform:** i.e. Video on Youtube vs Reel on Instagram. (Long form vs short form content has different amounts)
- **Commission based/Affiliate Marketing**: based on conversion rates from the linked post or special codes.
- **Brand Ambassador**: You are an official representative of the brand for a set period of time with exclusivity. Can't promote another brand.
- **Collaborative (Collab) Marketing**: Co-creating a product with the brand and promoting it as the influencer.
- **Merchandising:** As the influencer, you create and promote your own products.

Performance Skill

- Match Maker project: Pick a local brand and a local influencer. What level of influencer would you use and why? What kind of content would you want them to create for the brand? What kind of relationship would you have with the influencer? (Paid, ambassador, etc)

OR

- Design and Create your own merchandise. Your merchandise should represent your personal brand.

STRAND 8

Pathways, Post Secondary, and Careers
Students will understand the opportunities to graduate as a pathway completer, the post-secondary programs, and Career opportunities in Marketing.

Standard 1

The Marketing Pathway

- Explorer Courses: Marketing 1, Entrepreneurship, Customer Service
- Concentrator Courses: Digital Marketing & Retailing
- Completer Courses: BFM Capstone & Internships

Standard 2

Explore Post Secondary school programs in your region
- Tech colleges & certifications
- Associate degree programs
- 4-year Bachelors degrees

Standard 3

Explore why students may want to be an Influencer career potential in average salaries, benefits, flexibility, Work/Life Balance.
- Content Marketer
- Brand Ambassador
- Copy Writer
- Social Media Influencer
- Community Manager
- Influencer Creative Team/Videographer

Skill Certification 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		

STRANDS AND STANDARDS
SPORTS & OUTDOOR RECREATION MARKETING

Learning that works for Utah
CTE®

Course Description

This course seeks to introduce students to the specialized marketing activities involved in recreation and sporting events. Students will explore concepts such as recreation and sporting events and competitions, sponsorship, merchandising, integrated marketing campaigns, promotional activities, and calendars. Students should be introduced to the CTSOs for this course including DECA and FBLA and the related competitions.

Intended Grade Level	10-12
Units of Credit	.05
Core Code	37.01.00.00.260
Concurrent Enrollment Core Code	N/A
Prerequisite	None
Skill Certification Test Number	416
Test Weight	.05
License Area of Concentration	CTE or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	BFM(CTE/General)
Endorsement 2	BFM Essentials

STRAND 1
Sports & Recreation Events
Students will explore the varied world of recreation and sports events.

Standard 1

Explore recreation and sports opportunities available in your area. Examples: hiking, mountain biking, rock climbing, snowboarding, skiing, Ice skating, hunting, baseball, golf, soccer, and football
Define **recreation**: an activity done for enjoyment.

Define **sports**: activity involving physical exertion and skill in which an individual or team competes against another or others for entertainment.

Standard 2

Identify programs (both individual and team) for youth, adults, and seniors in your school, city, and state.
- Seasonal recreational programs
- City sports leagues
- Club sports teams
- Youth, adult, and seniors fitness programs
- UHSAA sanctioned events

Performance Skill
- Evaluate events held in your community that an integrated marketing campaign can be developed to increase attendance, participation, or fundraising.
- Determine which event you will use to create an integrated marketing campaign.

STRAND 2
Campaign Objectives
Students will be able to write SMART campaign goals that meet the organization or entity's vision for the event.

Standard 1

Distinguish between commonly used campaign goals and determine appropriate goals for your marketing campaign.
- **Specific**
  - Pinpoint problems and opportunities in the market your event will occur and write campaign goals that reflect those needs.
  - Identifies a timeline for each goal
  - Describes target market clearly
  - Determines the best metrics for the campaign.
- **Relevant**
  - Determine a campaign theme, slogan, or title for the campaign
  - Brand Awareness
  - Consider current economic conditions or the need to pivot.
  - Exhibits effective application of promotional strategies

- **Time-based**
  - 45 days or 6 weeks before the event
  - Sets checkpoints throughout the campaign to determine if promotions are effective.

Standard 2

Demonstrate evidence of marketing knowledge by describing goals that will challenge the student's abilities and are still attainable.

- **Attainable**
  - Compare competitive events happening in the same location during the same time period.
  - Set integrated marketing goals that combine traditional marketing and the use of digital marketing strategies.

Standard 3

Research-based goals

Demonstrate a variety of key metrics both digital and traditional metrics, that can be used in the goal-setting process

- **Measurable**
  - Base campaign goals on primary and secondary research of existing events or previous year's results.
  - Sales goal based on last year's event or fiscal year
  - Track and report progress to all stakeholders
  - Identify the quantitative and qualitative indicators to measure your effectiveness.

Performance Skills
- Create at least three campaign objectives using the SMART goal format.

STRAND 3

Campaign Target Market

Students will be able to identify and utilize relevant primary and secondary markets.

Standard 1

Marketing Segmentation

Describe how marketing segmentation can be used to think through who your primary and secondary markets are. Briefly review marketing segmentation.

- **Demographics**
- **Geographics/Location**
- **Psychographics/Interests**
- **Behavioral** (Provide specific details such as season/annual pass holders, merchandise purchases, and social engagement)

Standard 2

Campaign Reach

- Targeting your marketing efforts to attract participants, fans, and community. engagement through the use of specific keywords.
- Determine a unifying theme or central message that will engage participants.
- Brand your campaign with a common look and feel.

Standard 3

Campaign Season

Identify the seasonality of the event that is taking place. Highlight examples from both the sporting and recreational industries.

- Define **Seasons:** based on the time of year and the holidays.
  - Discuss both **recreation and sports examples of seasons**. i.e. Ski season (winter), Football (fall), River raft (Spring-Summer), Basketball (Fall-Winter)
- Identify a promotional campaign that fits the appropriate season of your event.
- Explain the purpose is to create brand or event awareness and build anticipation throughout the year
  - Off-Season and Pre-Season promotions and activities
    - Fan appreciation
    - Give back promotions
    - Season pass sales
    - Locals discounts and promotions

STRAND 4

Sponsors or Corporate Partnerships

Students will understand the relationship between sponsors and the recreation and sports events.

Standard 1

Describe the concept of **sponsorship** and the importance of the relationship between sponsors and recreation and sports organizations.

- **Define, understand, and identify sponsorship and sponsorship levels**, including the benefits and challenges of sponsoring an event or entity.
  - Determine the levels of sponsorship for your organization
  - Level of promotional opportunity should match the level of sponsorship
  - Theme can be included in your sponsorship level
  - Should include a distinct group of benefits for the level of sponsorship

Challenges

- Based on who you know limited in your prospecting of possible sponsors
- No security or accountability
- Saturation of teams and organizations asking for sponsorship
- Will need to cast a wide net to get results. Example: If you contact 10 sponsors, 3 will be interested, and 1 will become a sponsor.

Discuss reasons a company would be involved in a recreational or sports event.

- Leveraging your sponsor's followers/fans by using their official sites and pages.

Standard 2

Sponsorship Strategy

Describe the process of finding and building relationships with sponsors that share the same values and target market.

- Identifying potential sponsors
- Sponsorship goals
- Understand the concept of **borrowed equity**: utilizes the appeal of an event to market products, increases sponsorship demand for the event
  - Why would an entity sponsor an event
  - Why would an organization select a specific endorsement, influencer, or celebrity sponsor
- Creating a sponsorship proposal

Standard 3

Sponsorship Evaluation

- Evaluate the sponsor's effectiveness
- Assessing **return on investment (ROI)**:
- Measuring the brand awareness of a sponsor
- Obtaining and analyzing customer feedback

Performance Skill (Choose one)

- Identify at least 10 possible sponsors for an event that share the same target audience.
- Create a sponsorship proposal that includes the levels of sponsorship, the cost, and benefits to the business for becoming a sponsor.

STRAND 5

Marketing Campaign Activities and Schedule

Students will explore and determine the marketing campaign activities and promotions that will be used for the event.

Standard 1

Explore the brainstorming process of creating a campaign theme for a recreation or sports event.

- **Branding your campaign**
  - **Brand awareness**: the extent to which consumers are familiar with the distinctive qualities or image of a particular brand of goods or services
  - **Consistent** with brand identity and messaging.
  - Reinforce your brand values and personality.
- Brainstorm a theme including
  - **Slogans, taglines, or jingles**
    - Avoid groupthink. Listen to all ideas
    - Consider your sponsors and other stakeholders
    - Ethical and Legal considerations
    - Consider tone of voice
- **Deciding on the visualization of the campaign**
  - Use specific photo or video filters
  - Consistent color palette for all ads
  - Signage (facility, merchandise, banners)
  - Ensure ADA compliance online media

Standard 2

Campaign Activities

Describe possible choices for effective campaign activities.
- Direct students to consider the target audience of the event.
  - Include both participants and viewers of the event
    - **Intent:** Campaign goals
    - **Location:** Venue seating, frequency, arrival time, and event time
    - **Interest:** Is this for hobby, entertainment, or competition

- Select and develop the activities you will use to promote the event
  - Discuss activities that encourage registration or competitor sign-up
    - What do participants gain from participating
    - Beneficiaries of the event such as non-profits
    - Entertainment
    - Legacy Events
    - Extrinsic and intrinsic Incentives or clear benefits from participating
  - Discuss activities that encourage audience attendance
    - Theme nights
    - Giveaways
    - Half-time shows or performances

- Unifying theme: throughout all campaign activities
  - Keep consistent, colors, verbiage, and slogan
- Promote the campaign activities and event
  - Types of promotional media
    - Social Media Post
      - Videos both long and short form
      - Photos or Memes
    - Broadcasting
      - Announcements
      - Live Streaming
      - Radio and TV Channels
      - Mass Email
    - Traditional Media
      - Marquees, Billboard, Posters
      - Flyers or Mailer to Community
      - Press release

Standard 3

Campaign Schedule and Calendars
- **Campaign Calendar:** An overview of the campaign that provides the ability to view the entire campaign in one place.
  - 45-day schedule of planned promotions
  - Cohesive and consistent throughout the 45 days

- **Campaign Schedule:** A breakdown of specific dates and times of identified promotions for the campaign. Can be created by day, week, or by platform or media.
  - Who: Which team member is responsible for the promotion going out
  - When: What date and time is the campaign activity being held or the post going live.
  - What: the form of the promotion or activity.
  - Where: which means of distribution are you going to use

Performance Skill
- Create three high-quality, appropriate, and creative promotional materials.
- Create a 45-day calendar and a daily or weekly schedule of the campaign activities and promotions.

STRAND 6
Event Budget

Students will be able to create a detailed projection of the actual cost for the marketing of the event and all promotional activities and materials.

Standard 1
Research Projected Cost

Research the campaign event type and identify the applicable cost.
- **Venue**: a building, gym, park, stadium, or facility

Venue costs may be different based on the type of venue needed for the event i.e. building, gym, park, stadium, or facility rental
- **Staff:**

Staffing costs based on the event could include or be added to the facility rental. Ensure when you are researching the venue, ask which of the following may need to be paid separately.
  - Janitorial
  - Security
  - Officials or referees
  - Technology
  - Sound and lighting
  - Live streaming or video production
  - Staffing or volunteers
  - Room rental
  - Equipment rental

Look for both primary and secondary research on vendors
  - Contact vendors directly and ask for quotes
  - Read reviews of past customers' experiences
  - Create a survey to find resources
- Include **"In-Kind"** donations from sponsors and community partners to offset the cost.

Standard 2
Marketing Budget Categories
Identify commonly used categories when budgeting for a marketing campaign
- Media Production
- Web Designer
- Graphic Designer
- Copy Writer
- Print Promotion
- Influencer(s) or SM Content Creator
- Public Relations
- Merchandise
  - Volunteers
  - Participants
  - Giveaways

Performance Skill
- Conduct primary and secondary research for potential vendors
- Create a realistic budget for a campaign that includes all incurred costs

STRAND 7
Key Metrics
Students will understand various **key metrics** to determine the success of a recreation or ports campaign.

Standard 1
Discuss qualitative metrics that will be used to measure campaign success.
- **Qualitative Metric: metrics that look at perceived value**
  - Customer satisfaction
  - Reviews and comments on official sites or to personnel
  - Feedback surveys

Standard 2
Discuss quantitative metrics that will be used to measure campaign success
- **Quantitative Metric: a set of measurements that objectively evaluate your product or company's performance**
  - Attendance rates
  - Tickets sales
  - Repeat purchases (Season pass holders, Repeat sponsorship)
  - Total revenue
  - Increase in sales, participation, attendance, and registration over last year.
  - Merchandise and concession sales

Performance Skills
Use your three campaign objectives to identify and select a related metric(s) to evaluate the success of the campaign

STRAND 8
Pathways, Post Secondary, and Careers
Students will understand the opportunities to graduate as a pathway completer, the post-secondary programs and Career opportunities in Marketing.

Standard 1

Highlight the courses offered at your school in the marketing pathway.
- Explorer Courses
- Concentrator Courses
- Completer Courses

Standard 2

Explore post-secondary school programs in the region
- Tech colleges & certifications
- Associate degree programs
- 4-year Bachelor's degrees

Standard 3

Explore potential careers in sport and recreation marketing. Include average salaries, benefits, flexibility, and work/life balance.
- Athletic Director
- Program Directors
- Youth Programs
- Park Operations
- Athletics Supervisor
- Recreation Management
- Sports Event Planner
- Sales Manager
- Community Outreach Coordinator
- Outdoor Recreation Leadership
- Therapeutic Recreation
- Adaptive Sports
- Entrepreneurial Opportunities

Skill Certification 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		

STRANDS AND STANDARDS
REAL ESTATE

Learning that works for Utah
CTE®

Course Description

Students will be introduced to real estate basics that include the scope of the real estate business, usage of the land, land description, ownership, contracts, deeds, mortgages, title search and closes, liens, financing sources, the appraisal process, investments in real estate, and the sales and marketing process. Students will broach real estate marketing and sales through ethics, human, employee, and customer relations, the use of product knowledge, and the use of advertising and the media. Exposure to real estate terminology, forms, and contracts is an integral part of this class.

Intended Grade Level	10-12	
Units of Credit	.5	
Core Code	37.01.00.00.220	
Concurrent Enrollment Core Code	NA	
Prerequisite	None	
Skill Certification Test Number	411	
Test Weight	.05	
License Area of Concentration	Secondary Education 6-12	
Required Endorsement(s)		
Endorsement 1	Business, Finance & Marketing (CTE/General)	
Endorsement 2	Business, Finance & Marketing Essentials	

ADA Compliant: Month/year

STRAND 1

Introduction to Real Property/ Real Estate

Students will identify key components of the History in Real Estate through exploring the concepts of human culture, real property, and the characteristics and uses of land.

Standard 1

Describe the development of human cultures and its role in real estate
- Evolution of human culture and land
- How did private property and land ownership become important
- What is the **Homestead Act:** Signed by President Lincoln, allowed Americans to purchase land in the Western US.

Standard 2

Describe the difference between real and personal property
- **Real Property:** Rights associated with ownership of land and all permanent attachments to land
- **Personal Property:** An individual's personal items. Objects that are not permanently affixed to the land or structure

Standard 3

Develop an understanding of the characteristics of land.
The three main descriptions of land are the following.
- **Indestructibility:** Land is durable. Only improvements on the land can be destroyed, not the land itself
- **Uniqueness**: No two pieces of land are the same. Land has different locations, different types of buildings, and different shapes of property
- **Immobility:** A physical characteristic of land in that it cannot be moved from its location

Standard 4

Explain the many uses of land
- **Residential Property:** Land zoned specifically for living or dwelling of individuals and households
  - **Single Family:** free-standing non-attached dwelling
  - **Multi-Family:** attached dwelling where residents share walls
  - Condominiums / Townhomes
- **Commercial Property:** Land used for commerce and business
- **Agriculture Property:** Land used for grazing and farming
- **Public lands:** Land that benefits all citizens and is managed by Government Agency such as BLM (Bureau of Land Management), Schools, Post Office

Performance Skills

Compare and contrast the values of living in each of the different types of Residential Properties.

STRAND 2
The Nature of Real Property
Students will understand the nature of "Real" property.

Standard 1
Describe and define property attachments
- **Fixtures**: Personal property which has been attached to real estate so as to become part of the real property.
  The attachment must meet at least one of three conditions:
  1. Attached in a permanent manner.
  2. Specifically adapted to the property. or
  3. Intentionally made part of the real property.

- **Annexation:** Attaching personal property to real property, so that it becomes part of the real property (a fixture) as it pertains to the law.
- **Attachments:** anything affixed to the land.

  Explain Adaptation of the Item and Methods of Adaptation: (Method of attachment, adaptation of the realty, relationship of the parties, Intention of the annexure, agreement in writing)

Standard 2
Identify the current and historical methods of land descriptions.
- Describe the purpose and usage of a legal description.
- Explain the nature of a land survey
- Identify common methods of land description in legal documents, including the following.
  - **Metes and Bounds Method:** A system of land description using distance (metes) and angles/ compass directions (bounds), beginning and ending at the same point
  - **Government Land Survey Method:** A system of land description in some states that uses meridians (north and south lines) and baselines (east and west lines). Areas include quadrangles (24 miles on each side), townships (6 miles on each side), and sections (1 mile on each side). Also known as the "Rectangular Survey Method".
  - **Recorded Map Method:** A subdivision map filed with the county recorder's office that shows the location and boundaries (lot and block number) of individual parcels of land.
- Identify the Great Salt Lake Base and Meridian for the state of Utah.
- Know the number of sections in a **township** (a parcel of land that is six miles square, containing 36 sections); the number of acres in a **section,** one-mile square containing 640 acres, and the number of square feet in an acre (43,560).

Performance Skills

Write a description of property using the government land survey method and be able to identify it on a township map

SECTIONS IN A TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIVISIONS OF A SECTION

NW ¼ NW¼	NE ¼ NW¼	NE ¼ Section 160 acres	
SW ¼ NW¼	SE ¼ NW¼ 40 acres		
N½ SW¼		W½ SE¼	E½ SE¼ 80 acres
S½ SW¼ 80 acres			

STRAND 3

Real Estate and the Economy

Students will understand the macro and micro economics of the real estate sector.

Standard 1

Define economics in real estate both macro and micro.

- **GDP** Gross Domestic Product is the total monetary or market value of all the finished goods and services produced within a country's borders in a one-year time period.
- **Sector** An area of the economy in which businesses share the same general or related business activity, product, or service.
- **Industry** organizations involved in the production of goods and services for a particular field. Industries are usually categorized by the goods and services they produce.
- **Supply and Demand** economics, the relationship between the quantity of a product that producers wish to sell at various prices and the quantity that consumers wish to buy. It is the main model of price determination used in economic theory.

Describe and define the economic characteristics of land.

- **Scarcity:** The central force in the social science of economics; it is the concept that resources are finite and there is a limited amount available of anything and never enough to fulfill our human needs and wants
- **Location:** each parcel of land is unique and apart from all others, so to is the competition (supply and demand) for each parcel
- **Improvements:** man-made additions to real property

- Identify the Real Estate industry in the larger context of the GDP and its relative share of the U.S. GDP.
- Explain homeownership in the context of the American Dream and identify macro trends.
- Explore whether the "American Dream" is becoming more or less attainable for the average American.

Standard 2

Define the following terms in reference to home ownership vs. leasing
- **Home Equity:** the fair market value of a property, less any mortgage balances or existing liens, or monies owed.
- Additional expenses: taxes, **HOA**, fees, repairs and maintenance, finance and insurance.
  - **HOA** is a nonprofit association made-up of homeowners in a subdivision's architectural covenants and community affairs.

Describe the following ideas as they relate to home ownership or leasing.
- Tax benefits
- Owners rights
- Tenant rights
- Mobility
- Upfront Costs
- Property upkeep expense and responsibility
- Describe the advantages/disadvantages of home ownership vs. leasing.

Performance Skills

Students will evaluate local real estate values and trends by exploring the market and identifying which parts of the market are rising and/or falling.
Potential ideas:
- Create a local real estate market monopoly board.
- Create a graphic organizer or spreadsheet comparing local real estate markets and their values.

STRAND 4

Fundamentals of Ownership and Real Estate Contract Law
Students will understand methods of property ownership and real estate contracts.

Standard 1

Explain the different types of estates and a bundle of rights:
- **Bundle of Rights**
  - **Disposition**: which is the right to sell or give the property to another.
  - **Enjoyment**: which is the right to possess the property without outside interference.
  - **Exclusion:** which is the right to keep others from using the property.
  - **Possession**: which is the right to occupy the property.
  - **Control**: which is the right to legally use the property by the owner how they see fit.

- Describe the difference in water rights and define the following terms.
    - **Riparian Water Rights**: Right to water running on or adjacent to the property owned such as a river.
    - **Littoral Water Rights**: Right to body of water bordering the property owned such as a lake.
    - **Appropriative Water Rights**: Right to water that can be diverted to the property owned such as canals and irrigation systems.
- **Freehold estates:** Ownership of real property for an unspecified amount of time
    - **Fee-simple**: Highest form of real property ownership.
    - **life estate:** Ownership of real property that is limited in duration to the life of the owner and identifies who receives the property after the owner's death.
- **Leasehold estates:** Grants possession and other rights, but not ownership, for a specified time

Standard 2

Describe the different types of property ownership.
- Sole Ownership
- Co-Ownership
    - **Joint Tenancy:** Co-owners share all property rights and interests equally with rights of survivorship.
    - **Rights of Survivorship:** Transfer of ownership and rights to remaining co-owner(s) upon the death of a co-owner.
    - **Tenancy in Common:** Co-owners own a designated share of the property without rights of survivorship.

Standard 3

Understand the fundamentals of real estate contracts.
- Define **contract:** An agreement between two or more parties to do or not to do certain things
- Examine the essential elements of a real estate contract:
    - **Offer:** A specific proposal to enter into an agreement with another.
    - **Acceptance:** Expression of willingness to be bound, such as a handshake, signature, or "yes."
    - **Genuine Agreement:** A "meeting of the minds" as to the terms of the contract.
    - **Consideration:** A "bargained for" promise, such as money, property, services, or an agreement not to act.
    - **Legal Purpose:** all elements of the contract must be legally enforceable.
    - **Capacity:** The competence to enter into an agreement. Issues include mental competency, intoxication, language barriers, and minors.
    - In writing because of the **Statute of Frauds**
- Define and distinguish between **valid, void, voidable,** and **breach** in relation to contracts.
    - **Valid:** Contract contains all the essential elements and therefore is binding on all parties.
    - **Void:** Contract lacks one or more of the essential elements and therefore is not binding on any of the parties.
    - **Voidable:** One of the parties to a contract can challenge one or more of the essential elements and therefore has the right to affirm or disaffirm the contract.
    - **Breach:** When one party in a contract fails to deliver according to the terms of the agreement.
- Review the Utah Real Estate Purchase Contract:
    - **Earnest Money Deposit:** Funds deposited by the buyer representing good faith to make the purchase.
    - Offer to Purchase
    - Acceptance/Counter Offer/Rejection
- Review elements of a basic lease agreement

Standard 4

Describe the transferring ownership and deeds and define essential terms.

- **Title:** Legal right to ownership of real property. This is not a document
- **Deed:** Evidence of ownership of real property. This is a document showing the transfer of ownership.
- Identify the uses and different types of deeds
    - Warranty Deed
    - Special Warranty Deed
    - Quit Claim Deed
    - Trustee's Deed
- Involuntary Transfer
    - Adverse possession
    - Eminent domain
- Describe the facilitation or transfer of ownership
    - **Escrow:** Neutral third party holds funds and documents until all elements of the transfer are complete.
    - **Title Insurance:** Protects lenders and property owners from financial loss arising from defects in a title.
    - Closing Costs
    - Settlement Statement

Performance Skills

- Using critical thinking students will identify essential elements of a contract that are found in the Utah Real Estate Purchase Contract.
- Using critical thinking students will identify essential elements of a contract that are found in a standard lease agreement.

STRAND 5

Real Estate Financing and Appraisal

Students will understand the financial components involved in Real Estate including credit, home mortgages, appraisals, and property as an investment.

Standard 1

Develop an understanding of credit by defining and providing examples of the following terms in relation to credit.

- Define the following terms in relation to credit and home ownership.
    - **Credit Score**:
- The **4 C's of Creditworthiness**
    - character:
    - capacity:
    - capital:
    - collateral:

- Explain how your credit can affect your real estate loan.
    - **FICO: Fair Isaac Corporation**
    - **APR: Annual Percentage Rate**

Standard 2
Explain the various sources of funds for a home mortgage
- Variety outlets: banks, credit unions, mortgage brokers
- Identify the most common types of mortgages & terms of payment. (i.e. 15 years vs. 30-year period)
    - Conventional Mortgage loan
    - Federal Housing Administration (FHA)
    - Veteran Affairs (VA)

- Explain the elements of a monthly mortgage payment.
    - **Principal, interest, taxes, and insurance** (PITI),
    - Identify and explain **private mortgage insurance** (PMI)
- Identify the qualifying ratios
    - **Loan to Value** (LTV)
    - **Debt to Income Ratio**
- Identify and explain closing costs associated with getting a home loan (mortgage)
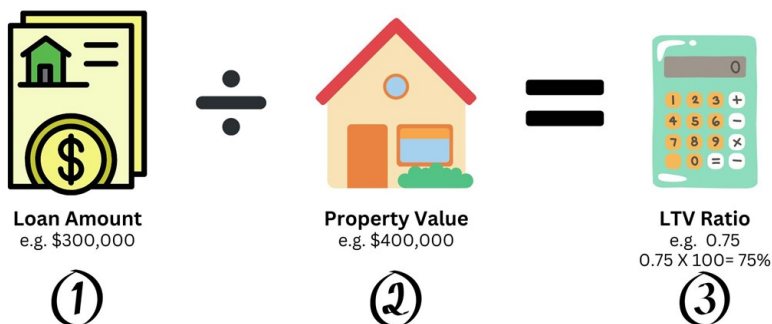
Standard 3

Describe what an Appraisal is and its significance in a home mortgage
- Define the term **Appraisal** and the three appraisal approaches:
  - Market Comparison
  - Cost
  - Income Capitalization
- Differentiate between a formal and informal Appraisal
- Define a **Competitive Market Analysis** (CMA)

Standard 4

Explore the different types of property investments
- Compare and contrast the financial risks and rewards of various property investments
  - long term rental income approach
  - short term income approach
    - **flipping (purchasing, improving, and reselling property)**
    - **vacation rentals**

Performance Skills (choose 2 of 3)
- Students will research mortgage loans by comparing and contrasting banks, types of loans and the costs associated with closing.
- Students will research current trends for residential living and investment properties
- Complete a Competitive Marketing Analysis

STRAND 6

Real Estate Marketing
Students will understand the method and process of buying and selling real property.

Standard 1

Describe marketing concepts in relation to selling a property.
- Determine significant factors that make a house marketable for purchase and future resale
  - Location
  - Kitchen
  - Lot size
  - Bedrooms
  - Square footage
- Understand the AIDA model (attention, interest, desire, action)
- Analyze buying motives when purchasing a home (rational, emotional, patronage).
- Explore the Pros and Cons of marketing your home For Sale By Owner **(FSBO)**

Standard 2

Understand the relationship between the Broker and Agent and their responsibility to their client.
Define the following terms in association with a real estate brokerage
- **Agency:**
- **Fiduciary:**

- Commission splits
- Listing agreements
- Seller disclosure
- Ethical duties:
  - Realtor ® Code of Ethics

Standard 3

Explain and describe the purpose of the different types of insurance affiliated with real estate

- Homeowners
- Earthquake
- Flood
- Credit-life insurance
- Rental insurance

Performance Skills

- Create an advertising promotional tool to communicate the features and to promote a specific property.
- Evaluate a scenario to problem-solve the best real estate insurance for three different properties.

STRAND 7

Real Estate Careers in the CTE Finance Pathway-Students will identify the courses that will help them to be pathway completers as well as potential careers in real estate and investing.

Standard 1

Career opportunities in real estate and associated careers.

- Compare and contrast the variety of supporting employment opportunities including
  - Real estate agents
  - Brokers
  - Lenders
  - Title insurance
  - Appraisers
  - Property Developers
  - Construction personnel

Standard 2

Describe the Finance pathway and the course offering at your school that allow students to become a pathway completer.

Finance Pathway
- Identify the "Explorer" courses offered at your school
- Identify the "Concentrator" courses taught at your school
- Identify the "Completer" course for the Finance Pathway

Standard 3

Certifications, Licenses, and Degrees in Real Estate and Investing
In-house training from real estate brokerages to sponsor the professional exams.

Certifications and Licenses

Some require a four-year degree as well as a trade license

- Real Estate Broker
- Real Estate Agent
- Appraisers
- Mortgage Brokers
- Title License
- Property Management

Degrees Available

Explore the potential programs in your region that are associated with real estate.

- Urban Planning
- Real Estate Law
- Architecture
- Master in Real estate development (U of U)

Standard 4

Careers in Real Estate and Investing

Explore current job postings in this field to introduce students to the fact that this is a high-wage high demand field.

Skill Certification 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		

Cluster: Computer Science & Information Technology		
Pathway: Cybersecurity		
Pathways: Information technology Systems		
Course Code Number	Course Name	Summary
35.01.00.00.040	Computer Systems 1	Updated to make sure it still aligns with the CompTIA A+ Industry Certification
35.01.00.00.041	Computer Systems 2	Updated Strands & Standards to verify alignment with the CompTIA A+ Industry Certification and industry needs.
35.01.00.00.030	Network Fundamentals	Updated Strands & Standards to verify alignment with the CompTIA Network+ Certification and industry needs.
35.02.00.00.025	Introduction to 3D Printing	NEW course per industry needs.

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.

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	Intro to Info Technology OR Teacher Approval
Skill Certification Test Number	884
	CompTIA IT Fundamentals (FC0- U61)
	CompTIA A+ Core 1 (220-1001),
	CompTIA A+ Core 2 (220-1002),
	TestOut PC Pro
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1 or	Cybersecurity
Endorsement 2	Information Technology System

CompTIA A+ Certification Exam: Core 1 Objectives

The table below lists the domains measured by the CompTIA A+ Core 1 examination and the extent to which they are represented. The CompTIA A+ Core 1 exam is based on these objectives.

Domain 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).

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
- Uplink Configuration
    - Cable/DSL
    - Satellite
    - Fiber Optic

Standard 4

Compare and contrast wireless networking protocols.

- 802.11a
- 802.11b
- 802.11g
- 802.11n
- 802.11ac
- Frequencies
    - 2.4 GHz (channels 1 – 11)
    - 5 GHz
    - 6 GHz
- 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
- Fiber optic cable tester
- Loopback plug
- Punchdown tool
- WiFi analyzer
- Ethernet cable tester

STRAND 3

Hardware

Standard 1

Explain basic cable types, features, and their purposes.
- Network cables
  - Ethernet
    - Cat 5
    - Cat 5e
    - Cat 6
    - Cat 6a
    - Plenum vs. Riser cable
    - 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-A
  - USB-B
  - USB-C
  - USB 2.0
  - USB 3.0

- Peripheral cables
  - Serial
- Hard drive cables
  - SATA
  - SAS
- 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
- 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
  - SAS
  - 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
  - Cmos
  - 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

The following workplace skills should be discussed, taught, and re-enforced in the course:
- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certification 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		
Computer Systems 1	884	4	6	13	7	2						32	27

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.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	35.01.00.00.041
Concurrent Enrollment Core Code	35.01.00.13.041
Prerequisite	Computer Systems 1
Skill Certification Test Number	885
	CompTIA IT Fundamentals (FC0- U61)
	CompTIA A+ Core 1 (220-1001),
	CompTIA A+ Core 2 (220-1002),
	TestOut PC Pro
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1 or	Cybersecurity
Endorsement 2	Information Technology System

CompTIA A+ Certification Exam: Core 2 Objectives

The table below lists the domains measured by the CompTIA A+ Core 2 exam and the extent to which they are represented. The CompTIA A+ Core 2 exam is based on these objectives.

Domain 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 and standards align with the CompTIA A+ Certification Exam: Core 2. These strands and standards also align with the TestOut PC Pro (Chapters 8 – 14).

STRAND 1
Operating Systems

Standard 1
Understand common operating systems and their purposes.
- Software compatibility
- 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
    - DHCP
    - 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 (waves)
  - 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.

- Identify and research malware symptoms.
- Quarantine the infected systems.
- Disable System Restore (in Windows).
- Remediate the infected systems.
  - Update the anti-malware software.
  - Scan and use removal techniques (safe mode, pre-installation environment).
- Schedule scans and run updates.
- Enable System Restore and create a restore point (in Windows).
- Educate the end user.

STRAND 4
Operational Procedures

Standard 1

Understand best practices of documenting asset management and enterprisepolicies.
- 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
- 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, hardware, and operating systems installations, 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

The following workplace skills should be discussed, taught, and re-enforced in the course:
- Communication
- Problem Solving
- Teamwork,
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

Skill Certification 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		
Computer Systems 2	885	21	6	12	6							45	45

STRANDS AND STANDARDS
NETWORK FUNDAMENTALS

Learning that works for Utah
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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
Core Code	35.01.00.00.030
Concurrent Enrollment Core Code	35.01.00.13.030
Prerequisite	Computer Systems 1&2, or Teacher Approval
Skill Certification Test Number	888
	981 - MTA Networking Fundamentals (98-366)
	982 – CompTIA Network+ (N10-007)
	9821 – TestOut Network Pro
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1 or	Cybersecurity
Endorsement 2	Information Technology System

CompTIA Network+ Certification Exam Objectives:

The table below lists the domains measured by the CompTIA Network+ exam 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**%

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
  - ax
- Cellular
  - GSM
  - TDMA
  - CDMA
- Frequencies
  - 2.4 GHz
  - 5.0 GHz
  - 6 GHz

- 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
  - Copper
    - UTP
    - STP
    - Coaxial
  - Fiber
    - Single-mode
    - Multimode
- Plenum vs. PVC vs. Riser
- 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
    - Simplex
    - Half Duplex
    - Full 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
- Layer 2 Switch
- Multilayer 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 summarizetheir 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
- Generating new keys
- Disabling unnecessary services
- Using secure protocols
- Network Segmentation
  - VLAN Tagging
- 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 Certification 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

STRANDS AND STANDARDS
INTRODUCTION TO 3D PRINTING

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Course Description

This course is an introduction to 3D Printing – its fundamentals principles, technologies, and applications. Students will gain hands-on experience with various 3D printing methods. Through a combination of lectures, demonstrations, and practical exercises, students will learn to design, prepare, and execute 3D prints. This course will also explore real-world applications.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	35.02.00.00.025
Concurrent Enrollment Core Code	N/A
Prerequisite	None
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 or	Programming & Software Development
Endorsement 2 or	Information Technology Systems
Endorsement 3 or	CAD Mechanical Design
Endorsement 4 or	Engineering
Endorsement 5	Technology

STRAND 1

Printer Technology
Students will understand different types of 3D printing technology and components of those technologies.
NOTE: Standards 1 – 2 could be hands on and Standards 3 – 5 could be lecture based.

Standard 1

Fused Deposition Modeling (FDM) Printers
- Understand how FDM printers work.
- Explore the variety of filament materials used with FMD printers, such as PLA, ABS, PETG, etc.

Standard 2

Stereolithography (SLA, DLP) Printers
- Understand how SLA and DLP printers work.
- Explain the difference between SLA and DLP processes.
- Explore the variety of liquid polymer materials such as standard ABS, castable, flexible, and high temp.

Standard 3

Selective Laser Sintering (SLS, SLM) Printers
- Understand how SLS printers work.
- Explain the difference between SLS and SLM printers.
- Explore the variety of powdered materials used with SLS printers, such as Powder

Standard 4

Multi Jet Fusion (MJF) Printers
- Understand how MJF printers work.
- Explore the variety of powdered materials used with MJF printers, such as Alloy metals, wood, and polymers.

Standard 5

Directed Energy Deposition (DED) Printers
- Understand how DED printers work.
- Explore the variety of powdered alloy metal materials used with DED printers.

STRAND 2

Printer Hardware/Software
Students will understand how to use the hardware and software involved with 3D Printing.

Standard 1

Printer Hardware Functions
- Explore the most common hardware components of 3D printers, such as Stepper Motors, Extruders, hotends, light sources.
- Understand how the 3D printer software uses G-Code to drive the hardware.

Standard 2

Slicer Programs

- Use different Slicer Programs to prepare 3D Models for printing. These are Cura, PrusaSlicer, LycheeSlicer, and ChiTuBox.
- Explore the variety of slicer settings and how they affect the printing process, such as Layer Height, Infil, Exposure Time, Print Orientation, etc.

Standard 3

File Types

- Use 3D Modeling Software to export 3D Models to appropriate printable formats, such as
- .stl, .obj, 3mf, etc.
- Unzip files from Compressed/Zipped folders when downloading files off the internet.
- Use Slicer Programs to export 3D Printer files for printing, such as Gcode.

STRAND 3

Printer Maintenance

Students will understand and be able to maintain a 3D printer, including assembly and troubleshooting

Standard 1

Filament (FDM) Maintenance

- Assemble and maintain basic parts such as Nozzle, Print Bed, Hot End, Bowden Tube, & Stepper Motors

Standard 2

Resin (SLA/DLP) Maintenance

- Understand the process of assembling and maintaining basic parts such as FEP Film, Reservoir, & Cleaning Station.
- Understand and implement proper safety equipment such as Nitrile Gloves, Safety Goggles, Isopropyl Alcohol, & Ventilation.

STRAND 4

3D Design for Printing

Students will understand how to efficiently design 3D models for printing

Standard 1

3D Modeling Software

- Use 3D Modeling Software to create 3D models for printing such as Sketchup, Blender, Inventor, Tinkercad, etc.
- Use 3D Modeling Software to modify/kitbash existing models downloaded from the internet.
- Use 3D Modeling Software to clean up existing models to make them suitable for 3D Printing.

Standard 2

Designing For Printing Limitations

- Students will understand how to design models that are optimized for 3D printing, using concepts such as Overhangs, Bridging, Orientation, Thickness, Tolerance, Supports, etc.
- Students will be able to accurately measure an object in metric units using calipers.

Standard 3
Hard Surface Modeling
- Students will create a variety of hard surface models such as fixtures, assembly parts, etc.

Standard 4
Organic Modeling
- Students will create a variety of organic models such as characters, animals, etc.

Standard 5
Design Process
- Students will understand the steps in the design process from having a need to finishing a final product that fulfills that need.
- Students will understand and demonstrate sketching designs from different perspectives.
- Students will find and solve local problems using designs and 3D printed products of their own design

STRAND 5

3D Printing Real World Applications
Students will explore what industries and groups are using 3D Printing currently and what areas it is growing in.

Standard 1
Industries
- Difference between Primary and Secondary manufacturing methods.
- Aerospace
- Manufacturing
- Medical
- Automotive

Standard 2
Hobbyists
- Tabletop Gaming
- Art
- Home Improvement
- DIY

Vocabulary Terms

ABS	Stands for Acrylonitrile Butadiene Styrene, which is a thermoplastic used for 3D printing. ABS is a common form of plastic found in most household items that were injection molded.
Additive Manufacturing	The process of creating an object from a digital file by stacking 2D layers to form a 3D object. Also called 3D printing.
Belt	Toothed gear belt that is used to transfer movement.
Bed Leveling	The act or process of adjusting the build plate/print bed, so that the first layer will be level
Bridging	Bridging occurs in a 3D print when filament is extended across an open area without supports. The distance a print can bridge is determined by the hardware capabilities of the printer and the slicer settings.
Brim	A platform adhesion option whose function is to reduce shrinkage of bottom print layers or better adhere a low surface area object by providing a larger base platform.
Build Plate	The surface where the printer deposits the materials used for printing. Also known as the Print Bed. see also Print Bed
Bowden Extruder	An extruder assembly used pushing filament that uses a tube to feed the filament from the motor to heated areas. This type of extruder assembly reduces heat transfer to filament pressure point, thereby reducing plastic buildup and clogs.
Calibration	The act or process of adjusting a device or instrument to perform correctly or more efficiently.
Control Screen	LCD screen that displays information and provides an interface to select settings and manipulate the printer
Cooldown	The process of cooling down the hot end. Cooldown occurs automatically after a print is finished, or can be done manually after changing filament to to prevent filament baking and clogs. Can be controlled using the Control Screen or turning off the 3D printer.
Endstop	Mechanical switches that indicate where the "home" or "zero" position is on each print axis. Also called Limit Switch
Extrude	The act of dispensing build material onto the build platform through a small nozzle commonly referred to as a "hot end."
Extruder	The assembly that handles feeding and extruding filament during a print. The extruder has two parts: the stepper motor and feeding system that pushes the material into the printer, and a hot end that heats and extrudes the material through a nozzle onto the build surface.
Filament	Typically a thermoplastic formed into a continuous wire and wound onto a spool so it is compatible with a 3D printer's extrusion system. see also ABS, PLA, TPU
Fill	The area within a 3D-printed object that connects the top, bottom, and side layers. Also called Infill or Fill Density
Flow	The action of filament moving in a steady continuous stream. see also Extrusion Multiplier
Fused Deposition Modeling (FDM)	FDM is another name for material extrusion. It is a trade name created by Stratasys, the company that invented and first commercialized the material extrusion process.

G-code	Coding language that the 3D printer understands. It is used to transmit instructions to a 3D printer's control system to tell the printer how to print the 3D model. see also Cura, Slicer
Hot End	The heated portion of the extruder assembly that includes the nozzle and heating block.
Layer	Extruded plastic of a closed loop, represented as a two-dimensional drawing on the X-Y plane. When replicated over again in the Z direction, it produces a 3D object or multi-layered X-Y drawing. see also Layer Height
Layer Height	Utmost determinant of quality for 3D printing, it defines the distance between lines of extruded plastic in the Z-direction. Material extrusion 3D printers typically print layers between 0.1mm and 0.3mm high. A lower layer height translates to a smoother, higher quality print. A higher layer height translates into a faster, low quality print.
Mesh	A collection of polygons attached by edges and vertices that makes up a net-like surface area in CAD.
Nozzle	A brass or steel funnel-shaped die through which melted plastic is extruded. Also called an Extruder Nozzle or Hot End
OBJ	OBJ stands for Object File, an alternative to the STL file format. OBJ (.obj) files store object exterior pattern and color.
PLA	Polylactic Acid (PLA) is a biodegradable thermoplastic polymer derived from the starch in plants (normally corn) that is used for 3D printing.
Preheat	Heating prior to using the device or tool. In 3D printing, the nozzle needs to be preheated before printing or for loading and unloading filament.
Print Speed	The rate at which a 3D printer is capable of moving while extruding plastic. A print speed of 50mm/s will be successful on most FDM printers. A print speed of 20–30mm/s will produce higher quality prints.
Print Quality	Refers to the quality of the print and is determined by many factors including mechanical capabilities of the printer, slicer used, layer height, print speed, support, and print orientation.
Printing Temperature	The temperature of the hot end at which the filament is melted and extruded.
Raft	- A platform adhesion option in which several layers of printed material are deposited on the build surface to smooth out any irregularities in the build surface and help prevent warping in the model being printed on top of the raft. A raft also helps with bed adhesion of delicate models.
Resolution	The smallest movement a printer's extruder can make within a single X-Y layer. Often indicates the produced quality of a printed model.
SD Card	A non-volatile memory card for use in portable devices to transfer information, such as .gcode to 3D printers.
Shell	The sidewalls of a 3D printed model, created by the exterior edges of every layer. Also called a Perimeter
Shell Thickness	The total width of an outside wall of a 3D-printed part. Shell thickness should be a multiple of nozzle size. Two shells is typically best. An increased number of shells will lead to a stronger model. see also Shell

Skirt	A platform adhesion option that extrudes an offset outline of the model on the first layer of the print. The skirt helps to remove unwanted colors and build pressure for material extrusion. It also checks the accuracy of bed leveling.
Slice	The action of changing a model file (STL, OBJ, etc.) into a a G-code file. The coordinate type can vary depending upon setting selection. The most common type uses cartesian coordinates on an XYZ plane. see also Slicer
Slicer	A type of program, such as Cura or Repetier Host, that allows manipulation of a 3D model and converts the file type into a coordinate system (usually .gcode) the printer follows to create a model. see also Cura, Repetier Host
Stepper Motor	In 3D printing, the stepper motor that produces precise movement of the extruder, X-, Y-, or Z-axis.
STL	The STL file format (STL stands for stereolithography) is the recommended file format for 3D models for 3D printing. The filetype contains the best mesh for solid 3D-printed objects.
Support	Additional removable structures that are printed to support overhangs or other parts of a model that do not make contact with the build plate during printing
X-Axis	The principal or horizontal axis of a system of coordinates.
Y-Axis	The secondary or vertical axis of a system of coordinates.
Z-Axis	The axis in three-dimensional Cartesian coordinates which is usually oriented vertically.

Cluster: Education & Training		
Pathway: K-12 Teaching as a Profession		
Course Code Number	Course Name	Summary
39.02.00.00.002	Teaching as a Profession 2	Updating S&S to better meet industry need and to better clarify what needs to be taught. NAME CHANGE: Principles of Educational Technology
39.02.00.00.001	Teaching as a Profession 1	Updating S&S to better meet industry need and to better clarify what needs to be taught. NAME CHANGE: Teaching as a Profession

STRANDS AND STANDARDS
PRINCIPLES OF EDUCATIONAL INSTRUCTION

Learning that works for Utah
CTE®

Course Description

This course examines the principles of educational instruction and prepares future educators to differentiate to meet the needs of all students using educational technology tools. Students will explore ways technology can be used to enhance student autonomy in the classroom while protecting student data. Students will evaluate technology tools based on student learning intentions, develop a professional digital presence, engage with evidence-based information, and identify benefits of collaboration within a professional learning network. Students will develop and design a course within a Learning Management System (LMS) that is accessible for all students and supports student learning outcomes.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	39.02.00.00.002
Concurrent Enrollment Core Code	39.02.00.13.002
Prerequisite	N/A
Skill Certification Test Number	012
Test Weight	1.0
License Area of Concentration	Secondary Professional Level License
Required Endorsement(s)	
Endorsement 1	K-12 Teaching as a Profession

STRAND 1
Students will explore and identify the roles of technology to enhance educational design and improve autonomy in the classroom.

Standard 1
Identify the purpose of technology to enhance educational design in the classroom.
- Discuss how technology facilitates collaboration.
  - Teacher and student
  - Teacher and parent
  - Teacher and teacher
  - Teacher and counselor
  - Teacher and administrator
- Identify how technology increases opportunities for formative and summative assessment.
  - Student prior knowledge
  - Immediate feedback
  - Student progress/mastery

Standard 2
Explore the ability of technology to enhance teacher and student autonomy.
- **Autonomy** is having the self-confidence and motivation to think and act independently.
- Compare how technology can enhance or decrease the components of autonomy for teacher instruction and student learning. (*Please reference the [Utah State Board of Education Portrait of a Graduate](#).*)
  - Communication
  - Critical thinking and problem solving
  - Creativity and innovation
  - Collaboration and teamwork

Strand 1 Performance Skill
Students will create a media presentation demonstrating how one (1) technology can be used in educational design to enhance autonomy.
- How could this technology support communication?
- How could this technology encourage critical thinking and problem solving?
- How could this technology develop creativity and innovation?
- How could this technology foster collaboration and teamwork?
- How could this technology impair effective educational design?

STRAND 2
Students will explain professional responsibilities of protecting student data and impacts on educational design when utilizing technology.

Standard 1
Explain professional responsibilities of protecting student data and privacy under Family Educational Rights and Privacy Act (FERPA).
- **Personal Identifiable Information (PII)** includes information that can be used to distinguish or trace a student's identity either directly or indirectly.
  - Student number
  - Name

- Age or Birthdate
- Email address
- Phone number
- Location data
- **Family Educational Rights and Privacy Act (FERPA)** is a federal law that protects a student's education records.
- **Education records** are records, files, documents, or other materials that contain information directly related to a student and is maintained by the school.
- **Confidentiality** is limiting access to student education records to only authorized individuals.

Standard 2

Explore and research how Utah State law and student data privacy impacts educational design when utilizing technology within a local education agency.

- **Utah Code 53E-9-309** requires LEAs to ensure there are specific provisions in place for education technology third party contractors (programs, apps, devices)
  - Where does your LEA list approved technologies? (e.g. metadata dictionary, approved application list, LearnPlatform)
  - What is the process for approving new technology products in your LEA?
- **Utah Code 53E-9-203** requires educators to get prior written consent from a student's guardian before asking students for personal or family information regarding:
- Political affiliations or philosophies
- Mental or psychological problems
- Sexual behavior, orientation, or attitudes
- Religious affiliations or beliefs
- Income
- Illegal, anti-social, self-incriminating or demeaning behavior
- Critical appraisals of individuals with whom the student or family member has close family relationship.
- Legally recognized privilege and analogous relationship (lawyers, medical personnel, or ministers)
  - How can educators ensure online content and classroom materials align with Utah Code 53E-9-203?

Strand 2 Performance Skill

Students will research and present on a current education issue regarding technology in the classroom and how it affects student data and privacy.

STRAND 3

Students will identify technology usage and evaluate technology tools based on student learning intentions.

Standard 1

Identify how different types of technology usage can help meet a learning intention in the classroom.

- **Learning intention** is a statement written by educators that defines the day-to-day learning goals aligned to state standards.
- **Engagement** allows students to participate in active learning focused on the learning goal.
  - **Passive consumption** is scrolling, watching, or playing on a digital device without any critical engagement or creativity.
  - **Active consumption** is cognitively or physically engaging in screen-based activities.

Standard 2

Identify how technology frameworks and models evaluate the effectiveness of technology.
- **SAMR Model** examines how a specific technology tool impacts student learning.
- **PICRAT Framework** examines the relationship between the engagement level and teacher technology instructional design.
- **TPACK Model** examines how technology, content, and pedagogy interrelate.
- **Triple E Framework** examines the student engagement, enhancement, and extension process.
- Evaluate how technology frameworks and models enhance student outcomes and teacher effectiveness to meet learning intentions.

Standard 3

Identify how technology can support and accommodate each student's unique learner characteristics.
- Evaluate common accessibility software to support each student's unique learner characteristics. (e.g. screen reader, screen magnifiers, screen contrast, voice recognition, voice amplification devices)
  - **Disability** as a physical or mental impairment that substantially limits one or more major life activities.
  - **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.
  - **Linguistic needs** as providing curriculum in both the primary language and secondary language.
  - **Socio-economic status (SES)** as three levels (high, middle, and low) that describe the three places a family and/or individual may fall based upon income, education, and occupation.
- Discuss how the accessibility and effectiveness of technology tools may differ based on student's unique learner characteristics.
  - Extended learning opportunities
  - Student autonomy

Strand 3 Performance Skill

Students will observe a classroom and use a technology framework or model to examine the impact of technology usage on student outcomes. Students will create and artifact of their findings.
- Select and justify a technology framework or model.
- Observe classroom technology integration.
- Create artifact evaluating technology integration based on selected framework or model.

Students will research how technology can support students with disabilities and create a presentation recommending effective technology educational supports for students with learning challenges. Students with disabilities could include:

Autism	Orthopedic impairment
Deaf-blindness	Other health impairments
Developmental delay	Preschool disabled
Emotional disturbance	Specific learning disability (e.g. dyslexia)
Hearing impairment	Speech or language impairment
Intellectual disability	Traumatic brain injury
Multiple disabilities	Visual impairment

STRAND 4

Students will use technology to develop a professional digital presence, engage with evidence-based information, and collaborate within a professional learning network.

Standard 1

Identify appropriate and inappropriate uses of digital tools and positive online behaviors that promote educational professionalism.

- Appropriate Use of Digital Tools
    - Set personal accounts to private
    - Engage in professional learning networks (PLN)
    - Use LEA approved educational tools
    - Use LEA approved communication methods with students and guardians
    - Use professional and timely communication with all stakeholders
    - Curate a professional digital presence
    - Regularly evaluate personal and professional digital footprint
- Inappropriate Use of Digital Tools
    - Providing unauthorized access to electronic files or communications
    - Disrupting network operations or supporting security breaches (password security, viruses, phishing)
    - Engaging in for-profit business activity
    - Accessing, distributing, or providing sexually orientated messages
    - Misrepresenting yourself or impersonating someone else, real or fictional
    - Passing on advertisements or unwanted communications
    - Privately engaging with a student through personal electronic devices and accounts

Standard 2

Analyze and examine how educators can foster a learning environment to support digital literacy and media fluency.

- Create a positive learning environment to support student dialogue.
- Model using evidence to support ideas.
- Evaluate source claims and purposes for accuracy.
- Demonstrate how to disagree professionally.
- Understand the educational impacts of sharing inaccurate information.

Standard 3

Explore a variety of professional learning networks to pursue professional learning and current research that supports student learning outcomes.

- Identify the opportunities provided by professional learning networks.
- Evaluate how collaboration within professional learning networks supports professional learning goals.

Strand 4 Performance Skill

Students will create a 5-10 minute professional development presentation on a specific skill needed to develop a professional digital presence.

- Identify the learning intention for the presentation.
- Consider the needs of audience.
- Model the use of technology in the presentation.
- Reflect on the professional learning experience.

STRAND 5
Students will develop and design a course within a Learning Management System (LMS) that is accessible for all students and supports the student learning outcomes.

Standard 1
Identify the components of effective lessons plans outlined in the Utah High Quality Instructional (HQI) Cycle.
- **Learning intentions** as statements written by educators that defines the day-to-day learning goals aligned to state standards.
- **Success criteria** as how educators and students will know if they have met the learning intentions.
  - **Formative assessment** as an ongoing evaluation of student learning that is administered multiple times during a lesson, unit, or course.
  - **Summative assessment** as a measurement of student learning at the conclusion of a defined instructional period.

Standard 2
Students will identify principles of online design and equitable access.
- Explain how quality online design can increase student engagement and equitable access to learning materials.
- High-quality design elements include:
  - Images representing real people and diversity
  - Appropriate content length to reduce scrolling
  - Embedded content and videos within the LMS
  - Consistent and appropriate fonts and colors
  - Icons representing specific learning tasks
- Accessibility elements include:
  - Labeling images
  - Providing image titles
  - Enabling closed captioning
  - Contrasting text and background color
  - Responsive design (e.g., scaling and appearance on computer vs. mobile device)
  - Multiple means of representation, engagement, and expression

Standard 3
Students will identify primary course elements and features within a Learning Management System (LMS).
- Primary course elements include:
  - Navigation elements
    - Landing page (e.g., Home, Stream, Dashboard)
    - Buttons
    - Course navigation
    - Global navigation
    - Calendar
  - Content Management
    - Course overview (e.g., Syllabus, Stream)
    - Organization systems (e.g., Module, Topic)
    - Content delivery (e.g., Pages, Materials)
  - Content Creation
    - Assignments
    - Embedded elements (e.g., videos, LTI tools)
    - Hyperlinks

- Assessment
  - Collaborative dialogue (e.g., Discussions, Question)
  - Quizzes
  - Rubrics
- Primary Course Features include:
  - Communication
    - Messaging
    - Announcements
  - Grading
    - Gradebook
    - Feedback
    - SIS (Student Information System) sync

Performance Skills

Students will design a course within a learning management system (LMS) that includes:

- Landing page
- About Me page
- Organization system (Module or Topic)
- Embedded materials (video or LTI)
- Educational resources
- Hyperlinks
- Assignment with rubric
- Collaborative dialogue
- Quiz

Teaching as a Profession 1 Vocabulary

Strand 1

autonomy

Strand 2

Personal Identifiable Information (PII)
Family Educational Rights and Privacy Act (FERPA)
education records
confidentiality
Utah Code 53E-9-309
Utah Code 53E-9-203

Strand 3

learning intention
engagement
passive consumption
active consumption
SAMR Model
PICRAT Framework
TPACK Model

Triple E Framework
disability
academic learning needs
linguistic needs
socio-economic status (SES)

Strand 5

learning intentions
success criteria
formative assessment
summative assessment

Skill Certification Test Points by Strand

Coming soon

STRANDS AND STANDARDS
TEACHING AS A PROFESSION

Learning that works for Utah
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Course Description

A course designed to create the next generation of effective educators in Utah. Students will explore educational careers and develop employable skills outlined in Utah's Portrait of a First Year Teacher. Students will create basic lesson plans and accommodate for individual student needs. Students will investigate theorists who set the framework for effective student learning. Students will craft a variety of hands-on projects applicable to classroom learning. Students will experience the job responsibilities of an educator.

Effective School Year	2024-2025
Intended Grade Level	9-12
Units of Credit	0.5
Core Code	39.02.00.00.001
Concurrent Enrollment Core Code	N/A
Skill Certification Test Number	011
Test Weight	1.0
License Area of Concentration	Professional Secondary License
Required Endorsement(s)	
Endorsement 1	K-12 Teaching as a Profession

STRAND 1

Students will explore a variety of educational careers, compare school types, and identify employability skills needed to gain and maintain employment in education.

Standard 1

Explore and compare the different roles and benefits in the administrative, academic, and support services careers in education.

- Administrative
  - Superintendent
  - Principal
  - Assistant Principal
- Academic Teachers (Elementary and Secondary)
  - Arts
  - Career and Technical Education
  - Health/Physical Education
  - Language Arts
  - Mathematics
  - Science
  - Social Studies
  - Special Education
- Support Services
  - Counselor
  - Librarian
  - Paraprofessional
  - Psychologists
  - Social Workers

Standard 2

Identify and compare different types of schools.

- **Public school** is a school supported by public funds.
- **Private school** is a school supported by private organizations or individuals instead of the state and federal government.
- **Charter school** is a publicly funded independent school established by parents, teachers, or community groups.
- **Online** school is a school using internet connection to receive instruction.
- **Magnet school** is a public school that focuses on a special area of study (e.g. science, performing arts, military, career education).

Standard 3

Identify employability skills in the workplace.

- **Communication** is exchanging information, both verbal and nonverbal, between individuals or groups within an organization.
- **Verbal communication** is spoken and written words.
  - Email
  - Face-to-face
  - Thank you note
- **Nonverbal communication** is visual body language and personal appearance used to convey a message.
  - Facial expression
  - Clothing

- Posture
- **Collaboration** is contributing ideas, perspectives, and experiences to accomplish a common goal.
- **Digitally literate** is evaluating and using digital technologies to enhance learning and achieve learning goals.
- **Compassionate** is creating a mutually respectful relationship with and between students.
- **Critical thinker** is accessing, evaluating, and analyzing information to make informed decisions, recognize biases, and find solutions.
- **Integrity** is being trustworthy, ethical, reliable, and accountable for learning outcomes.

Strand 1 Performance Skill

Students will conduct an interview with a current administrative, academic, 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.
- Follow-up with a handwritten thank you note to the professional.

STRAND 2

Students will evaluate the theories of Gardner, Bloom, Piaget, Maslow, and Erikson and how they relate to student learning.

Standard 1

Identify the developmental domains of student learning.
- **Cognitive** is the construction of thought process, including remembering, problem solving, and decision-making, from childhood through adolescence to adulthood.
- **Physical** is the process that starts in human infancy and continues into late adolescent concentrating on gross and fine motor skills as well as puberty.
- **Social-emotional** is the child's experience, expression, and management of emotions and the ability to establish positive and rewarding relationships with others.

Standard 2

Identify Gardner's Theory of Multiple Intelligences and apply to student learning outcomes.
- Developmental domain: Cognitive
- Differentiated instruction: Allows an educator to think about different types of mental strengths and abilities.
- Application of learning
  - **Verbal-linguistic** is learning through spoken and written words (e.g. reading, listening, speaking, and writing).
  - **Mathematical-logical** is learning through reasoning and problem-solving (e.g. numbers).
  - **Musical** is learning through songs, patterns, rhythms, instruments, and musical expression.
  - **Visual-spatial** is learning visually (e.g. images, pictures, video).
  - **Bodily/kinesthetic** is learning through gross and fine motor movement (e.g. tapping, dancing, flexible seating).
  - **Intrapersonal** is learning independently based on individual autonomy (e.g. personalized learning).
  - **Interpersonal** is learning collaboratively through interactions with others (e.g. group work, pair share).
  - **Naturalist** is learning through observing, understanding and organizing patterns in the natural environment (e.g. exploring outdoors).
  - **Existential** is learning through project-based learning (e.g. school, community, global).

Standard 3

Identify Bloom's Taxonomy for 21st Century Learning and apply to student learning outcomes.
- Developmental domain: Cognitive
- Differentiated instruction: Helps educators identify achievable learning goals and develop plans to meet them.
- Application of learning
  - **Remember** is recalling facts and basic concepts (define, duplicate, list, memorize, repeat, state).
  - **Understand** is explaining ideas or concepts (classify, describe, discuss, explain, identify, locate, recognize, report, select, translate).
  - **Apply** is the use of information in new situations (execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch).
  - **Analyze** is drawing connections among ideas (differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test).
  - **Evaluate** is justifying a stand or decision (appraise, argue, defend, judge, select, support, value, critique, weigh).
  - **Create** is producing new or original work (design, assemble, construct, conjecture, develop, formulate, author, investigate).

Standard 4

Identify Piaget's theory of cognitive development and apply to student learning outcomes.
- Developmental domain: Cognitive
- Differentiated instruction: Provides a clear framework for the way in which students at different ages and stages are capable of learning.
- Application of learning
  - **Sensorimotor stage** is when infants and toddlers acquire knowledge through sensory experiences and manipulating objects.
    - Birth to 2 years of age
  - **Preoperational stage** is when kids learn through pretend play but still struggle with logic and taking point of view of other people.
    - 2 to 7 years of age
  - **Concrete operational stage** is when children become much more adept at using logic.
    - 7 to 11 years of age
  - **Formal operational stage** involves an increase in logic, the ability to use deductive reasoning, and understanding abstract ideas.
    - 12 years of age and up

Standard 5

Identify Maslow's hierarchy of needs and apply to student learning outcomes.
- Developmental domain: Cognitive, Physical, and Social-emotional
- Differentiated instruction: Provides a model for how students are motivated to learn.
- Application of learning
  - Deficiency Needs
    - **Physiological needs** is a condition that something is required or wanted (e.g. air, food, water, shelter, warmth, sleep).
    - **Safety needs** is something needed to keep safe from harm (e.g. shelter, security, law and order, employment, health stability).
    - **Belonging and love needs** is a person's need for feeling loved and accepted (e.g. affection, intimacy, family, friends, relationships).
    - **Esteem needs** is a person's need for internal esteem factors (e.g. self-esteem, self-confidence,

achievement, recognition, status, respect).
- Growth Needs
  - **Cognitive needs** is the desire to know, understand, and solve problems.
  - **Aesthetic needs** is the appreciation and search for beauty, balance, and form.
  - **Self-actualization** is growth of an individual toward fulfillment of the highest needs, meaning in life.
  - **Transcendence** is putting needs aside to serve something greater than oneself.

Standard 6

Identify Erikson's stages of psychosocial development and apply to student learning outcomes.
- Developmental domain: Social-emotional
- Differentiated instruction: Identifies the different goals, challenges, and concerns at each stage of life to help educators create a positive learning environment to improve student learning.
- Application of learning
  - **Trust vs. Mistrust** (Stage 1)
    - When a child's needs are being met, they develop basic trust.
    - When a child's needs are not being met, they develop mistrust.
    - Birth to 1 year
  - **Autonomy vs. Shame and Doubt** (Stage 2)
    - When a child learns to exercise their own will and do things for themselves, they develop autonomy.
    - When a child does not learn to do things for themselves, they develop doubt in their abilities.
    - Age: 2 to 3 years
  - **Initiative vs. Guilt** (Stage 3)
    - When a child learns to initiate tasks and carry out plans, they develop initiative.
    - When a child does not learn to initiate tasks and carry out plans, they develop guilt about their efforts to be independent.
    - Age: 3 to 6 years
  - **Industry vs. Inferiority** (Stage 4)
    - When a child learns to apply themselves to tasks, they feel accomplished.
    - When a child does not learn to apply themselves to tasks, they feel inferior to others.
    - Age: 6 to 11 years
  - **Identity vs. Role Confusion** (Stage 5)
    - When a child refines a sense of self by testing roles, they form a single identity.
    - When a child does not form a single identity, they become confused about who they are.
    - Age: 12 to 18 years

Strand 2 Performance Skill

Students will create a visual artifact that depicts one of the theories about a developing child.
- Identify the theorist and the theory.
- Identify the developmental domain.
- Apply the theory to a real-life experience of a developing child.

Examples of visual artifacts could include:
- *Interactive bulletin board: Using Maslow's Hierarchy of Needs, create a mood bulletin board that allows a child to identify their current emotion.*
- *Children's literature book: Using Erikson's stages of psychosocial development, create a children's literature book that relates to children learning to tie their shoes.*
- *Teacher created material: Using Gardner's multiple intelligences, write a song and develop actions to*

teach about the different types of rock formations.

STRAND 3
Students will develop and present a lesson plan connecting learning intentions and success criteria by using instructional strategies for student engagement.

Standard 1
Identify lesson plan, learning intentions and success criteria.
- **Lesson plan** is an educator's plan for teaching an individual lesson.
- **Learning intentions** are statements written by educators that define the day-to-day learning goals aligned to state standards.
- **Success criteria** is how educators and students will know if they have met the learning intentions.

Standard 2
Compare instructional strategies and the role they play in student engagement.
- **Instructional strategies** are techniques used to help students become independent learners.
- **Student engagement** is the degree of attention, curiosity, interests, optimism, and passion that students show when they are learning and being taught.
- Assess how a variety of instructional strategies engage students.
  - **Explicit instruction** is an instructional approach that is structured, sequenced, and led by teachers.
    - Lecture
    - Teacher demonstration
  - **Cooperative instruction** is a technique that allows students to learn from each other and gain important interpersonal skills.
    - Jigsaw
    - Pair share
    - Peer review

Strand 3 Performance Skill
Students will plan, create, and present a 5-7 minute "how-to" lesson that includes:
- A learning intention.
- A success criteria.
- A reflection on the effectiveness of the instructional strategies used.

Examples of a "how-to" lesson could include:
- *How to make a peanut butter sandwich*
- *How to draw a star*
- *How to troubleshoot common computer issues*

STRAND 4
Students will apply DuFour's four critical questions when giving summative and formative feedback.

Standard 1
Identify ways DuFour's critical questions are applied when giving feedback.
- **Feedback** is information about the student's performance related to learning intentions.
- Ways feedback is shared to improve student learning
  - Teacher to student (e.g. written or verbal)
  - Student to teacher (e.g. self evaluation)

- Student to student (e.g. peer review)
- Feedback aligns to DuFour's four critical questions
    - What do you want all students to know and be able to do?
    - How will we know if they learn it?
    - How will we respond when some students do not learn?
    - How will we extend the learning for students who are already proficient?

Standard 2

Identify formative assessment and how it evaluates student learning.

- **Formative assessment** is an ongoing evaluation of student learning that is administered multiple times during a lesson, unit, or course.
- Formative assessment allows the educator to evaluate:
    - **Comprehension**: the action or capability of understanding something.
    - **Learning needs**: the gap between what the student knows and what the student needs to know.
    - **Progress**: forward movement toward a learning intention.

Standard 3

Identify summative assessment and how it evaluates student learning.

- **Summative assessment** is a measurement of student learning at the conclusion of a defined instructional period.
- Summative assessment allows the educator to evaluate:
    - **Competency**: demonstrating learned skills and knowledge as expected.
    - **Remediation**: reteaching concepts to help students achieve competency.
    - **Intervention**: differentiating instructional strategies to help students achieve competency.

STRAND 5

Students will review and evaluate legislation related to accommodations in the classroom and the professional roles and responsibilities of educators in the local school environment.

Standard 1

Review and evaluate legislation related to individual student accommodations in the classroom.

- **Family Educational Right and Privacy Act (FERPA)** is a federal law that protects a student's education records.
    - Transcripts
    - Test scores
    - Behavior support
- **Section 504 of the Rehabilitation Act of 1973** is a law that requires accommodations be provided to students with disabilities to access the general curriculum and activities.
- **Individualize Education Program (IEP)** is a written statement developed for each student with a disability who qualifies for special education services, including specially designed instruction and related services.
- Compare 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

Evaluate a variety of accommodations to meet all student needs.
- Extended time (e.g. tests, due dates)
- Reduced workload (e.g. fewer questions, shorter essay)
- Preferential seating (e.g. closer to teacher, front of classroom, away from door)
- Guided notes (e.g. printed notes, fill in the blank)
- Accessibility (e.g. read aloud, speech to text, screen reader)

Strand 6 Performance Skill

Students will reflect and adapt the "how-to" lesson plan in Performance Skill 3 to accommodate a student with an IEP.

Teaching as a Profession 1 Vocabulary

Strand 1

public school
private school
charter school
online school
magnet school
communication
verbal communication
nonverbal communication
collaboration
digitally literate
compassionate
critical thinker
integrity

Strand 2

cognitive
physical
social-emotional
verbal-linguistic
mathematical-logical
musical
visual-spatial
bodily/kinesthetic
intrapersonal
interpersonal
naturalist
existential
remember

understand
apply
analyze
evaluate
create
sensorimotor stage
preoperational stage
concrete operational stage
formal operational stage
physiological needs
safety needs
belonging and love needs
esteem needs
cognitive needs
aesthetic needs
self-actualization
transcendence
trust vs. mistrust
autonomy vs. shame and doubt
initiative vs. guilt
industry vs. inferiority
identity vs. role confusion

Strand 3

lesson plan
learning intentions
success criteria
instructional strategies
student engagement
explicit instruction
cooperative instruction

Strand 4

feedback
formative assessment
comprehension
learning needs
progress
summative assessment
competency

remediation
intervention

Strand 5

Family Educational Right and Privacy Act (FERPA)
Section 504 of the Rehabilitation Act of 1973
Individualize Education Program (IEP)

Skill Certification Test Points by Strand

Coming soon

Cluster: Engineering & Technology		
Pathway: Engineering		
Course Code Number	Course Name	Summary
38-01-00-00-051	Mechanical Engineering Design 1 (formerly CAD Mechanical 1)	NAME CHANGE More detail added to college and career exploration. More detailed and specific performance skills added.
38-01-00-00-052	Mechanical Engineering Design 2 (formerly CAD Mechanical 2)	NAME CHANGE Tolerancing strand simplified. More detailed and specific performance skills added.
38-01-00-00-053	Mechanical Engineering Design 3 (formerly CAD Mechanical 3)	NAME CHANGE Greater emphasis on resume and portfolio creation. Details added to specify important fasteners and symbols. Strand added on 3D printing. More detailed and specific performance skills added.

STRANDS AND STANDARDS
MECHANICAL DESIGN ENGINEERING 1

Learning that works for Utah
CTE®

Course Description

The first in a sequence of courses that prepares individuals to plan and prepare scale, isometric drawings and technical documentation of engineering and design concepts. This includes standard engineering practices in design and graphics including the use and application of computer softwares to create and modify designs.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.041
Concurrent Enrollment Core Code	38.01.00.13.041
Prerequisite	None
Skill Certification Test Number	661
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Mechanical Design

ADA Compliant: August 2023

STRAND 1

Engineering & Design Careers

Standard 1

Explore the design aspect of the following career areas:
- Industrial Designer
  - Industrial designers combine art, business, and engineering to develop the concepts for manufactured products. (U.S Bureau of Labor Statistics)
- Mechanical Engineering
  - Mechanical engineers design, develop, build, and test mechanical and thermal sensors and devices. (U.S. Bureau of Labor Statistics)
- Manufacturing/Industrial Engineering
  - Industrial engineers devise efficient systems that integrate workers, machines, materials, information, and energy to make a product or provide a service. (U.S. Bureau of Labor Statistics)
- Technician

Standard 3

Understand the education and training needed for each of the occupations discussed in Strand 1 Standard 2.

Standard 4

Identify which post-secondary institutions, local and statewide, offer certificates and degrees related to engineering, drafting, and design.
- University of Utah
- Bridgerland Technical College
- Utah State University
- Davis Technical College
- Weber State University
- Ogden-Weber Technical College
- Southern Utah University
- Southwest Tech
- Snow College
- Uintah Basin Technical College
- Utah Tech University
- Dixie Technical College
- Utah Valley University
- Mountainland Technical College
- Salt Lake Community College
- Salt Lake Technical College
- Tooele Technical College
- Brigham Young University
- Westminster University

Performance Skill

Students can create a personal plan to become a technician, designer, and/or engineer in the state of Utah.

STRAND 2

Sketching and the Engineering Design Process

Standard 1

Engineering Design Process
- Identify and define the design problem.
- Brainstorm solutions
- Create models and build a prototype.
- Test the prototype.
- Redesign and optimize.

Standard 2

Create accurately proportioned sketches using correct drawing conventions.
- Demonstrate understanding of dimensioning practices and apply them to technical or design sketches.
- Create freehand sketches using paper, pencil, and an eraser which is neat, clear, and smudge-free.
- Create drawings or sketches with isometric, orthogonal, sections, and assembly views.
- Understand and demonstrate the proper use of the alphabet of lines.
- Create letters and numerals that conform to an industry accepted style including size, spacing, pitch, and all other common factors as specified in current industry standards..
- Create notes that are neat and legible.

Performance Skill

Student can document their design process using sketches with correct drawing conventions.

STRAND 3

Mathematics, Measuring Conventions, and Scale

Standard 1

Perform basic arithmetic functions using fractions and decimals.
- Add
- Subtract
- Multiply
- Divide

Standard 2

Convert between fractions and decimals.

Standard 3

Convert between and within metric and imperial units.

Standard 4

Make and record basic measurements.
- Understand and demonstrate the conversion of actual lengths to common technical drawing scales.
- Accurately set the drawing scale using CAD software when creating a drawing.
- Record measurements using Cartesian and polar coordinates, as well as absolute and relative distances.
- Can accurately measure to 1/16" using a ruler or tape measure.
- Can accurately measure to a millimeter using a ruler or tape measure.

Performance Skill

Student can accurately measure to 1/16" and to a millimeter.
Student can add, subtract, multiply, divide, and convert in fractions and decimal units.
Student can convert between and within metric and imperial units.

STRAND 4
Orthographic Views

Standard 1
Drawing orthographic projections.
- Apply correct 2D geometric construction techniques.
- Drawing elements are accurate and drawn to scale.
- Draw on the correct plane.
- The top, front, and side views are used unless otherwise required using orthographic projection.
  - Minimum number of views necessary.
- All views are properly aligned and use third-angle projection.
- Appropriate lines and surfaces are located on each view.

Standard 2
Understand common terminology associated with drafting and design.
- Axis
- Concentric
- Diameter
- Coordinate
- Fillet
- Vertical
- Horizontal
- Orthographic view
- Parallel
- Perpendicular
- Plane
- Radius
- Round
- Sketch
- Tangent
- Third angle projection

Performance Skill
Student can create a multiview or orthographic projection of a part.

STRAND 5
Line Types

Standard 1
Know common line thicknesses:
- Thick -0.7mm
- Medium - 0.5mm
- Thin - 0.35mm
- Thinnest - 0.25mm

Standard 2
Understand the Alphabet of lines.
- Object line

- Hidden line
- Cutting Plane line
- Center line
- Dimension line
- Extension line
- Leader line
- Border line
- Phantom line
- Section line
- Construction line

Standard 3
Understand Line Thickness Applications:
- Thick Lines
  - Object/visible line
  - Cutting plane line
- Medium Lines
  - Hidden line
- Thin Lines
  - Center line
  - Section line
  - Dimension line
  - Leader line
  - Extension line
  - Phantom line

Performance Skill
Student can correctly use the alphabet of lines in a technical drawing.

STRAND 6
Dimensioning

Standard 1
Know proper location for dimensions.
- Locate dimensions on the profile view and between views.
- Apply appropriate spacing between the object and the first dimension.
- Apply uniform spacing between dimension lines.
- Use correct dimension line terminators such as arrowheads, ticks, and dots.

Standard 2
Compare Baseline vs. Chain dimensioning.

Standard 3
Understand leaders and notes.
- Understand and correctly form callouts for thru holes, countersinks, counterbores, and spotfaces.
- Demonstrate correct dimensioning for fillets, and rounds.
- Understand and correctly form callouts for threaded holes.
- Use appropriate angles for leaders.

Performance Skill

Student can properly dimension a drawing.

STRAND 7

CAD Software

Standard 1

Know how to do the following file operations:
- Save
- Open
- Rename
- Move

Standard 2

Create technical drawings using design software features.
- Create a new drawing setup to support both English and metric drawing standards.
- Create drawing setups for different sizes of drawing sheets.
- Use and control accuracy enhancement tools.
- Using snap, grid and positioning methods.
- Analyze drawings using the software features.
- X,Y coordinates, area, distance, perimeter, etc.

Standard 3

Prepare and understand proper title blocks.

Standard 4

Add correct annotation to drawings.
- Use the correct text height.
  - ⅛" (.125")
  - 3mm
- Use accepted industry standards for letters and numerals.
- Understand the placement and use of general notes.

Standard 5

Plot/print drawings with correct line widths and line types.

Performance Skill

Students will correctly plot/print a drawing to scale on a specified sheet size.

Technology & Engineering Workplace Skills
- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use (or not use) personal electronic devices.
  - Maintain a high standard of industrial hygiene by:
  - adopting strong habits of professional dress and personal hygiene,
  - wearing the appropriate personal protective equipment,
  - adopting the habit to "clean as you go", and
  - guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:

- - understanding and complying with established safety procedures,
  - watching for and speaking out when potential hazards and concerns are observed, and
  - actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with an awareness of and respect for global diversity and cultural differences.
- Exhibit initiative and leadership while maintaining a flexible and adaptable attitude.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
  - addition, subtraction, multiplication, division,
  - fraction to decimal as well as decimal to fraction conversions, and
  - using decimal places.
- Understand mathematical concepts such as:
  - ratios and proportions,
  - rounding and tolerance ranges,
  - engineering notation, and
  - metric equivalents.
- Demonstrate an ability to think critically and creatively to solve problems and develop improvements to products and processes.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship

Skill Certification 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		
CAD Mechanical 1	661										

STRANDS AND STANDARDS
MECHANICAL DESIGN ENGINEERING 2

Learning that works for Utah
CTE®

Course Description

This course prepares individuals to develop 3D models and 2D technical drawings for the mechanical and industrial engineering industry. This includes instruction in the use of 3D modeling software to create models and produce drawings.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.042
Concurrent Enrollment Core Code	38.01.00.13.042
Prerequisite	Mechanical Engineering Design 1
Skill Certification Test Number	662
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Mechanical Design

STRAND 1
Mathematics, measuring conventions, and scale.

Standard 1
Perform basic arithmetic functions using fractions and decimals.
- Add
- Subtract
- Multiply
- Divide

Standard 2
Convert between fractions and decimals.

Standard 3
Convert between and within metric and imperial measurements.

Standard 4
Make and record basic measurements.
- Use scales, micrometers, and calipers (dial and digital) to take measurements.
- Understand and demonstrate the conversion of actual lengths to common technical drawing scales.
- Accurately scale drawings using CAD techniques when drawing and plotting.
- Record measurements using Cartesian and polar coordinates, as well as absolute and relative distances.

Performance Skill
Student can use scales, micrometers, and calipers (dial and digital) to take accurate measurements.

STRAND 2
3D modeling with dimensional and geometric size constraints

Standard 1
Demonstrate exactness and precision when producing drawing geometry.
- Apply correct 3D geometric construction techniques.
- Model elements accurately and to scale.
- Create elements on the correct plane.

Standard 2
Be proficient in the use of terminology associated with 3D drafting and design.
- Axis
- Concentric
- Dimensional constraint
- Geometric constraint
- Coordinate
- Extrusion
- Isometric view
- Parallel
- Perpendicular
- Plane
- Tangent
- Vertical

Standard 3

Assign different materials to a part to determine physical properties such as:
- Density
- Volume
- Surface area
  - Net
  - Gross
- Center of Mass

Performance Skill

Student can create and evaluate an accurate, basic 3D model using 3D design software.

STRAND 3

Line Types

Standard 1

Understand and use the recommended thickness of lines.
- Thick
  - Visible edges and Outlines
- Thin
  - Hatching
  - Leader Lines
  - Center Lines
  - Dimensions
  - Projections

Standard 2

Know common line thicknesses:
- Thick -0.7mm
- Medium - 0.5mm
- Thin - 0.35mm
- Thinnest - 0.25mm

Standard 3

Understand and correctly use the following line types (the alphabet of lines).
- Object lines
- Hidden lines
- Center lines
- Dimension lines
- Extension lines
- Leader lines
- Border lines
- Phantom lines
- Section lines
- Cutting Plane lines
- Construction

Performance Skill

Student can apply correct line types and thicknesses to a drawing.

STRAND 4
Sectional Views and Detail Views

Standard 1
Be familiar with and appropriately use the following section views.
- Full
- Half
- Offset
- Broken Out
- Removed
- Revolved

Standard 2
Cross Hatch lines are evenly spaced and drawn at a 45-degree angle unless a more appropriate angle is justified.

Standard 3
Cutting plane lines, section lines, and break lines are drawn according to the alphabet of lines.

Standard 4
Visible edges, hidden lines, and contours behind the cutting plane are correctly shown.

Standard 5
Be familiar with and appropriately use detail views.

Performance Skill
Student can create an accurate sectional view and a detail view of a part.

STRAND 5
Technical drawings using 3D modeling software.

Standard 1
Demonstrate how to save, open, rename, and move data files using common computer operations and operating system software.

Standard 2
Create technical drawings using 3D modeling software features.
- Create a new drawing setup to support both English and metric drawing standards.
- Create drawing setups for different sizes of drawing sheets.
- The top, front, and side views are used unless otherwise required using orthographic projection.
- All views are properly aligned and use third-angle projection.
- Appropriate lines and surfaces are located on each view.

Standard 3
Add correct annotation to drawings.
- Add general notes to a drawing following proper conventions including size and placement.
- Complete/create a proper title block and border with all required information.

- Using the 3D modeling software verify that all text is correctly sized and meet all conventions as specified in the current ANSI/ASME standards. Use the correct text height.
- Use Gothic letters and numerals.
- Understand the placement and use of general notes.
- Prepare and/or understand title blocks.

Standard 4

Plot to scale and use correct plot specifications.
- Plot drawings with correct line widths.
- Sheet sizes are correct, and scales are applied properly.
- Students identify and demonstrate the ability to print/plot to standard sheet sizes as specified by their instructor.

Performance Skill

Student can create accurate technical drawings using 3D modeling software.

STRAND 6

Dimensioning and Tolerancing

Standard 1

Describe/create/apply nominal dimensions, tolerancing, limit dimensions, and allowances of two or more mating parts.

Standard 2

Identify and properly size:
- Clearance fit.
- Interference fit.
- Transition fits.

Standard 3

Describe and use the basic hole and the basic shaft dimensions.

Standard 4

Dimension two or more mating parts using:
limit dimension, unilateral tolerances, and bilateral tolerances.

Standard 6

Identify and specify the classes of fits as required on drawings.

Performance Skill

Students can properly dimension a drawing with tolerances.

Technology & Engineering Workplace Skills

- Exceed the established school attendance policy to establish a consistent record of punctuality and dependability.
- Appropriately use (or not use) personal electronic devices.
- Maintain a high standard of industrial hygiene by:
  - adopting strong habits of professional dress and personal hygiene,
  - wearing the appropriate personal protective equipment,

- adopting the habit to "clean as you go", and
- guarding against foreign object debris (FOD) from contaminating the workspace or product.
- Contribute to a culture of safety by:
  - understanding and complying with established safety procedures,
  - watching for and speaking out when potential hazards and concerns are observed, and
  - actively participating in improving safety conditions.
- Follow established practices and procedures with exactness.
- Work productively as a member of a team with an awareness of and respect for global diversity and cultural differences.
- Exhibit initiative and leadership while maintaining a flexible and adaptable attitude.
- Communicate clearly & effectively with others.
- Proficiently use software found in the professional environment, such as MS PowerPoint, MS Excel, and MS Word.
- Correctly apply mathematics in areas such as:
  - addition, subtraction, multiplication, division,
  - fraction to decimal as well as decimal to fraction conversions, and
  - using decimal places.
- Understand mathematical concepts such as:
  - ratios and proportions,
  - rounding and tolerance ranges,
  - engineering notation, and
  - metric equivalents.
- Demonstrate an ability to think critically and creatively to solve problems and develop improvements to products and processes.
- Read and understand technical documents, such as work orders, specifications, and standard operating procedures.
- Complete assigned tasks in a timely manner and with a high degree of workmanship.

Skill Certification 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		
CAD Mechanical 2	662	10	14	12	7	4	12	NA	NA	59	38

STRANDS AND STANDARDS
MECHANICAL DESIGN ENGINEERING 3

Learning that works for Utah
CTE®

Course Description

The third in a sequence of courses that prepares individuals with an emphasis in developing technical knowledge and skills to create working drawings and prototypes for mechanical and industrial engineering industries. This includes instruction in the use of 3D modeling software, 3D prototyping, and understanding threads & fasteners, welding symbols, and assemblies.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	38.01.00.00.043
Concurrent Enrollment Core Code	38.01.00.13.043
Prerequisite	Mechanical Engineering Design 2
Skill Certification Test Number	663
Test Weight	0.5
License Area of Concentration	Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Technology & Engineering
Endorsement 2	CAD Mechanical Design

ADA Compliant: August 2023

STRAND 1
Portfolio and Resume

Standard 1
A student's notebook/portfolio records:
- the chronological account of all projects
- research and citations
- notes
- sketches
- test procedures and resulting data.

Standard 2
Resume and Cover Letter

Performance Skill
Create and maintain a digital Portfolio of work (hard copy can be used if necessary).
Create a digital Resume and Cover Letter with professional formatting (hard copy can be used if necessary).

STRAND 2
Fasteners

Standard 1
Define thread terminology.
- Major Diameter
- Minor Diameter
- Pitch Diameter
- Root
- Flank Angle
- Pitch
- Angle
- Crest
- Flank

Standard 2
Identify the following thread types.
1. Unified
2. Acme
3. Pipe
4. Square

Standard 3
Know the common uses of the thread types in Strand 2 Standard 2

Standard 4
Calculate thread pitch.
- TP = L/n
  - TP = Thread Pitch
  - L = Length of thread
  - n = Number of threads

Standard 5

Understand thread callout notes.

Standard 6

Draw screw threads using these three methods:
- Detailed
- Schematic
- Simplified

Standard 7

Compare common head types:
- Round
- Oval
- Pan
- Countersink
- Hex

Standard 8

Compare common drive types:
- Slotted
- Philips
- Square
- Hexagonal

Standard 9

Understand the hardness grading system:
- Metric
  a. Class 8.8
  b. Class 10.9
  c. Class 12.9
- SAE
  a. Grade 2
  b. Grade 5
  c. Grade 8

Performance Skill

Student can correctly place and label fasteners in their mechanical models and drawings.

STRAND 3

Welding Symbols

Standard 1

Understand, identify and specify welds on drawings.
1. Type
2. Size and length
3. Finish & contour
4. Field welds
5. Basic welding processes

Performance Skill
Student can correctly place a weld symbol on a mechanical drawing

STRAND 4
3D Printing

Standard 1
Successfully prepare a 3D printing strategy using slicing software.
1. File Types
   a. STL vs OBJ
   b. G-Code
2. Layer Height
3. Infill
4. Base Supports
   a. Raft
   b. Brim
   c. Skirt
5. Overhang Supports
   a. Breakaway
   b. Dissolvable

Standard 2
Identify each of the 3D printing materials and technologies.
1. FDM Fused Deposition Modeling (Filament)
2. SLA Stereolithography (Resin)

Standard 3
Understand commonly used 3D printing materials and their appropriate applications.
1. PLA
2. PETG
3. ABS
   a. Filament
   b. Resin
4. TPU

Standard 4
Identify the specific parts of a 3D printer.
1. Feeder
2. Extruder Assembly
3. Bed
   a. Heated
   b. Glass
   c. Flexible
4. X,Y, & Z Axes
5. Print Envelope
6. Spool/Reservoir
7. Control Board
8. Power Supply

9. Guide Tube

Performance Skill

A student will model, slice, and successfully print an object/prototype of their own design.

STRAND 5

Students will be able to demonstrate the ability to create a flat pattern development.

Standard 1

Understand and calculate bend allowance.

Performance Skill

Create a flat pattern development of a simple part to be made from sheet metal.

STRAND 6

Students will create assembly and working drawings.

Standard 1

Develop a set of working drawings of six or more parts of industry assembled parts.
1. Draw all necessary views of each part.
2. Draw only one part per sheet.
3. Dimension parts as per current ASME/ANSI standards.
4. Apply appropriate tolerances.
5. Apply necessary notes, material specifications, symbols, and other data.
6. Complete a parts list of the parts, which include, parts number, manufacturer's name, manufacturer's stock number, material specs, quantity of each part, and notes for assembly.
7. Complete an assembly drawing showing the relationship of the parts to each other.
8. Analyze center of mass, surface area, and volume of an assembly.
9. Include title block and border on each production drawing sheet.

Performance Skill

A student can create parts and assembly drawings. They can analyze the center of mass, surface area, and volume.

Skill Certification 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		
Mechanical Design Engineering 3	663	7	6	14	3	13	3	NA	NA	46	38

Cluster: Health Science		
Pathway: Health Science (Courses are linked to state required certifications)		
Course Code Number	Course Name	Summary
36.01.00.00.030	Emergency Medical Technician	Adheres to the requirements of the Utah Bureau of Emergency Medical Services.
36.01.00.00.070	Emergency Medical Response	Adheres to the requirements of the American Red Cross Emergency Medical Response course and the Utah Bureau of Emergency Medical Services.
36.01.00.00.190	Nurse Assistant	Adheres to the requirements of Utah Nurse Assisting Registry (UNAR) as directed by the Utah Department of Health and Human Services.
36.01.00.00.210	Pharmacy Technician	Adheres to the requirements of ASHP and DOPL.
36.01.00.00.250	Surgical Technician	Adheres to the Salt Lake Community College course requirements.

USBE does not establish requirements for state required certifications

Cluster: Human Services		
Pathway: Family & Human Services		
Course Code Number	Course Name	Summary
40.03.00.00.215	Community and Public Health	New Course
Pathway: Personal Care Services (Courses are linked to state required certifications)		
40.03.00.00.001	Cosmetology	Course adheres to Utah Administrative Code/DOPL requirements.
40.03.00.00.002	Nail Technician	Course adheres to Utah Administrative Code/DOPL requirements.
40.03.00.00.003	Barbering	Course adheres to Utah Administrative Code/DOPL requirements.
40.03.00.00.005	Basic Esthetician and Skin Care	Course adheres to Utah Administrative Code/DOPL requirements.
40.03.00.00.100	Hair Design	Course adheres to Utah Administrative Code/DOPL requirements.

USBE does not establish requirements for state required certifications

STRANDS AND STANDARDS
COMMUNITY & PUBLIC HEALTH

Learning that works for Utah
CTE®

Course Description

This course focuses on studying, protecting, or improving the health of individuals and families. This includes health promotion, history, prevention, management and epidemiology of disease. This course will provide a foundation of understanding, skill development, and preparation for community and public health related careers.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.03.00.00.215
Concurrent Enrollment Core Code	40.03.00.13.215
Prerequisite	None
Skill Certification Test Number	NA
Test Weight	NA
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Health Science, Introduction
Endorsement 2	Nurse Assistant
Endorsement 3	Health Education

STRAND 1
Understand the role of community and public health in our environment.

Standard 1
Describe the history of community and public health.

Standard 2
Evaluate the relevance and impact of community and public health on our daily lives.

Standard 3
Compare and contrast the common features of community health and public health.

Standard 4
Identify the essential services and job opportunities within public health and the role they play in the community.
- Hospitals
- Mental health clinics
- Schools
- Corporate wellness
- Health departments
- Health insurance companies
- Government organizations
- Health related non-profit organizations

STRAND 2
Understand the Social Determinants of Health (SDoH) and their impact on the health of a community.

Standard 1
Identify conditions of concern to the health of the individual or community that have a major impact on people's health, well-being, and quality of life.
- Social Determinants of Health (SDoH).
  - Healthcare accessibility and quality
  - Neighborhood and environment
  - Social and community context
  - Economic stability
  - Education access and quality
- Other impacts to Social Determinants of Health.
  - School health (childhood wellness)
  - Worksite wellness
  - Environmental determinants
  - Mental health issues
  - Substance Abuse

Standard 2
Identify and analyze public health and intervention strategies currently being used within local communities.
- Primary – preventative
- Secondary - screenings
- Tertiary - management

Standard 3

Describe a comprehensive approach to public health practice to make informed decisions related to Social Determinants of Health and intervention strategies.

STRAND 3

Understand how data influences community and public health and where to locate that data.

Standard 1

Identify industry recognized professional sources for data.
- Peer reviewed journals
- Key informant interviews
- Records data
    - IFIS
    - IBIS
- Government data
    - CDC
    - National Library of Medicine
    - National Institute of Health (NIH)

Standard 2

Explain data collection strategies used by community and public health professionals.
- Observational data
- Interviews (in-person surveys)
- Key informant interviews (experts)
- Surveys/Questionnaires
- Documents and records
- Focus groups
- Medical data

Standard 3

Evaluate how data is being used to influence community and public health interventions.

STRAND 4

Explore the careers related to community and public health.

Standard 1

Identify the common careers in community and public health.
- Community Health Worker (CHW)
- Wellness Coach
- Epidemiologist
- Community Health Educator
- Public Health Educator
- Program Directors
- Corporate Wellness Director
- Fitness Specialist

Standard 2

Identify settings for job opportunities in community and public health.

- Hospitals
- Mental health clinics
- Schools
- Corporations/Businesses
- Health departments
- Health insurance companies
- Government organizations
- Health related non-profit organizations

Standard 3

Analyze characteristics needed in community and public health.
- Workplace skills
  - Interpersonal communication
  - Relationship building
  - Care coordinating
  - Community outreach
  - Culture and linguistic competency
  - Advocacy skills
  - Empathy
  - Trustworthiness
  - Persistence
  - Resourcefulness
- Discuss professionalism.

Performance Skills

Select one of the following:
- Students will use a Social Determinant of Health (SDoH) to do the following:
  - Research topic using at least three different professional sources for data.
  - Locate and examine data related to the SDoH of choice.
    - Define and describe the SDoH chosen.
    - How influential is the SDoH in impacting health outcomes?
    - What interventions have been identified and implemented?
    - How successful were the interventions?
    - What jobs/careers would be related to the findings?
    - Based on information found, form a conclusion on potential improvements for future application.
  - Create a presentation of findings. Could include but not limited to:
    - PowerPoint presentation
    - Video
    - Written presentation
    - Posters
    - Brochures
- Create a project based on the guidelines contained for one of the following HOSA competitive events (HOSA.org - Competition and Guidelines):
  - Community Awareness
  - Health Education
  - Public Health

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations

Skill Certificate Test Points by Strand – no test at this time

Cluster: Law, Public Safety, Corrections & Security		
Pathway: Protective Services		
Course Code Number	Course Name	Summary
40.6.00.00.010	Fire Science, Introduction	Name Change and restructure of Fire Science to improve alignment with Concurrent Enrollment and industry needs.
40.6.00.00.015	Fire Science, Safety and Survival	New course
40.6.00.00.020	Fire Science, Fire Behavior and Combustion	New course

STRANDS AND STANDARDS
FIRE SCIENCE, INTRODUCTION

Learning that works for Utah
CTE®

Course Description

Explores career opportunities and job requirements of fire and rescue emergency services. Discusses the various duties within emergency services, including structural fire fighting, wildland fire fighting, technical rescue, hazardous materials control, fire protection, fire investigations, and incident command. Explains the employment testing and selection processes of federal, state, municipal, and industrial emergency service organizations. Provides information, skills, and facilities to help students develop personal fitness plans in preparation for fire service physical ability testing.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.06.00.00.010
Concurrent Enrollment Core Code	40.06.00.13.010
Prerequisite	None
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	Fire Science
Endorsement 2	
Endorsement 3	

Strand 1

Students will explore early traditions and history of emergency services.

Standard 1

Discuss fire protection in early America.

Standard 2

Describe early American fire equipment.

Standard 3

Explain how the growth of the volunteer fire service affects modern-day fire and emergency services.

Standard 4

Describe how the "age of steam" affects modern-day fire and emergency services.

Standard 5

Describe how improvements to protective clothing and self-contained breathing apparatus (SCBA) impact modern-day fire practices.

Standard 6

Indicate how developments in gasoline- and diesel-powered equipment has changed modern-day fire practices.

Standard 7

Explain how the modern-day philosophy of public safety has been informed by historic fires in North America.

Standard 8

Explain how the modern-day philosophy of firefighter safety has been informed by historic fires in North America.

Performance Skill

Submit a case study relevant to early traditions in history of emergency services.

Strand 2

Students will explore career opportunities in emergency services.

Standard 1

Discuss the fire and emergency services culture.

Standard 2

Identify fire protection and emergency-service careers.
- Federal
- Local
- Private

Standard 3

Recognize the components of career preparation and goal setting.

Standard 4

Discuss firefighters as public figures.

Standard 5

Differentiate between the following type of training:
- Fire service training and education
- Fire protection certificate programs
- Fire service degree programs

Standard 6

Compare and contrast the career firefighter selection process and the volunteer firefighter selection process.

Performance Skill

Submit a case study relevant to career opportunities in emergency services.

Strand 3

Students will explore firefighter physical fitness requirements.

Standard 1

Explore methods of assessing a candidate's current level of physical fitness.

Standard 2

Determine goals for a candidate's physical fitness improvement.

Standard 3

Locate and implement the weekly use of a Fitness Tracker.

Performance Skills

Take a pre-assessment to determine your/candidate's current level of physical fitness.
Verify that you have selected a fitness tracker and have started logging in it.

Strand 4

Students will explore roles of fire and emergency services personnel.

Standard 1

Identify the duties of fire suppression (operations) personnel.
- Engine
- Ladder
- Rescue companies
- Wildland

Standard 2

Define the roles of training division personnel.
- Chief officer
- Training captain
- Training specialist

Standard 3

Recognize possible positions for fire service administration.
- Fire chief
- Deputy chief
- Assistant chief

- Public information officer
- Fire marshal

Standard 4
Define special operations personnel duties.
- Technical rescue
- Hazardous Materials (HazMat)
- Bomb and Arson
- Airport Rescue Fire Fighting (ARFF)
- Swift Water

Standard 5
Explain how fire prevention (community risk reduction) personnel assist in enhancing community fire safety.

Standard 6
Compare and contrast the duties of emergency medical services personnel versus the duties of fire suppression personnel.

Standard 7
Describe the role emergency management personnel has in community safety planning.

Standard 8
Recognize other fire department personnel who assist in carrying out the broad mission of the fire department.
- Dispatch
- Information technology
- Apparatus maintenance
- Logistics

Performance Skill
Submit a case study relevant to roles of fire and emergency services personnel.

Strand 5
Students will explore roles of public and private support organizations.

Standard 1
Discuss local organizations that support fire and emergency services.
- Building departments
- Water departments
- Other utility departments

Standard 2
Describe state government agencies and organizations that support fire and emergency services.
- State Fire Marshal
- State Fire Training
- Law Enforcement
- Department of Public Safety (DPS)

Standard 3
Recognize the various federal agencies that support fire and emergency services in North America.

- Department of Homeland Security/FEMA
- Bureau of Alcohol, Tobacco, and Firearms (BATF)
- Bureau of Land Management
- Environmental Protection Association (EPA)

Standard 4
Identify trade, professional, and membership organizations in the United States and Canada.
- Factory Mutual (FM)
- Insurance Services Office (ISO)
- International Association of Fire Fighters (IAFF)
- International Association of Fire Chiefs (IAFC)

Strand 6
Students will explore fire prevention, life safety education, and fire investigation.

Standard 1
Identify the components of fire prevention.
- Fire inspections
- Fire investigation
- Fire and Life Safety education

Standard 2
Explain the various responsibilities of fire and emergency services personnel regarding fire prevention.
- Fire inspectors
- Arson investigators
- Public outreach/information

Performance Skill
Submit a case study relevant to fire prevention, life safety education and fire investigation.

Strand 7
Students will explore scientific terminology.

Standard 1
Describe the properties of matter.
- Solid
- Liquid
- Gas

Standard 2
Explain combustion, the fire tetrahedron, and fire development.

Standard 3
Describe special considerations of fire that have particular implications for firefighter safety.
- Explosive capabilities/energy
- Heat
- Chemical reactions

Standard 4

Discuss the four aspects of fire extinguishment theory.
- Heat reduction
- Fuel separation
- Oxygen removal
- Interruption of the chemical chain reaction

Standard 5
Define the five main stages of fire.
- Incipient
- Growth
- Fully developed
- Flash over
- Decay

Performance Skill
Submit a case study relevant to Scientific terminology.

Strand 8
Students will explore building construction.

Standard 1
Distinguish the main differences between the five types of building construction.
- Type I: Fire resistive
- Type II: Noncombustible
- Type III: Ordinary
- Type IV: Heavy timber
- Type V: Wood frame

Standard 2
Explain how common building materials affect fire prevention and code enforcement.

Standard 3
Describe the firefighter hazards related to building construction.
- Collapse
- Inhalation hazards
- Fire loads

Performance Skill
Submit a case study relevant to building construction.

Strand 9
Students will explore fire detection, alarm, and suppression systems.

Standard 1
Discuss the reasons for installing fire detection, alarm, and suppression systems.
- Occupant safety
- Building protection
- Property preservation

Standard 2
Describe various types of alarm systems.
- Heat activated alarms
- Smoke alarms
- Flame alarms
- Gas alarms

Standard 3
Describe the impact of automatic sprinkler systems on fire prevention and safety.

Standard 4
Identify how various standpipe systems impact fire fighting operation.

Performance Skill
Submit a case study relevant to fire detection, alarm, and suppression systems.

Strand 10
Students will explore fire and emergency services apparatus, equipment, and facilities.

Standard 1
Identify fire department apparatus.
- Fire engines
- Heavy rescue
- HazMat
- Air and Light
- Ladder truck

Standard 2
Recognize the uses for uniforms and personal protective clothing.

Standard 3
Explain the three basic types of breathing apparatus.
- Pressure demand
- Positive pressure
- Supply to air-line

Standard 4
Describe how powered and non-powered tools and equipment can be used in the fire and emergency services.
- Powered tools
  - Generators
  - Hydraulic
    - Spreaders
    - Rams
    - Cutters
  - Battery powered
- Non-powered tools
  - Axe
  - Air bags
  - Halligan

Standard 5

Recognize ropes, webbing, related hardware, and harnesses as used in the fire and emergency services.

- Life safety rope
- Utility rope
- Webbing
- Hardware
    - Carabiners
    - Harnesses

Standard 6

Describe why ground ladders are key to fire suppression activities.

Standard 7

Explain the basic functions of fire hose, nozzles, and hose appliances and tools.

Standard 8

Recognize uses for various fire department facilities.

- Training towers
- Fire stations
- Dispatch centers
- Headquarters/administration

Performance Skills

Submit a case study relevant to fire and emergency services apparatus, equipment, and facilities.

Strand 11

Students will explore fire department organization and management.

Standard 1

Discriminate between a policy and procedure as used in the fire and emergency services.

Standard 2

Describe the basic principles of organization.

- Span of control
- Division of labor
- Unity of command
- Discipline

Standard 3

Identify basic positions in the local government structure that can affect fire and emergency services.

- Commission
- Mayor/council
- Fire districts

Standard 4

Explain the different types of fire departments.

- Career
- Volunteer
- Part-paid

- Paid on-call

Standard 5
Describe automatic aid and mutual aid.

Standard 6
Explain the different ways a fire department can be funded.
- Tax revenue
- Bonds
- Grants
- Fundraisers
- Special fees

Standard 7
List the common purposes of fire protection agencies.
- Life safety
- Incident stabilization
- Property preservation

Standard 8
Describe how the Incident Management System works in the fire and emergency services field.

Performance Skills
Submit a case study relevant to fire department organization and management or complete the FEMA ICS 100 course.

Strand 12
Students will explore firefighter fitness issues and personal improvement.

Standard 1
Research articles related to fitness issues, inside and outside of the fire service.
- Importance of fitness to stay safe
- Lifelong fitness plans

Standard 2
Evaluate fitness articles for relevancy to firefighting.

Performance Skill
Write a synopsis of how the information applies to firefighter fitness; cite the information correctly using APA format.

Strand 13
Students will explore firefighter physical fitness post assessment and goal reporting.

Standard 1
Reflect on areas of improvement in the candidate's physical fitness.

Standard 2
Evaluate and determine lifelong goals for maintaining physical fitness to qualify for careers in the fire service.

Performance Skills

Repeat the physical fitness test to compare your original fitness level to current fitness level.

Submit your fitness tracker log for the course.

Strand 14

Students will explore goal setting.

Standard 1

Evaluate how goal setting helps a candidate mentally and physically prepares for a job in the fire service.

Standard 2

Identify specific short-term and long-term goals related to overall wellbeing.

Performance Skill

Submit an electronic copy (in "Word" format) of a paper that addresses short-term and long-term goals.

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations

STRANDS AND STANDARDS
FIRE SCIENCE, SAFETY AND SURVIVAL

Course Description

Principles of Fire and Emergency Services Safety and Survival, introduces students to the basic principles and history that relates to the 16 national firefighter life safety initiatives. This course focuses on the need for cultural and behavioral change related to safety throughout the fire and emergency services profession.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.06.00.00.015
Concurrent Enrollment Core Code	40.06.00.13.015
Prerequisite	None
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	Fire Science
Endorsement 2	
Endorsement 3	

ADA Compliant: June 2023

Strand 1

Students will understand the safety culture within the fire service and explore the need for cultural change.

Standard 1

Define the current fire safety culture.

Standard 2

Discuss the gaps between a safety culture and the existing culture of emergency services.

Standard 3

Discuss the need for cultural change in the fire service relating to safety.

Standard 4

Examine some of the reasons people resist change and explore examples of those reasons in the fire service.
- Close-mindedness
- Loss of control
- Change not needed
- Tradition – it's always been done this way

Standard 5

Explore examples of other industries that have used leadership, management, and supervision to develop components of safety culture and how they can be used as a catalyst for "advocating" the same components of a safety culture in the fire service.
- Military
- Law Enforcement
- OSHA
- Mining

Performance Skill

Write a one-page response to the question: Is there a need for cultural and behavioral change within the emergency services relating to safety? Why or why not.

Strand 2

Students will explore how personal accountability and organizational accountability contribute to improved health and safety.

Standard 1

Compare and contrast personal accountability and organizational accountability, highlighting their advantages.

Standard 2

Discuss ways that personal and organizational accountability can affect health and safety within fire and emergency services.

Standard 3

Explore the National Fire Protection Association Standard 1500 (Standard on Fire Department Occupational Safety, Health, and Wellness Program) and the process of using this standard to improve accountability related to the health and safety of an organization.

Performance Skill

Write a one-page paper on your views regarding the need to create health and safety parameters for organizational accountability.

Strand 3

Students will define and learn how to apply risk management techniques.

Standard 1

Define risk management and explain why it is an important component of incident management.

Standard 2

Describe a risk-benefit analysis and its application to emergency services.

Standard 3

Examine the six steps of risk management.
- Define the context.
- Identify potential risk.
- Assess and analyze.
- Develop alternative plans.
- Deciding and implementing.
- Evaluating and monitoring.

Standard 4

Explain the four strategies to handle risk.
- Acceptance of the risk.
- Avoidance of the risk.
- Transfer of the risk.
- Mitigation of the risk.

Standard 5

Examine the five safety features of the incident management model.
- Safety Officer.
- Scene accountability (PAR).
- Emergency Traffic.
- Rapid Intervention.
- Responder Rehabilitation.

Standard 6

Explain the importance of risk management in the incident action plan (IAP), and identify risk management practices at the strategic, tactical, and task levels.

Performance Skill

Write a case study on the Occupational Safety and Health Administration's (OSHA's) "two-in, two-out" rule and its effect on rapid intervention.

Strand 4

Students will explore how empowerment leads to the elimination of unsafe acts.

Standard 1

Explain empowerment and how it relates to the fire safety culture.

Standard 2

Define what constitutes an unsafe act in the fire service.

Standard 3

Define the Law of Energy Conservation and explore how the transfer of energy causes injuries.

Standard 4

Explore of the four categories of unsafe acts and provide examples within each.
- Unsafe acts in the spotlight (visible).
- Unsafe acts in disguise (invisible).
- Poor risk management decisions.
- Distraction events.

Standard 5

Explore examples of using the following Initiatives to prevent injuries:
- Education (Initiative 14)
- Engineering (Initiative 8)
- Environment (Initiative 1)
- Enforcement (Initiatives 9 and 11)

Standard 6

Compare and contrast training fires and real fires and explain why it is important to understand them.

Standard 7

Explain the difference between "bolt-on" and "built-in" safety.

Standard 8

Describe crew resource management and the four components of human interaction necessary to institute it.
- Policies and Procedures.
- Situational Awareness.
- Communication.
- Problem Solving.

Performance Skill

Write a one-page paper or a discussion post on how you might address safety concerns with your supervisor.

Strand 5

Students will explore the standards for training, qualifications, and certifications (including regular recertification) that are equally applicable to all firefighters, based on the duties they are expected to perform.

Standard 1

Describe the purpose and advantages of credentialing for emergency responders.

Standard 2
Identify ways to use didactic learning skills and apply them to an effective psychomotor learning environment.

Standard 3
Explore the professional qualification standards regarding safety for the following:
- Firefighter I
- Firefighter II
- HazMat
- Apparatus Driver Operator (ADO)
- Technical rescue

Standard 4
Compare and contrast the differences in training requirements between volunteer firefighters and career firefighters.

Standard 5
Explore the Fire and Emergency Services Higher Education (FESHE) model and how it relates to career progression.

Standard 6
Explain the advantages of a tiered system of certification and how it could improve safety.

Performance Skill
Write a one-page paper or a discussion post on whether there is a need to adjust methods of training to the various risk scenarios that you may encounter.

Strand 6
Students will examine the medical and physical fitness standards that they can implement, and are equally applicable to all firefighters, based on the duties they are expected to perform.

Standard 1
Discuss what the national medical and physical fitness standards are as they are stated in NFPA 1500 and their relevance to fire and emergency responders.

Standard 2
Explain why improving the health, wellness, and fitness of emergency responders is important.

Standard 3
Explore the reasons heat dissipation is difficult for firefighters.
The environment is hot.
Personal Protective Equipment (PPE) makes sweat cooling difficult.
Personal Protective Equipment (PPE) makes it difficult to hydrate.

Standard 4
Define anaerobic and aerobic metabolism. Compare energy (ATP) creation from each type of metabolism.

Standard 5
Explain maximum heart rate and how emergency responses influences heart rate.

Standard 6
Examine the components of a firefighter's criterion test task.
- Hose dragging
- Stair climb
- Equipment carry
- Ladder raise and extension
- Forcible entry
- Search
- Rescue drag
- Ceiling pull

Standard 7
Describe the differences between wellness and "fit for duty", and identify the NFPA standards developed for medical and fitness applications.
- Standard 1583 – Standard on Health-related Fitness Programs for Firefighters
- Standard 1582 – Standard on Comprehensive Occupational Medical Programs for Fire Departments

Performance Skill
Take a pre-assessment to determine your current level of physical fitness. Create goals to improve your fitness. Submit the results of your pre-assessment and an outline of your goals.

Strand 7
Students will explore how to utilize available technology to produce higher levels of health and safety.

Standard 1
Describe how technology can produce higher levels of health and safety.

Standard 2
Describe some safety improvements that have evolved since the introduction of newer technologies in the fire service.

Standard 3
Explain the problems that can arise by overreliance on technology.

Standard 4
Discuss the use of technology in improving the medical monitoring of personnel.

Standard 5
Explain the theory of using time, distance, and shielding to prevent injuries.

Performance Skill
Submit a case study from a recent fire incident that could have been reduced or avoided with the use of available technology.

Strand 8
Students will explain the reasons for thoroughly investigating firefighter fatalities, injuries, and near-misses.

Standard 1
Examine the two reasons for thorough investigation.

- Find fault where fault exists.
- Identify the actions and contributing factors.

Standard 2
Define hindsight bias and explain how it affects events that have already occurred.

Standard 3
Explain the advantages of indemnity in the near-miss reporting process.

Standard 4
Explain why reporting is mandatory and explore the disadvantages of voluntary reporting as it applies to near-miss reporting.

Standard 5
Describe the process of near-miss reporting.
- Reporter information
- Event information
- Lessons learned
- Resources and weather

Standard 6
Examine the five leverage points that can be used when implementing a safety system.
- The Event
- Personal accountability (Initiative 2)
- Investigations and Near-misses (Initiative 9)
- Data Collection and Research (Initiative 7)
- Implementation (Initiatives 5 and 11)

Performance Skill
Visit the National Firefighter Near Miss Reporting System at the Firefighter Near Miss website. Click on the "Browse Reports" tab then answer the following:

"Is there is a need for such a reporting system when it comes to firefighter safety and does your own organization or an organization that you have contacted utilize it? Also, is there value in a national website with this information- why or why not?".

Strand 9
Students will explain the benefits of establishing response standards.

Standard 1
Explain the importance of understanding the terminology in policies and procedures.

Standard 2
Differentiate between standard operating procedures (SOP's) and standard operating guidelines (SOG's).

Standard 3
Examine the seven components of an effective procedure or guideline.
- Purpose
- Revision History

- Personnel Affected
- Policy
- Definitions
- Responsibilities
- Procedures

Standard 4
Discuss the assembling, modeling, and adoption of procedures.

Standard 5
Explain how safety would be improved with national standards.

Performance Skill
Find a report on a firefighter fatality. Choose one of the causes of the firefighter fatal injuries listed in the report to be the basis of your research. Then use the internet as well as professional journals, articles, and other academically recognized sources (not including Wikipedia) to research and design an organizational policy based on an actual or realistic risk assessment and brief literature review that you perform for your current department or a future agency that you wish to serve. The intention of this policy is to minimize the potential injuries and death associated with the cause above.

Strand 10
Students will explore national protocols for response to violent incidents and explain why they should be continually developed.

Standard 1
Explain the differences between terrorism and other violent events such as riots.

Standard 2
Explain the importance of establishing better training to be prepared for violent incidents.

Standard 3
Examine the specific types of violent incidents that should have national standards.
- Civil disturbances
- School or public shooting
- Bomb threats and possible bombs
- Illegal drug and explosive labs
- Medical and mental health emergencies
- Animal attacks

Standard 4
Explain the reasons that fire and emergency services (EMS) uniforms should be professional yet unique.

Standard 5
Define Level II staging and explain the benefits of using Level II staging for violent events.

Performance Skill
Submit a case study identifying a situation in which "staging for a safe scene" is not an option. If this is the case, describe how to best prepare for this incident.

Strand 11

Students will explain the need for firefighters and their families to have access to counseling and psychological support.

Standard 1

Compare the effects of physical and psychological stresses of a critical incident on the health and well-being of responders.

Standard 2

Explain why relying on alcohol or drugs is an unhealthy coping mechanism.

Standard 3

Describe healthy ways to deal with stress.

Standard 4

Compare and contrast critical incident stress and post-traumatic stress disorder.

Standard 5

Explain the differences between demobilizing, defusing, and debriefing in critical incident stress management (CISM).

Performance Skill

Write a one-page paper on the need for counseling and psychological support for emergency services personnel and their families. Include local resources and services and how to contact them.

Strand 12

Students will understand and advocate for the need for increased public education for critical fire and life safety programs.

Standard 1

Discuss why public education needs more resources in order to be championed as a critical fire and life safety program.

Standard 2

Understand the difference between prevention and preparation.

Standard 3

Describe available resources for public education in relation to fire and life safety.

Standard 4

Explain the purpose of using an action plan to ensure safety during equipment demonstrations.

Standard 5

Describe the link between fire and life safety education and firefighter safety.

Performance Skill

Prepare and deliver a five-minute fire or life safety demonstration in accordance with NFPA Standard 1001, 5.5.2.

Strand 13

Students will explain the need for the enforcement of fire/building codes and the installation of home sprinkler systems.

Standard 1

Discuss the importance of fire/building code enforcement and home fire sprinklers.

Standard 2

Discuss some of the arguments against residential sprinklers. Explore whether those arguments are flawed or based in myth.

Standard 3

Develop logical arguments for residential sprinklers using statistics.

Standard 4

Describe the fire/building code enforcement duties that directly affect firefighter safety.

Standard 5

Explain how fire and life safety education can promote the message and importance of residential fire sprinklers.

Performance Skill

Read the NFPA study authored by Marty Ahrens entitled U.S. Experience with Sprinklers. Answer how the data supports whether sprinklers are beneficial for preventing firefighter injuries and then use the data found in the study to make a case for mandatory residential sprinkler ordinances.

Strand 14

Students will understand why safety must be of primary concern in the design of apparatus and equipment.

Standard 1

Discuss why safety should be a primary consideration in the design of apparatus and equipment.

Standard 2

List some of the groups responsible for originating safety.
- National Fire Protection Association (NFPA)
- National Institute for Occupational Health and Safety (NIOSH)
- Occupational Safety and Health Administration (OSHA)

Standard 3

Compare the level of safety of a piece of equipment when safety is designed into versus retrofitted.

Standard 4

Explain how a cost-benefit analysis can justify investing in safety techniques.

Performance Skill

Locate the USFA Emergency Vehicle Safety Initiative study. Read the study and its contained documents. Write in detail the following:
- Your opinion of the Emergency Vehicle Safety Initiatives.
- What prompted its creation?

- Why is it important?

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations

STRANDS AND STANDARDS
FIRE SCIENCE, FIRE BEHAVIOR AND COMBUSTION

Learning that works for Utah
CTE®

Course Description

Explores the theories and fundamentals of how and why fires start, spread and how they are controlled. Addresses the fire problem in America, background of research, and how to approach the study of fire. Provides an overview of various flames, smoldering, and spontaneous combustion.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.06.00.00.020
Concurrent Enrollment Core Code	40.06.00.13.020
Prerequisite	None
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	Fire Science
Endorsement 2	
Endorsement 3	

Strand 1
Students will explore early traditions and history of firefighting operations.

Standard 1
Discuss fire protection in early American history.

Standard 2
Review historical fires in early American history and assess their impact on building and construction standards.

Standard 3
Explain how the growth of the volunteer fire service has changed modern-day fire and emergency medical services.

Standard 4
Examine modern building codes and the challenges faced by modern firefighting agencies.

Standard 5
Explore improvements and standards relating to personal firefighting clothing, equipment and SCBA capabilities.

Standard 6
Indicate how improvements in technology have increased the safety and effectiveness of the modern American fire department.
- Alternative fuels
- Infrared imaging
- GPS
- Suppression techniques
- Personal Protective Equipment (PPE)
- Apparatus

Performance Skill
Submit a case study review of a historical fire and explore its impact on improvements in firefighter safety and building construction standards.

Strand 2
Students will examine fire chemistry as it relates to fire behavior.

Standard 1
Discuss the various states of matter.
- Solid
- Liquid
- Gas

Standard 2
Explore the properties of vapor pressure, density, solubility, and specific gravity.

Standard 3
Examine flash points, fire points, and explosive limits.

Standard 4
Examine the conditions that contribute to a Boiling Liquid Expanding Vapor Explosion (BLEVE).

Standard 5
Illustrate the components of chemical reactions within fire:
- Water Reactive
- Air-Reactive
- Oxidizers

Performance Skill
Present to the class on the properties of fire chemistry.

Strand 3
Students will understand the components of combustion and fire behavior.

Standard 1
Define the fire tetrahedron.
- Fuel
- Heat
- Oxygen
- Chemical reaction

Standard 2
Describe the three types of combustion:
- Pre-Combustion
- Smoldering Combustion
- Flaming Combustion

Standard 3
Classify fires based on the type of substance burning.
- Class A: Ordinary cellulose materials
- Class B: Flammable Liquids
- Class C: Energized Electrical Equipment
- Class D: Combustible Metals
- Class K: Cooking Oils

Standard 4
Classify fires based on stages and events:
- Fire Stages
  - Ignition
  - Growth
  - Fully Developed
  - Decay
- Fire Events
  - Flame over or Rollover
  - Flashover
  - Backdraft
  - Smoke Explosion

Standard 5
Describe the fire ratings of building materials.

Standard 6
Examine weather conditions and their impact on fire behavior.
- Wind effect
- Relative humidity
- Stack effect

Standard 7
Define the four methods of heat transfer.
- Conduction
- Convection
- Radiation
- Direct flame impingement

Standard 8
Define key terms related to fire behavior.
- Rate of spread
- Fire intensity
- Building factors

Standard 9
Explain the impact that products of combustion have on fire behavior.

Standard 10
Recognize the characteristics of specific fire events.
- Liquid fires
- Electrical fires
- Metal fires

Standard 6
Distinguish the skills necessary to read smoke patterns and behavior at structural fires.

Performance Skill
Build a presentation on the different aspects of fire behavior.

Strand 4
Students will examine fire extinguishing agents and the methods of application for each.

Standard 1
Examine the basic components of the fire extinguishment process.
- Temperature reduction
- Fuel removal
- Oxygen depletion
- Chemical flame inhibition

Standard 2
Review the five basic classifications of fire and explain the various types of agents used to extinguish or control fires in these five classifications.

- Class A: Ordinary cellulose materials
- Class B: Flammable Liquids
- Class C: Energized Electrical Equipment
- Class D: Combustible Metals
- Class K: Cooking Oils

Standard 3

Examine the variety of agents used for fire extinguishment and explain the application methods for each of these agents.
- Water
  - Wet water
  - Slippery water
  - Thick water
  - Viscus water
- Foam
- Carbon dioxide
- Dry chemicals
- Halogenated agents

Standard 4

Identify and explain the benefits of using the latest technological advances in fire extinguishing agents.
- Compressed air foam
- Ultrafine water mist systems

Performance Skill

Demonstrate the correct usage of a fire extinguisher.

Strand 5

Students will develop an understanding of firefighting tactics and strategies.

Standard 1

Discuss strategies/tactics for fire ground operations.
- Locate the fire.
- Confine the fire.
- Extinguish the fire.

Standard 2

Define the term "size-up" and explain the steps and factors involved in conducting a size-up at an emergency scene.
- Rescue
- Exposures
- Confinement
- Extinguishment
- Overhaul
- Ventilation
- Salvage

Standard 3

Distinguish the differences in fire construction types.

- Type 1: Fire Resistive
- Type 2: Non-Combustible
- Type 3: Ordinary
- Type 4: Heavy Timber
- Type 5: Lightweight

Standard 4
Identify special concerns that are found at a fire. Discuss how these concerns alter and/or impact strategies, tactics, and overall operations.
- Occupancy or use
- Apparatus and staffing
- Life hazard
- Terrain
- Water supply
- Weather

Standard 5
Explain and provide examples of historical changes in construction type, building codes, and occupancy types and loads.

Performance Skill
Write a capstone paper on a historical fire identifying building construction, fire ground strategies, and changes in codes and/or laws as a result.

Strand 6
Students will explore fire related emergencies in high-rise buildings and the unique challenges they pose to modern fire departments.

Standard 1
Explain why high-rise buildings present a difficult and different fire problem for firefighters, including the unique fire behavior problems that may be encountered in a high-rise fire.

Standard 2
Describe the firefighting strategies and tactics used to locate, confine, and extinguish high-rise fires.

Standard 3
Examine the special problems encountered on high-rise fires.
- Communications issues
- Stack effect
- Evacuation concerns
- Resource management
- Elevator control
- Incident command

Standard 4
Explain the various special fire protection equipment found in high-rise buildings.
- Sprinkler systems
- Standpipe connections
- HVAC systems

- Communications technology
- Fire-alarm notification systems
- Elevator management systems

Standard 5
Discuss the principles of ventilation unique to fighting fires in a high-rise building.
- Stack effect
- Utilization of HVAC systems
- Vertical ventilation

Performance Skill
Submit a pre-incident survey on a high rise structure within the student's jurisdiction or nearest relevant location.

Strand 7
Students will explore fire related emergencies in wildland and urban interface settings.

Standard 1
Discuss the basic fire combustion principles related to a wildland fire emergency.
- Fuel
- Heat
- Oxygen

Standard 2
Describe the method used to classify resources used on wildland fires and how fire behavior impacts the type and number of resources needed to achieve containment and suppression.

Standard 3
Explore the tools unique to wildland firefighting.
- Pulaksi
- Combi-tool
- Mcleod
- Chainsaw
- Flapper

Standard 4
Summarize the five-step decision making process for wildland incident size- up.
- Factors impacting life safety.
- Factors impacting property safety.
- Factors that may harm the environment.
- Factors that harm wildlife.
- The availability of needed firefighting resources.

Standard 5
Explain how weather, fuel types, and topography effects fire behavior.

Standard 6
Distinguish the unique types of resources used to combat a wildfire emergency.
- Engine type

- Hand crew type
- Bulldozers
- Fixed wing aircraft
- Rotary wing aircraft
- Water tenders

Standard 7

Indicate the difference between direct, in-direct, and combination attack methods and their application in wildland fire tactics.

Performance Skill

Submit a case review of a well-documented wildland fire emergency.

Strand 8

Students will explore hazardous material related emergencies and responses within the fire service.

Standard 1

Describe the U.S. Department of Transportation hazardous materials warning system.

Standard 2

Explain the requirements, purposes, and value of Safety Data Sheets (SDS) to firefighters and first responders.

Standard 3

Become familiar with the Emergency Response Guidebook and how it is used in a real-world setting.

Standard 4

Explain the issues that make weapons of mass destruction incidents complex and the reasons for the development of the National Incident Management System.
- Weapons of Mass Destruction Incidents
    - Dirty bombs
    - Economic impact
    - Chemical
    - Biological
- National Incident Management System
    - Inter-agency operations
    - Resource allocation
    - Emergency management planning

Standard 5

Illustrate the four main areas of difficulty regarding terrorism events relating to Weapons of Mass Destruction (WMD).
- Large number of persons needing immediate assistance at the same time.
- Multifunctions conducted simultaneously.
- Immediate involvement of federal and state agencies.
- Overwhelming response of the national media.

Performance Skill

Submit a case study related to a hazardous material response of your local fire agency.

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations

Cluster: Manufacturing		
Pathway: Welding & Machining		
Course Code Number	Course Name	Summary
40.10.00.00.072	Machining 1	Current Strands and Standards contained too much content to cover in a single semester. S&S narrowed and updated to match industry need.
40.10.00.00.070	Machining 2	Strands and Standards updated to cover excess content from Machining 1 as well as to match industry need.
40.10.00.00.071	Machining 3	(NEW COURSE) Strands and Standards updated to cover excess content from Machining 1 and 2 as well as to match industry need.

STRANDS AND STANDARDS
MACHINING 1

Learning that works for Utah
CTE®

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 and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machinist Technician
Endorsement 2	N/A
Endorsement 3	N/A

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.
- Good Documentation (don't scribble).
- Develop a solution to address the problem.
- Record Keeping

Standard 4
Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.
- Set and meet goals on attendance and punctuality.
- Personal Hygiene
- Prioritize, plan, and manage work to complete assignments and projects on time.

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.

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 Safety Data Sheets (MSDS).
- Basics of 5S standard (sort, sustain, standardize, shine, set in order)

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.

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.
- Recognize out-of-date blueprints and know appropriate related procedures.

STRAND 6
Students will be able to properly measure and inspect parts according to drawing and document specifications.

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 use and care of precision measuring tools.

Standard 2
Apply proper measuring techniques.
- Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, burrs, etc.).
- Demonstrate how to check basic calibration of various precision instruments.

Standard 3
Accurately perform measurements with hand-held instruments.
- Read a micrometer to .001".
- Read a steel rule.
- Read a dial/digital caliper to .001".
- Thread measurements using wire gage, go/no go gage, and a mating part
- Read and use Dial Indicators to an accuracy of .001"

STRAND 7
Students will be able to understand planning, use hand tools, and recognize different manufacturing materials and processes.

Standard 1
Prepare and plan for machining operations.
- Read and interpret blueprints.
- Plan machining operations

Standard 2
Demonstrate proper use of hand tools.
- Select the most appropriate hand file and properly demonstrate its use.
- Correctly identify and use.
- Identify common hand tools and describe and perform their basic applications.

Standard 3
Identify common materials and explain basic properties.
- 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 proper use of bench grinding machines and bandsaws.

Standard 1

Demonstrate proper use of grinding (abrasive) machines.
- Demonstrate the proper use and care of bench and pedestal grinders.
- Demonstrate the proper selection and usage of PPE while operating grinding machines.

Standard 2

Demonstrate proper use of bandsaws.
- Demonstrate the proper use and care of bandsaws.
- Demonstrate the ability to select appropriate speeds and feeds for the bandsaw.

STRAND 9

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

Standard 1

Demonstrate proper use of metal lathes.
- Demonstrate the proper cleaning, lubrication, and care of the conventional lathe.
- Identify common parts and demonstrate the proper use of basic controls and adjustments on the conventional lathe.
- Identify and demonstrate the proper installation and application of standard tools and tool holders for the conventional lathe.
- Identify common chucks and demonstrate proper selection and use of those chucks.
- Demonstrate the ability to dial in a workpiece within .001" TIR
- Demonstrate the proper procedure for facing a part within .005" TIR
- Demonstrate the proper setup and procedure for drilling a hole on the conventional lathe.
- Demonstrate the proper setup and procedure for boring on the conventional lathe.
- Demonstrate proper setup and technique for tapping a hole on a conventional lathe.
- Demonstrate proper setup and procedure for turning a diameter with an accuracy of .001".
- Demonstrate proper setup and procedure for turning a 90 degree shoulder.
- Demonstrate the proper setup and procedure for cutting chamfers and or tapers using the compound rest.
- Demonstrate proper setup and procedure for single point cutting of threads.
- Demonstrate the proper procedure for grinding a High Speed Steel cutter.

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
- Convert fractions to decimal equivalents as needed.
- Calculate speeds and feeds for machining.
- 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 for accuracy based off the blueprint specifications.

- 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 conventional lathes.
- Demonstrate the ability to use the Machinery Handbook as a reference for technical information related to turning and drilling.

Skill Certification 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		

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 and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machinist Technician
Endorsement 2	
Endorsement 3	

STRAND 1

Student will participate in work-place readiness activities.

Standard 1

Perform basic trigonometric functions.
- Solve for unknown sides.
- Solve for unknown angles.
- 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.

Standard 4

Use PPE (personal protective equipment).
- Use PPE - Personal Protective Equipment.
- Maintain and use appropriate protective guards and equipment on machinery.

STRAND 2

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.
- Understand and demonstrate the use of basic GD&T symbols and functions.

STRAND 3

Students will be able to properly measure and inspect parts according to drawing and document specifications.

Standard 1

Apply proper measuring techniques.
- Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, burrs, etc.)
- Demonstrate the proper care and use of the surface plate.
- Use surface plate accessories correctly (side bar, gage blocks, etc.).

Standard 2
Accurately perform measurements.
- If provided a 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 features of a machined part using a height gage and accurately document those measurements.
- Measure a hole diameter with a telescope gage and a calibrated micrometer of appropriate size and accurately document the measurement.
- Measure features of a machined part using a calibrated caliper, within .001" accuracy and document the measurements correctly.
- Measure a part for squareness. In at least 4 places within a .002 tolerance
- Measure all part dimensions for accuracy within the specified tolerance rang acceptable on print specifications

STRAND 4
Students will be able to understand project planning, use hand tools, and recognize different manufacturing materials and processes.

Standard 1
Prepare and plan for machining operations.
- Read and interpret blueprints.
- Calculate proper speeds, feeds and depth of roughing and finish cuts for various applications.
- Plan machining operations
- Plan for machine-ability and control chip formation.

Standard 2
Identify and demonstrate proper use of deburring tools.
- Proper care and use of deburring tools
- Select the most appropriate hand file and properly demonstrate its use.
- Correctly identify and use abrasives.

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.

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 Safety Data Sheets (SDS).
- Keep storage rooms well organized and free of clutter.

STRAND 5
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 within .001" TIR.
- Properly locate a Datum point in regards to drawing specifications
- Identify the common work holding devices.
- 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 with- in .001".
- Demonstrate proper procedure for dialing in on a pin or a hole to within .001" TIR.
- Accurately calculate speeds and feeds for a milling machine operation.
- Demonstrate proper setup and procedure for squaring a part.
- Demonstrate the proper setup and procedure for hole work.
- 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.
- Differentiate between conventional milling and climb milling.
- Demonstrate the ability to use the Machinery Handbook as a reference for technical information related to milling.

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.
- Practice geometric dimensioning and tolerancing (GD&T) methodology.
- Accurately perform measurements ith 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.

Skill Certification 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		

STRANDS AND STANDARDS
MACHINING 3

Learning that works for Utah
CTE®

Course Description

This course is the third 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	40.10.00.00.071
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machinist Technician
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 be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.
- Set and meet goals
- Prioritize, plan, and manage work to complete on time.

Standard 2
Student will be accountable for results.
- Standard Workflow
- Accurately and constantly preform documentation professionally
- File a regular written report on progress toward completion of timeline.
- Demonstrate ethics, e.g. fair, honest.

Standard 3
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 for a career in machining.

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).
- Use PPE - Personal Protective Equipment.
- Maintain and use appropriate protective guards and equipment on machinery.
- Demonstrate safe machine operations at all times.

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.

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.
- Calculate surface foot
- Calculate gage blocks up to 5" and 10" sine plates.

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.

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.
- Understand and demonstrate the use of basic GD&T symbols and functions.

STRAND 6
Students will be able to properly measure and inspect parts according to drawing and document specifications.

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 use and care of precision measuring tools.
- Demonstrate proper use of a optical comparator.
- Demonstrate first article inspection vs first piece inspection vs In-process vs sampling.

Standard 2

Accurately perform measurements with/for:
- Calipers
- Micrometer
- Height gage
- Surface plate
- Part squareness
- Thread measurement
- Dial indicators
- Optical comparator
- Bore gage
- Gage pins
- Go/no-go (Ring and Plug)
- Datums
- Flatness
- Parallelism
- Runout
- Squareness
- Positional
- Concentricity
- Gage blocks

STRAND 7

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.

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-CAM system, post and load a pre-existing program 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 3
Demonstrate proper use of CNC Machining Equipment.
- Demonstrate the proper care, setup, lubrication, and operation
- 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.
- Install soft jaws as required.
- Demonstrate proper techniques of establishing accurate tool offsets for each tool.
- Demonstrate proper techniques of establishing accurate work offsets if needed.
- Establish/set machine and part references to within appropriate tolerances.
- load programs into a controller.
- Demonstrate working knowledge of all controls.
- Demonstrate proper operation of CNC machine to include single block, and final production.
- Edit CNC programs for accuracy.
- Operate machine in DNC mode, if that capability exists. (optional)

Standard 4
Program CNC machines using CAD-CAM systems.
- Create plan of operation for machining assigned parts.
- Construct part geometry.
- 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.

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.

- Identify common materials and explain basic properties.
- Program common CNC machines.
- Demonstrate proper use of CNC Machining
- Program CNC machines using CAD-CAM systems.

Skill Certification 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		

Cluster: Transportation & Distribution		
Pathway: Automotive		
Course Code Number	Course Name	Summary
40.11.00.00.110	Professional Driver	Requested name change to "Commercial Driver Prep." Strands and standards created to align students with preparation in attaining a CDL license in the state of Utah, following the Utah CDL Handbook, Utah laws, and regulations.
Pathway: Aviation		
40.09.00.00.001	Aviation Maintenance 1	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.09.00.00.002	Aviation Maintenance 2	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.11.00.00.044	Aviation History	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.11.00.00.046	Air Transportation	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.11.00.00.042	Aircraft Systems	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.11.00.00.040	Private Pilot	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.
40.11.00.00.048	Flight Simulator	Updating Strands and Standards to better align with and meet the changing needs of industry/FAA regulations.

STRANDS AND STANDARDS
COMMERCIAL DRIVER PREP

Course Description

The Commercial Driver course follows the Utah Commercial Driver License Handbook and Driver Manual, 2017 edition. This course introduces students to the Commercial Driving career and helps students in attaining knowledge and skills to prepare students to pass the Commercial Driver License Instruction Permit. This course will cover topics discussing driving safely, transporting cargo, air brakes, and combination vehicles.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.11.00.00.110
Concurrent Enrollment Core Code	40.11.00.11.110
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	N/A
Endorsement 2	N/A
Endorsement 3	N/A

STRAND 1

Students will understand the importance of vehicle classifications, certifications, licensing, Motor Vehicle Records (MVR), International Registration Plans (IRP), and International Fuel Tax Agreement (IFTA)

Standard 1

Differentiate vehicles and their respective classes.
- Class A: Combination Vehicles
- Class B: Heavy Straight Vehicles
- Class C: Small Vehicles

Standard 2

Explain the process and requirements for obtaining a Commercial Driver License and endorsements.

Standard 3

Understand the role of self-certifications.

Standard 4

Demonstrate knowledge of the importance of Motor Vehicle Records (MVR) and their impact on professionalism and rights to operate vehicles.
- Serious Traffic Violations
- Out-of-Service orders
- Railroad-highway grade crossing violations
- Hazardous materials endorsement
- Background checks and disqualifications
- Traffic violations in personal vehicle and other CDL rules

Standard 5

Identify the International Registration Plan (IRP) and its relation to International Fuel Tax Agreement (IFTA)

STRAND 2
Students will use safety concepts to solve real-world scenarios that may be encountered on the road while driving as a Commercial Driver.

Standard 1
Summarize vehicle inspections and their relation to driving safely.
- Why inspect
- Types of inspections (before, during, and after trips)
- Filing reports
- CDL Vehicle Inspection Test
- Seven-Step Inspection Method
- Vehicle Inspection Guide

Standard 2
Demonstrate safety in basic control of a vehicle.
- Accelerating
- Steering
- Stopping
- Backing up

Standard 3
Describe processes for shifting gears and their relation to vehicle control.
- Manual Transmissions
- Multi-speed Rear Axles and Auxiliary Transmissions
- Automatic Transmissions
- Retarders

Standard 4
Explain how to use sight while driving to avoid accidents and hazards.
- Seeing ahead
- Seeing to the sides and rear

Standard 5
Demonstrate safe communication while driving
- Signaling
- Hazard lights/emergency flashers
- Braking early
- Utilize horns or headlights appropriately

Standard 6
Control vehicle speeds in response to roadways and conditions.
- Stopping distance
- Matching speed to the road surface
- Speed and curves
- Speed and distance ahead
- Speed and traffic flow
- Speed on downgrades
- Roadway work zones

Standard 7

Manage appropriate space around the vehicle in various situations
- Ahead
- Behind
- Overhead
- Below
- Turns
- Crossing or entering traffic

Standard 8

Identify and react appropriately to various road hazards
- Importance of seeing hazards
- Hazardous roads
- Drivers who are hazards
- Always have a plan

Standard 9

Discuss the causes and effects of distracted driving
- Distracted driving statistics
- Effects of distracted driving
- Types of distractions
- Cell/mobile phones
- Texting
- Eliminate distractions
- Awareness of other distracted drivers

Standard 10

Discuss ways to appropriately avoid and respond to aggressive drivers and road rage.

Standard 11

Identify the hazards and procedures of night driving
- Increase of danger
- Human factors
- Roadway factors
- Vehicle factors
- Proper driving procedures

Standard 12

Identify the hazards and procedures of winter driving
- Increase of danger
- Human factors
- Roadway factors
- Vehicle factors
- Vehicle inspections
- Proper driving procedures

Standard 13
Identify the hazards and procedures of driving in extreme heat
- Increase of danger
- Human factors
- Roadway factors
- Vehicle factors
- Vehicle inspections
- Proper driving procedures

Standard 14
Assess a railroad crossing and employ proper vehicle crossing procedures
- Types of crossings
- Warning signs and devices
- Driving procedures
- Stopping safely at railroad-highway crossings
- Special situations

Standard 15
Identify the hazards and procedures of mountain driving
- "Safe" speeds
- Proper gear utilization
- Brake fading or failure
- Proper braking techniques

Standard 16
Investigate ways to appropriately respond to driving emergencies and situations
- Steering to avoid a crash
- Stopping quickly and safely
- Brake failure
- Tire failure

Standard 17
Illustrate how the Antilock Braking System (ABS) works
- Vehicles required to have ABS
- How to know if you are equipped with ABS
- How ABS helps
- ABS on the tractor only or only on the trailer
- Braking with ABS
- Braking if ABS is not working
- Safety reminders

Standard 18
Explain the causes of a skid and how to recover from one
- Drive-wheel skids
- Correcting a drive-wheel braking skid
- Front-wheel skids

Standard 19

List appropriate actions to be taken after an accident occurs
- Protect the area
- Notify authorities
- Care for the injured

Standard 20

Explain the causes, prevention, and handling of vehicle fires
- Causes
- Prevention
- Fire fighting techniques

Standard 21

Discuss the effects of alcohol, other drugs, and illness and their impacts on driving

Standard 22

Identify various hazardous materials and appropriate rules for transporting them
- What hazardous materials are
- Why there are rules
- Regulated products

Performance Skills

- Visit a school or entity listed on the FMCSA (Federal Motor Carrier Safety Administration) training provider registry where a qualified instructor can introduce students to a physical semi truck.

STRAND 3
Students will demonstrate appropriate transportation of cargo through inspections, weight and balance, and securing loads.

Standard 1
Demonstrate an appropriate cargo inspection
- Before a trip
- After starting
- Re-check

Standard 2
Investigate appropriate methods for distributing weight and balance on a load
- Gross Vehicle Weight Rating (GVWR)
- Gross Combination Weight Rating (GCWR)
- Legal weight limits
- Top-heaviness
- Balance and weight

Standard 3
Demonstrate proper cargo securing procedures
- Blocking and bracing
- Cargo tie-down
- Header boards
- Covering cargo
- Sealed and containerized loads

Standard 4
Identify cargo needing special attention and proper methods for securing them.
- Dry bulk
- Hanging meat
- Livestock
- Oversized loads

Performance Skills
- Visit a school or entity listed on the FMCSA (Federal Motor Carrier Safety Administration) training provider registry where a qualified instructor can introduce students to a physical load securement on a semi truck.

STRAND 4
Students will identify the function and proper use of air brakes and dual brake systems.

Standard 1
Illustrate the parts and function of an air brake system
- Air compressor
- Air compressor governor
- Air storage tanks
- Air tank drains
- Alcohol evaporator
- Safety valve
- Brake pedal
- Foundation brakes
- Supply pressure gauges
- Application pressure gauge
- Low air pressure warning
- Stop light switch
- Front brake limiting valve
- Spring brakes
- Parking brake controls
- Antilock Braking Systems (ABS)

Standard 2
Identify the function and use of a Dual Air Brake

Standard 3
List the steps to inspecting an Air Brake System

Standard 4
Demonstrate proper methods for using air brakes
- Normal stops
- Braking with Antilock Brakes
- Emergency stops
- Stopping distance
- Brake fading or failure
- Proper braking techniques
- Low air pressure
- Parking brakes

Performance Skills
- Visit a school or entity listed on the FMCSA (Federal Motor Carrier Safety Administration) training provider registry where a qualified instructor can introduce students to a physical air brake system on a semi truck.

STRAND 5
Students will demonstrate knowledge on combination vehicles

Standard 1
Explain combination vehicles and proper safety procedures for driving them.
- Rollover risks
- Steer gently
- Brake early
- Railroad-highway crossings
- Prevention of trailer skids
- Turn wide
- Backing with trailer

Standard 2
Identify parts and functions of combination vehicle air brakes
- Trailer hand valve
- Tractor protection valve
- Trailer air supply control
- Trailer air-lines
- Hose couplers (Glad Hands)
- Trailer air tanks
- Shut-off valves
- Trailer service, parking and emergency brakes

Standard 3
Explain Antilock Brake Systems (ABS) use on trailers
- Trailers required to have ABS
- Braking with ABS

Standard 4
List the steps for proper coupling and uncoupling of trailers
- Coupling tractor-semitrailers
- Uncoupling tractor-semitrailers
- Coupling a Pintle Hook
- Uncoupling a Pintle Hook

Standard 5
List the proper procedure steps for inspecting a combination vehicle
- Additional things to check during a walk-around inspection
- Combination vehicle brake check

Performance Skills
- Visit a school or entity listed on the FMCSA (Federal Motor Carrier Safety Administration) training provider registry where a qualified instructor can introduce students to a physical coupling system on a semi truck.

Skill Certification 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		

STRANDS AND STANDARDS
AVIATION MAINTENANCE 1

Learning that works for Utah
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Course Description

Aviation Maintenance 1 prepares students to demonstrate the theories, principles, skills, and risks associated with safety, aircraft drawings, maintenance forms, records, publications, an regulations, aircraft weight and balance, cleaning and corrosion control, mathematics, and fluid lines and fittings. These courses are designed to meet Federal Aviation Administration (FAA) requirements for licensing as an airframe and powerplant mechanic.

The strands and standards identified in this document align with industry through the Federal Aviation Administration (FAA) Airman Certification Standards (ACS).

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.09.00.00.001
Concurrent Enrollment Core Code	--
Prerequisite	--
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Maintenance
Endorsement 2	--
Endorsement 3	--

ADA Compliant: JUNE 2023

STRAND 1

Students will understand risk management and principles of safety.

Standard 1

Understand how to properly use appropriate personal protective equipment (PPE).
- Eye protection.
- Hearing protection.
- Hand and skin protection.
- Respiratory protection and filtration (masks, etc.).
- Chemical neutralization.
- Arc Flash/Electrical safety and protection.
- Proper attire (footwear, clothing, jewelry, hair, etc.).

Standard 2

Understand the importance and use of safety data sheets (SDS).
- Read and interpret content.
- Understand purpose and content.

Standard 3

Identify and demonstrate understanding of the basic principles of hazardous materials and shop safety equipment.
- Hazardous materials (storage, labeling, handling, PPE, etc.).
- Shop safety equipment locations (fire extinguisher, eye wash, chemical cleanup, first aid kit, etc.).
- Incident and accident reporting procedures.
- Shop safety rules.

Standard 4

Describe the importance of alerts, cautions, and warnings used in maintenance and operating manuals.
- Lock out/tag out procedures.
- Basic definitions of alerts, cautions, warnings, and notes found in maintenance and operating manuals.

STRAND 2

Students will be able to read and create aircraft drawings for proposed maintenance procedures using industry standard drafting techniques.

Standard 1

Analyze the purpose, function, and version control of aircraft drawings.

Standard 2

Identify types of aircraft drawings.
- Orthographic views.
- Electrical.
- Hydraulic.
- Pneumatic Systems.

Standard 3

Explore various methods for illustrating aircraft drawings
- Blueprints (preferred method).
- Computer-Aided Design (CAD).
- Solid works.

Standard 4

Differentiate various drafting lines and interpret their meaning.

Standard 5

Explain the importance of dimensions in aircraft drawings (clearance and tolerances)

Standard 6

Read an aircraft production drawing.
- Identify risks for specifications for design of alterations and repairs.
- Explain how aircraft drawings relate to the aircraft model and serial number.

Standard 7

Apply techniques used in sketching/drafting.
- Freehand
- Blocking
- Precision drafting

Performance Skills

- Create an aircraft drawing using symbols and system schematics.
- Investigate commonly used aircraft electrical and electronic symbols.
- Classify lines and symbols in an aircraft drawing.
- Perform an installation using diagrams and schematics to meet manufacturers specifications.
- Create sketches of repairs and alterations.
- Read, interpret, and use blueprint information.
- Read, interpret, and use aircraft drawings.
- Trace circuits with aircraft wiring diagrams.
- Identify and interpret dimensions.
- Use manufactures charts and graphs.

STRAND 3

Students will understand and perform aircraft cleaning and corrosion control.

Standard 1

Identify principles and basic theory of corrosion.

Standard 2

Investigate corrosion-prone areas.

Standard 3

Identify the types of corrosion and their detection methods.

Standard 4

List corrosion inspection, cleaning, and control procedures.

Standard 5

Demonstrate the removal and treatment of corrosion.

- Removal.
- Neutralizing.
- Corrosion preventative compounds.

Standard 6

Explore corrosion preventive maintenance procedures.
- Material selection compatibility.
- Surface coatings.
- Contamination prevention.

Performance Skills

- Select and use appropriate PPE for a given cleaning material.
- Inspect and identify aircraft corrosion, including common corrosion-prone areas.
- Apply corrosion prevention/coating materials and protective finishes.
- Clean and protect aircraft surfaces including paint, metals, plastics, and engine parts.
- Determine location and size requirements for aircraft registration numbers.
- Prepare surfaces for painting; identify and use appropriate paints, etch solutions, thinners, conversion coatings, and paint system compatibility.

STRAND 4

Students will explain the importance of weight and balance for various kinds of aircraft and make appropriate calculations.

Standard 1

Explain the importance, principles, purpose, and effect of weight and balance.

Standard 2

Define common terminology used in weight and balance procedures.

Standard 3

Investigate weighing procedures and general preparations for aircraft weighing.

Standard 4

Calculate weight and balance.
- Calculate the center of gravity (CG), arm, and moment.
- Calculate the addition and removal of equipment and ballast
- Calculate for adverse-loading conditions.

Standard 5

Identify the characteristics of helicopter weight and balance.
- Emphasize smaller CG envelope vs fixed wing.
- Differences in equipment and tools required.

Standard 6

Analyze aerodynamic effects and performance in relation to weight and balance principles.
- Pilots.
- Passengers.
- Cargo.
- Fueling loading for flight with CG.

Standard 7

Relate risks with the weight and balance of an aircraft.
- Jacking an aircraft.
- Weighing procedures.
- Use of scales and equipment.
- De-fueling an aircraft.

Performance Skills

- Weigh an aircraft in accordance with manufacture specifications and procedures (Type Certificate Data Sheet).
- Perform complete weight and balance check and record data.
- Check aircraft weighing scales for calibration.
- Identify tare items.
- Identify datum and perform calculations of the center of gravity, arm, and moment.
- Perform calculations of adding and removing equipment/ballast.
- Perform calculations to determine adverse-loading conditions.
- Compute forward and aft loaded center of gravity.
- Compute weight and balance on a helicopter.
- Examine weight and balance records.
- Calculate complete weight and balance and loading for passengers and cargo in preparation for flight.

STRAND 5

Students will explain the importance of maintenance forms, records, publications, and regulations.

Standard 1

Cite privileges and limitations of an airframe and powerplant mechanic certificate.
- Earning, losing, and re-establishing a certificate.
- Time in service.
- Maintenance.
- Preventative maintenance.
- Major alteration.
- Major repair.
- Minor alteration.
- Minor repair.
- Regulatory framework of an aircraft mechanic.
- Address change notification procedures.

Standard 2

Compile data for maintenance records.
- Return to service entries (maintenance, inspections, alterations, major overhaul, etc.).
- Documentation of inoperative equipment, discrepancy records, and placards.
- FAA forms (FAA Forms 337, 8010-4, 8100-2, 8130-3, etc.).
- Aviation/maintenance terminology, terminology resources, and awareness of acronyms (14 CFR part 1).

Standard 3

Identify and use approved publications in performance of aircraft maintenance.
- Type Certificate Data Sheet (TCDS).
- Supplemental Type Certificate (STC).
- Advisory Circulars (AC).
- Airworthiness Directives (AD).
- Alternative Method of Compliance (AMOC) for an AD.
- FAA-approved data, acceptable practices, manufacturer's publications, maintenance manuals, service bulletins, maintenance alerts, and master minimum equipment lists including inspection interval requirements.
- Identify applicability of effectivity codes in parts manuals.
- Identify methods used to establish the serial number effectivity of an item.
- Databases and on-line resources available.
- FAA-approved airworthiness limitations.
- Air Transport Association (ATA) Codes.

Standard 4

Students will identify, assess, and mitigate risks associated with maintenance forms, records, publications, and regulations.

- Importance of completeness or accuracy of documentation
- Attitude effects on recording data during documentation phase of maintenance procedures.
- Risks documented in Safety Data Sheets.
- Importance of adhering to warnings, cautions, or notes in maintenance and operational manuals.
- Importance of component applicability of an aircraft.

Performance Skills

- Compare "approved data" and "acceptable data" (required for major repair/alteration), and identify the applicability of approved data for a major repair.
- Complete an FAA Form 337 for a major repair or alteration and review the document for accuracy. For a given repair or alteration, determine if it is major or minor.
- Complete a 100-hour inspection aircraft maintenance and a maintenance record entry for return to service.
- Determine an aircraft's inspection status from a given aircraft record.
- Determine if a given published Airworthiness Directive (AD) is applicable to the aircraft.
- Record multiple AD compliance maintenance records entries for a specific airframe, aircraft engine, appliance, or propeller.
- Perform an aircraft conformity inspection using the correct manufacturer's aircraft equipment list, FAA aircraft specifications, and FAA TCDS.
- Assess a component for proper markings using a Technical Standard Order (TSO) or part manufacturing authorization (PMA).
- Identify a specific part number and applicability using a manufacturer's illustrated parts catalog and determine approved replacement parts for installation on a given aircraft.
- Locate the reference sources for supplemental type certificates (STC) applicable to a specific aircraft.
- Determine the conformity of an aircraft instrument range markings, placarding, and maximum allowable weight of a specific aircraft using a type certificate data sheet (TCDS).

STRAND 6

The student will demonstrate an understanding of fluid lines and fittings

Standard 1

Students will investigate the fabrication, use, characteristics, and maintenance practices involved with fluid line hoses and tubing.
- Identify tubing and hose materials, applications, sizes, and fittings
- Describe rigid line fabrication, installation, and inspection techniques/practices.
- Identify flexible hose material and describe flexible hose fabrication, installation, and inspection techniques/practices.
- Discuss maintenance practices involving use of a torque wrench when securing fluid hose and line fittings, and the use of torque seal or similar witness techniques after installing critical fluid hose and line fittings.

Standard 2

Students will identify, assess, and mitigate risks associated with fluid lines and fittings.
- Identify the fluid system configuration prior to and during maintenance.
- Explain the use of required safety equipment and hazards associated with hydraulic fluids.
- Discuss the risks associated with high-pressure fluid systems, twisted hoses, and loosened fittings or a hose that has moved out of position.
- Improper use of tools while applying torque to a fluid line.

Performance Skills
- Identify fluid lines, pneumatic lines, and fittings.
- Fabricate a rigid line with a flare and a bend
- Fabricate a flareless-fitting-tube connection
- Install aircraft rigid line and inspect installation and security requirements.
- Install an aircraft flexible hose and inspect installation and security requirements.
- Fabricate a flexible hose.

STRAND 7

The student will demonstrate knowledge of mathematics in relation to aviation maintenance.

Standard 1

Students will apply mathematical principles to aviation maintenance problems.
- Measurement systems.
- Volumes, areas of various geometrical shapes.
- Definitions, descriptions and use of geometrical terms, including but not limited to any of the following: polygon, pi, diameter, radius, and hypotenuse.
- Ratio problems, including examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
- Proportion and percentage problems, including examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
- Algebraic operations, including examples of where or how they may be used in relation to aircraft maintenance.
- Conditions or areas in which metric conversion may be necessary.
- Scientific (exponential) notation, decimal notation, fractional notation, binary notation, and conversion between these various forms of numeric notation.
- Rounding numbers. Powers and special powers.
- Use of positive and negative integers in mathematical operations. Basic mathematic functions (addition, subtraction, multiplication, division).

Standard 2

The student will identify, assess, and mitigate risks associated with mathematical calculations in relation to aviation maintenance.
- Precedence of operations when solving an algebraic equation.
- Use of both positive and negative integers in mathematical operations.
- Rounding off calculations.

Performance Skills
- Determine the square root of given numbers.
- Compute the volume of a cylinder.
- Compute the area of a wing, the volume of a shape, such as a baggage compartment or fuel tank.
- Convert between fractional and decimal numbers, and compare two numerical values using ratios.
- Compute compression ratio of a reciprocating engine.
- Compute the torque value when converting from inch-pounds to foot-pounds or from foot-pounds to inch-pounds.

STRAND 8

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:

- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
AVIATION MAINTENANCE 2

Course Description

Aviation Maintenance 2 prepares students to demonstrate the theories, principles, skills, and risks associated with physics, human factors, aircraft materials, hardware, processes, fundamentals of electricity and electronics, ground operations and servicing, and inspection concepts and techniques. These courses are designed to meet Federal Aviation Administration (FAA) requirements for licensing as an airframe and powerplant mechanic.

The strands and standards identified in this document align with industry through the Federal Aviation Administration (FAA) Airman Certification Standards (ACS).

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.09.00.00.002
Concurrent Enrollment Core Code	--
Prerequisite	--
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Maintenance
Endorsement 2	--
Endorsement 3	--

STRAND 1

Students will be able to perform physics principles in relation to aviation maintenance.

Standard 1

Students will apply knowledge of various physics concepts.
- Matter and energy.
- Work, power, force, and motion.
- Simple machines and mechanics.
- Heat and pressure.
- Bernoulli's Principle.
- Newton's Law of Motion.
- Gas law and fluid mechanics.
- Theory of flight (aerodynamics).
- Standard atmosphere and factors affecting atmospheric conditions.
- Primary and secondary aircraft flight controls.
- Additional aerodynamic devices (vortex generators, wing fences, and stall strips).
- Relationship between temperature, density, weight, and volume.
- Force, area, or pressure in a specific application.

Standard 2

Students will identify, assess, and mitigate risks associated with calculations and mathematics relating to aviation maintenance.
- Use of performance/testing data, and changes in aircraft and engine performance due to density altitude.
- Effect a repair can have on a flight surface.
- Measurement errors related to use of units of measure (e.g., Celsius vs. Fahrenheit).

Performance Skills
- Convert temperature units (e.g., from Celsius to Fahrenheit).
- Determine density and pressure altitude
- Calculate force, area, or pressure in a specific application.
- Demonstrate the mechanical advantage of various types of levers (inclined planes on paper, indicating the mechanical advantage).
- Identify changes in pressure and velocity as a fluid passes through a venturi.
- Calculate horsepower.

STRAND 2

The student will investigate human factors as it relates to performing aircraft maintenance.

Standard 1

Students will assess and identify key aspects of the safety culture in a work environment.
- Describe the importance of safety and organizational factors that impact work culture.
- Identify and explain human error principles and types of human errors.
- List the steps associated with a safety event investigation.
- Identify human performance and limitations, and describe physical and social environments impacts.
- Explain the importance of teamwork, leadership, professionalism and integrity within the work environment.
- Describe the importance of communication/reporting of hazards.
- List the risks associated with shift and task turnover, and describe the conditions/preconditions for unethical and unsafe acts.

Standard 2

Students will identify, assess, and mitigate risks associated with labor hazards in the aviation maintenance industry.
- Selective reporting of hazards and not including all potential hazards when performing maintenance.
- Fatigue management and fitness for duty, including non-invasive, condition-monitoring technologies to determine worker fitness for duty.

Performance Skills

- Simulate the completion of a Malfunction or Defect Report.
- Perform an effective shift turnover for continuity of work.
- Locate reference source information regarding human factors errors associated with the performance of aircraft maintenance.

STRAND 3

Students will use aircraft materials, hardware, and processes.

Standard 1

Students will investigate aircraft materials, hardware, tools and welding processes.
- Materials commonly used in aircraft and their applications. Material heat treatment and metalworking processes, and forces placed on materials (e.g., tension, compression, torsion, bending, strain, and shear).
- Identify hardware and hardware markings commonly used in aircraft (e.g., bolts, nuts, screws, pins, washers, turnlock fasteners, cables, cable fittings, and rigid line couplings).
- Recognize torquing tools, principles, and procedures, and understand the relationship between torque and fastener preload.
- Understand the principles of safety wire techniques and safety clip requirements.
- Be aware of precision measurement tools, principles, and procedures.
- Characteristics of acceptable welds, unacceptable welds, and procedures for weld repairs. Become familiar with soldering preparation, types of solder, and flux usage.

Standard 2

Student will identify, assess, and mitigate risks associated with aircraft materials, hardware, and processes.
- Use of personal protective equipment (PPE).
- Improper torque techniques.
- Reuse of hardware or suspected unapproved parts (SUPS).
- Torquing techniques on critical fasteners.

Performance Skills
- Identify aircraft materials and hardware based on manufacturer's markings. Select and install aircraft bolts. Properly torque aircraft hardware. Install safety wire on nuts, bolts, and turnbuckles.
- Inspect and check welds.
- Check calibration and make precision measurements with an instrument that has a Vernier scale. Use a precision measurement device to check the concentricity of a shaft.
- Identify aircraft control cable components. Fabricate a cable assembly using a swaged-end fitting using proper tooling.
- Distinguish between heat-treated and non-heat-treated aluminum alloys. Determine the suitability of materials for aircraft repairs. Select the correct aluminum alloy for a structural repair. Identify rivets by physical characteristics.

STRAND 4

Students will apply ground operation and servicing concepts.

Standard 1

Students will illustrate aircraft ground operations and safety procedures.
- Aircraft towing and securing procedures (engine starting, ground operation, and aircraft taxiing procedures). Airport operation area and ATC communications (runway incursion prevention).
- Types/classes of fire extinguishers and procedures.
- Aircraft oil, hydraulic and pneumatic, and deicing servicing procedures.
- Oxygen system servicing procedures.
- Characteristics of aviation gasoline and turbine fuels (basic types and means of identification, commonly used fuel additives, approved grades/types, fueling/defueling procedures, hazardous materials, PPE, and Safety Data Sheets (SDS)).
- Tooling, hardware, material handling and parts protections. The effects of foreign object damage related to airframe and powerplant.

Standard 2

Students will identify, assess, and mitigate risks associated with ground operations and servicing.
- Fueling/defueling ungrounded aircraft or using improper equipment. Misfueling and using incorrect or contaminated fuel.
- Oxygen system servicing.
- Engine start/run-up without using a checklist. Engine starting and operation while troubleshooting or adjusting engine controls. Ground operation of an aircraft engine with cowling removed contrary to manufacturer instructions.
- Ground operation of aircraft near other aircraft or ground support equipment.

Performance Skills

- Perform a foreign object damage control procedure.
- Prepare an aircraft for towing and use hand signals for the movement of aircraft.
- Identify different grades of aviation fuel. Select an approved fuel for an aircraft. Prepare an aircraft for fueling. Inspect an aircraft fuel system for water and foreign object debris (FOD) contamination.
- Identify procedures for extinguishing fires in an engine induction system.
- Connect external power to an aircraft using the correct voltage. Follow a checklist to start up or shut down an aircraft reciprocating or turbine engine.
- Locate and explain procedures for securing a turbine-powered aircraft and reciprocating-powered aircraft after engine shutdown and properly secure an aircraft.

STRAND 5

Students will identify and demonstrate the fundamentals of electricity and electronics through various theories and devices.

Standard 1

Students will understand General Electrical Theory by differentiating between specific electrical laws and theories.
- Ohm's Law
- Kirchhoff's Laws
- Watt's Law
- Faraday's Law
- Lenz's Law
- Right-hand motor rule
- Electron theory (conventional flow vs. electron flow).

Standard 2

Students will explore concepts in General Electrical Theory.
- Magnetism.
- Capacitance and inductance in a circuit.
- Voltage.
- Current.
- Resistance.
    - Impedance
    - Resistance in series and in parallel
    - Total resistance
- Power.
- Circuit continuity.
- Electrostatic discharge.
- Electrical circuit drawings.
- Complex/combined circuits.

Standard 3

Students will demonstrate the use of DC Theory, circuits and measurements
- Direct current (DC) electrical circuits.
- Electrical measurement tools, principles, and procedures - DC Circuits
- Series circuits. Parallel circuits - DC
- Motors - DC

Standard 4

Students will demonstrate the use of AC Theory and circuits
- Alternating current (AC) electrical circuits.
- Electrical measurement tools, principles, and procedures - AC Circuits
- Series circuits. Parallel circuits - AC
- Motors - AC

Standard 5

Students will investigate circuit control, power regulation, and protection devices.
- Controlling devices, including switches and relays.
- Protective devices (fuses, circuit breakers, and current limiters).
- Resistor types and color coding.
- Transformers.
- Voltage regulation

Standard 6

Students will analyze the functioning, use, and handling of aircraft batteries.

Standard 7

Students will illustrate Electronic Circuit Theory and its components.
- Semiconductors (diodes, transistors, and integrated circuits).
- Digital logic (RAM, ROM, NVRAM, logic gates, inverter, rectifier, flip flop, and binary numbers).

Standard 8

Students will identify, assess, and mitigate risks associated with the maintenance and handling of aviation electronics.
- Handling, storage,working with/around, and inspection of different types of batteries (i.e., lead acid, NiCad, lithium ion, gel cell).
- High-voltage circuits (e.g., strobe lighting).

Performance Skills

- Read and interpret aircraft electrical circuit diagrams, and symbols, including solid-state devices and logic functions.
- Identify symbols used in electrical and electronic schematic diagrams (e.g., grounds, shields, resistors, capacitors, fuses, circuit breakers, batteries, diodes, transistors, and integrated circuits).
- Perform circuit continuity test. Measure voltage, current, and resistance. Measure voltage drop across a resistor. Test a switch or relay, fuse or circuit breaker.
- Troubleshoot a circuit. Demonstrate how to test for short-circuit and open-circuit conditions. Determine or measure for open electrical circuits.
- Inspect and service an aircraft battery.

STRAND 6

Students will identify and apply inspection concepts and techniques.

Standard 1

Students will inspect and test an aircraft using applicable materials, hardware, calibrations, and processes.
- Calibration and tool accuracy requirements. Tools, including calipers, micrometers, and gauges.
- Nondestructive Testing (NDT) procedures and methods.
- Aircraft inspection methods and tools for materials, hardware, and processes. Aircraft inspection programs (e.g., progressive, 100-hour, annual, AD's, and other FAA-approved inspections).

Standard 2

Students will identify, assess, and mitigate risks associated with inspection concepts and techniques.
- Identify the risks associated with not demagnetizing a component following a magnetic particle inspection.
- Calibration of precision measuring equipment.
- Proper selection of inspection techniques.
- Damage prevention to aircraft components and test equipment when using an ohmmeter.

Performance Skills
- Use measurement gauges (Vernier calipers and micrometers).
- Perform a visual inspection.
- Perform a dye penetrant inspection.
- Identify NDT methods for composite, surface metal, and subsurface metal defects.
- Perform a tap test on a composite component.
- Inspect aircraft for compliance with an AD.

STRAND 7

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills
The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
AVIATION HISTORY

Course Description

Aviation History will prepare students interested in the field of aviation by discussing general knowledge and terminology, historical events, research and development, and government roles to identify various aviation career paths. Students will use critical thinking and collaboration to discuss the following historical eras/concepts: early, wartime, and peacetime aviation, civilian vs. military use, and space exploration applications.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.11.00.00.044
Concurrent Enrollment Core Code	40.11.00.13.044
Prerequisite	--
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Flight
Endorsement 2	--
Endorsement 3	--

STRAND 1

Students will be able to understand early aviation and the events leading up to the successful flight of the Wright Brothers.

Standard 1

Discuss the early inventions of aviation; balloons, drigibles, and airships before WWI.
- Early aviation pioneers (Leonardo DaVinci, Cavendish, Montgolfier, etc.)
- Significant historical aviation events
    - First unmanned and manned balloon flights
    - Balloons and drigibles used during wartime.
    - Importance of heavier than air aircraft in the stages of aviation development.

Standard 2

Identify early aviation pioneers and their significance to the development of the first controlled powered aircraft.
- Early fight developments and events in the discovery and advent of the airplane in Europe and America.
    - Gliders
    - Engines
    - Key figures (George Cayley, John Montgomery, Otto Lillienthal, Octave Chanute, Samuel Langley, and others)
- The first design and test of the Wright brothers controlled powered aircraft.

Performance Skills
- Discuss the early inventions of aviation; balloons, drigibles, and airships before WWI.
- Identify early aviation pioneers and their significance to the development of the first controlled powered aircraft.

STRAND 2

Students will investigate early twentieth century aviation events.

Standard 1

Identify aviation events and competitions that contributed to the aviation industry.
- Wright Brothers contracts with the War Department and French companies.
- Glenn Curtiss and the Aerial Experiment Association.
- Rheims Airmeet in France.
- First coast-to-coast flight competition.
- Women aviators (Harriet Quimby, Bessie Coleman, and others)

Standard 2

Recognize how World War I impacted the development of aviation
- Aviation events in preparation for the war.
    - Formation of military flying services
    - Development of the aviation industry
- Importance of airships, dirigibles, and balloons during WWI.
- Development and purpose of military aircraft during WWI

Performance Skills
- Identify aviation events and competitions that contributed to the aviation industry.
- Recognize how World War I impacted the development of aviation

STRAND 3

Students will discuss the significance of the Golden Age of aviation.

Standard 1

Distinguish the difference in aviation between WWI and WWII.
- Passenger travel on aircraft during the early days of aviation.
- Importance of airships and float plane designs.
- Modern barnstormers and their significance in aviation.
- Congressional Airmail Acts and their significance in the development of aviation.

Standard 2

Identify pioneers and their significance during the Golden Age of aviation.
- Charles Lindburgh
- Amelia Earhart
- General Billy Mitchell
- And others

Standard 3

Identify the importance of general aviation companies and commercial airlines.
- Cessna, Piper, Beechcraft, etc.
- McNary-Watres Act
- United Airlines, Transcontinental and Western Airlines, Pan American, etc.
- Boeing Aircraft and Douglas Aircraft Corporations

Performance Skills
- Distinguish the difference in aviation between WWI and WWII.
- Identify pioneers and their significance during the Golden Age of aviation.
- Identify the importance of general aviation companies and commercial airlines.

STRAND 4

Students will explain the changing roles, capabilities, and impact of the airplane on aviation advancements and outcomes of WWII.

Standard 1

Distinguish how different countries prepared their Air Forces for war after WWI
- Germany, Japan, and Italy (Axis Powers)
- Britain and US (Allied Powers)
- New type of war (Blitzkrieg)
- Significant aircraft (for example Spitfire, B-17, Bf-109, P-51, A6M Zero, FW-190, etc.)

Standard 2

Observe the differences in aerial warfare between WWI and WWII and how it impacted the outcome in the European Theater (WWII).
- Germany invades Poland and other European countries using airpower
- Battle of Britain
- Multiple fronts - Europe, Russia, North Africa, and Mediterranean
- Allied Air Strategy and Doctrine - Giulio Douhet, Billy Mitchell, Claire Chennault
- Combined Bomber Offensive and Normandy Invasion

Standard 3

Analyze how the Air War was fought and its outcome in the Pacific Theater.
- Japanese strategy in the Pacific
- US enters the war - Pearl Harbor
- Doolittle's Raid
- Naval air power - Battles of Coral Sea and Midway
- Island hopping
- Bombing of Japan - fire bombs and atomic bombs

Standard 4

Investigate and discuss pilot training during WWII.
- German Luftwaffe
- UK Royal Air Force
- US Civilian Pilot Training Program and War Service Program
- WAFS (Women's Auxiliary Ferrying Squadron) and WFTD (Women's Flying Training Detachment) join to become the WASP (Women's Air Force Service Pilots)
- Tuskegee Airmen
- Russian Night Witches

Standard 5

Provide examples of military research, development, and production during WWII.

- Aircraft production - bomber aircraft, fighter aircraft, and helicopters
- Radar
- Jet engines
- Rocket propulsion
- Norden bomb sight
- Atomic bomb

Performance Skills

- Distinguish how different countries prepared their Air Forces for war after WWI
- Observe the differences in aerial warfare between WWI and WWII and how it impacted the outcome in the European Theater (WWII).
- Analyze how the Air War was fought and its outcome in the Pacific Theater.
- Investigate and discuss pilot training during WWII.
- Provide examples of military research, development, and production during WWII.

STRAND 5

Students will understand military aviation from the Cold War through the modern age.

Standard 1

Understand and discuss the important aircraft and technology used during military conflicts of the Cold War and the aviation lessons learned from each conflict.

- Berlin Airlift (examples C-47 and C-54)
- Korean Conflict (examples F-80, F-84, F-86, F-4U, MiG-15)
- U2 Incident over USSR
- Vietnam War (examples F-100, B-52, F-105, F-4, A-6, MiG-17, MiG-19, MiG-21, SAM and AGM)

Standard 2

Explore the US military strategies used to protect the country from nuclear threat.

- Cuban Missile Crisis
- Strategic Air Command (SAC)
- Early Warning systems (E-3, Looking Glass)

Standard 3

Investigate the development of military aviation after the end of the Cold War by analyzing the following conflicts:
- Desert Shield and Desert Storm
- Operation Allied Force
- Operation Noble Eagle and Enduring Freedom
- Military Aircraft (F-15, F-22, KC-135, etc.)

Performance Skills

- Understand and discuss the important aircraft and technology used during military conflicts of the Cold War and the aviation lessons learned from each conflict.
- Explore the US military strategies used to protect the country from nuclear threat.
- Investigate the development of military aviation after the end of the Cold War by analyzing specific conflicts.

STRAND 6

Students will investigate civilian aviation after World War II.

Standard 1

Students will recognize modern major air carriers.
- Airline Deregulation Act of 1978
- Passenger and cargo carriers (United, Southwest, Delta, UPS, FedEx, etc.)
- Regional carriers (Skywest, Allegiant, Breeze, Horizon, etc.)
- Modern airliners

Standard 2

Compare the different types of general aviation aircraft.
- Personal aviation companies (Cessna, Beechcraft, Piper, etc.)
- Home-built and experimental models
- Ballooning, soaring, and gliding
- Aerobatics and racing (National Championship Air Races)

Standard 3

Differentiate the difference between business and commercial aviation.
- Executive aircraft (Turboprops, Multiengine Piston Aicraft, Turbojets, etc.)
- Commercial aviation passenger and cargo
- Nontransportation aircraft (agriculture, firefighting, aerial photography, etc.)

Standard 4

Investigate how to receive private pilot certification and beyond.
- Ground school and flight instruction
- Private pilot rating
- Instrument rating
- Commercial pilot rating
- Air transport pilot rating
- Part 107 UAS pilot rating

Performance Skills

- Students will recognize modern major air carriers.
- Compare the different types of general aviation aircraft.
- Compare the different types of general aviation aircraft.
- Investigate how to receive private pilot certification and beyond.

STRAND 7

Students will apply previous concepts to the development of space exploration.

Standard 1

Illustrate the invention, development, and impact of rockets on space operations.
- Titan
- Atlas
- Space-X

Standard 2

Explore the use and purpose of unmanned space vehicles and satellites.
- Rovers
- Telescopes
- Global Positioning System (GPS)

Standard 3

Understand the impact of manned space vehicles on space exploration.
- History of The Space Race
- Mercury, Gemini, and Apollo programs
- Space shuttles
- Space stations

Performance Skills

- Illustrate the invention, development, and impact of rockets on space operations.
- Explore the use and purpose of unmanned space vehicles and satellites.
- Explore the use and purpose of unmanned space vehicles and satellites.

STRAND 8

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:

- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
AIR TRANSPORTATION

Learning that works for Utah
CTE®

Course Description

Air Transportation gives a broader understand of the business aspects of aviation. Some ares of study will include historical and present status of air transportation, regulations, administration, general aviation, and aircraft manufacturers. This course provides students with skills for the following careers: airline managers, flight dispatchers, and air traffic controllers.

Intended Grade Level	11-12
Units of Credit	Minimum .5
Core Code	40.11.00.00.046
Concurrent Enrollment Core Code	40.11.00.13.046
Prerequisite	Private Pilot
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Flight
Endorsement 2	--
Endorsement 3	--

STRAND 1
Students will be able to understand the historical timeline of air transportation.

Standard 1
Students will be able to track the historical timeline of air transportation.
- Air transportation is a mode of moving around.
- Air transportation is a major career in aviation.

Standard 2
Students will be able to identify the developmental patterns of the airplane through historical markers.
- Beginning of controlled flight.
- Commercial applications of the airplane.
- Modern era of airlines and air carriers.

STRAND 2
Students will be able to understand and explain regulations of air transportation.

Standard 1
Students will understand the structure and importance of aviation regulations and their functions.
- Department of Transportation
  - Regulators of general aviation
- Aviation Safety and the National Transportation Safety board
  - Performs investigations of aviation incidents.
- The Federal Aviation Administration (FAA)
  - Improves aviation safety through regulations and oversight.
- Aviation accident investigation and safety performance.

Standard 2
Students will understand air carriers and air carrier economic regulations.

Standard 3
Students will explain international air transportation law.
- International Civil Aviation Organization (IKAO)

Standard 4
Students will understand commercial space transportation.

Performance Skills

Understand and explain regulation and air transportation.
- The air carrier industry and federal legislation.
- Department of Transportation.
- The Federal Aviation Administration (FAA).
- Aviation safety and the National Transportation Safety board.
- Aviation accident investigation and safety performance.
- Air carrier economic regulations.
- International air transportation law.
- International air transportation organizations.
- Non-US air carriers.
- Commercial space transportation.

STRAND 3

Students will understand and explain administration of air transportation.

Standard 1

Students will investigate air carrier management and organization.

Standard 2

Students will critique air carrier marketing.
- Impact of the Internet on airline marketing strategies.

Standard 3

Students will differentiate the business structures of airlines.
- Air carrier accounting.
- Financial analysis.
- Aviation industry performance.
- Aviation industry forecasts.

Performance Skills

Understand and explain administration of air transportation.
- Air carrier management and organization.
- Air carrier marketing.
- Air carrier accounting and financial analysis.
- Legal aspects of air transportation.
- Aviation industry performance and forecasts.

STRAND 4

Students will be able to understand and explain aircraft manufacturing and manufacturers.

Standard 1

Students will compare the major aviation manufacturers.
- Boeing Company.
- Airbus Industries.
- Lockheed Martin Corporation.

Standard 2

Students will understand general aviation industry.
- Pilot training processes.
- Recreational aviation.
- Private aircraft ownership
- Non-air carrier career opportunities.

Standard 3

Students will explore future aircraft and space vehicles.
- Development of alternative fuel aircrafts.

Performance Skills

Understand and explain aircraft in general.
- Aircraft performance.
- The Boeing Company.
- The Lockheed Martin Corporation.
- Airbus Industries.
- Future aircraft and space vehicles.
- The general aviation industry.

STRAND 5

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
AIRCRAFT SYSTEMS

Learning that works for Utah
CTE®

Course Description

Aircraft Systems will give students the knowledge to take and pass the FAA written exam and prepare them for flight. Some of the areas of study will include science of flight, aircraft engine systems, fueling systems, pressurization, electrical systems, hydraulic and pneumatic systems, and aircraft control systems and weight distribution.

Intended Grade Level	11-12
Units of Credit	Minimum 0.5
Core Code	40.11.00.00.042
Concurrent Enrollment Core Code	40.11.00.13.042
Prerequisite	Private Pilot
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Flight
Endorsement 2	Aviation - Maintenance
Endorsement 3	--

ADA Compliant: JUNE 2023

STRAND 1

Students will be able to understand the science of flight.

Standard 1

Students will relate the physics involved in flight.
- General characteristics of matter
- Matter of measurement
- Fluids (behavior of air)
- Machines
- Work, energy, and power
- Friction
- Force and motion of bodies
- Vibration
- Resonance
- Systems

Standard 2

Students will classify Aircraft engine types and their construction.
- The heat engine.
- Comparison of aircraft power plants (reciprocating vs. turbine engines).
- Types of reciprocation engines.
- Reciprocating engine design and construction.
- Engine components.

Standard 3

Students will demonstrate reciprocating engine theory of operation
- Reciprocating gasoline engine operating principles
- Operating cycles
- Four-stroke cycle
- Engine power and efficiency
- Absolute and gauge pressure

Performance Skills

Understand and explain the science of flight.
- Flight physics
- Aircraft engine types and construction
- Reciprocating engine theory of operation

STRAND 2

Students will be able to understand and explain aircraft engine systems.

Standard 1

Students will explain how engine lubrication and cooling systems function in an aircraft.
- Principles of engine lubrication
- Requirements and characteristics of reciprocating engine lubricants
- Internal lubrication
- System operation maintenance
- Engine cooling system (air-cooled systems vs. oil-cooled systems)
- Engine temperature control

Standard 2

Students will apply knowledge of the propeller and governor systems.
- Propeller types & principles
- Propeller operations
- Constant-speed propellers vs. Fixed Pitch propellers
- Governor principles
- Unfeathering
- Propeller synchronization
- Propeller ice control systems (de-icing vs. anti-icing)

Performance Skills

Understand and explain aircraft engine systems.
- Engine lubrication and cooling systems.
- Propeller and governor systems.

STRAND 3

Students will demonstrate proper procedures in handling the aircrafts engine and interior comfort.

Standard 1

Students will compare and classify aircraft fuels and fuel systems.
- Fuel types (100LL, Jet Fuel, AvGas, and MOGas).
- Fuels for reciprocating engines.
- Fuel metering systems and their associated gauges.
- Aircraft float carburetor.
- Carburetor icing and heating.
- Fuel injection systems.

Standard 2

Students will identify and explain power management in an aircraft.
- RPM and MAP.
- Effect of air density on power output.
- Engine operations.
- Propeller-starting.
- Stopping procedure.

Standard 3

Students will compare supercharging and turbocharging systems
- Turbocharging
- Turbo compound systems for reciprocating engines.

Standard 4

Students will identify pressurization and high altitude operations.
- Altitude physiology.
- The atmosphere.
- Respiration and circulation.
- Hypoxia.
- Oxygen equipment.
- Hyperventilation.
- Dysbarism.
- Trapped gases.
- Cabin pressurization and decompression.
- Cabin pressurization systems.

Performance Skills

Understand and demonstrate proper procedures in handling the aircrafts engine and interior comfort.
- Fuels and fuel systems.
- Power management.
- Supercharging and turbocharging.
- Pressurization and high altitude operations.

STRAND 4

Students will be able to explain aircraft electrical systems.

Standard 1

Students will demonstrate aircraft electrical principles.
- Electron flow.
- Units of electrical measure.
- Pressure.
- Metric prefixes and powers of ten.
- Static electricity.
- Electromagnetic fields.
- Distribution of electrical charges.
- Magnetism.
- Electromagnetics.
- Sources of electrical energy.
- Electromagnetic induction.
- Mechanical power in electrical circuits.
- Advantages of alternating current over direct current.
- Alternating current and it's generation.

Standard 2

Students will demonstrate the functions of aircraft electrical components.
- Modern battery system configurations.
- Battery servicing.
- Control of aircraft DC generators.
- Circuit control devices (circuit breakers and fuses).
- Inverters and diodes.
- Half-wave and full-wave rectifier.
- Transformers.

Standard 3

Students will diagram aircraft electrical systems.
- Series and parallel circuits.
- Voltage and current measuring instruments / ammeters and load meters.
- The aircraft electrical system.
- Electrical system installation.
- Ignition system.
- Electrical circuit of the magneto.

Performance Skills

Understand and explain aircraft electrical systems.
- Electrical principles.
- Electrical components.
- Aircraft electrical systems.

STRAND 5

Students will explain aircraft hydraulic and pneumatic systems.

Standard 1

Students will analyze aircraft hydraulic systems and landing gear.
- History of fluid power applications.
- Basic laws of fluid power.
- Fluid statics and dynamics.
- Hydraulic fluids.
- Hydraulic system components.
- Evolution of the aircraft hydraulic system.
- The power pack.
- Aircraft landing gear.
- Nose wheel steering and shimmy dampers.
- Aircraft brakes, wheels, tires and tubes.

Standard 2

Students will demonstrate knowledge of pneumatic and de-icing systems.
- Pneumatic systems.
- Ice controls (de-icing vs. anti-icing).
- Rain control systems.

Performance Skills

Understand and explain aircraft hydraulic and pneumatic systems.
- Hydraulic systems and landing gear.
- Pneumatic and de-icing systems.

STRAND 6

Students will be able to understand and explain aircraft control systems and proper weight distribution.

Standard 1

Students will identify aircraft structures and flight controls.
- Evolution of aircraft structures.
- Stresses and structure.
- Materials for aircraft construction.

Standard 2

Students will identify and interpret the purpose of aircraft flight controls.
- Flight controls.
- Auxiliary lift devices.
- Control systems for large aircraft.

Standard 3

Students will investigate weight and balance principles of an aircraft.
- Weight and balance.
- Adverse-loaded center of gravity.
- Balance changes after an alteration.

Standard 4

Students will show and explain the purpose of inspections and pilot maintenance.
- Aircraft inspections.
- Pilot accomplished maintenance.
- Maintenance forms and records.

Standard 5

Students will demonstrate knowledge of aircraft instrument systems.
- Classification of instruments.
- Pitot-static systems.
- Vacuum & pneumatic pump system instruments (gyro).
- New types of rate gyros.
- The magnetic compass.
- Electronic Flight Instrument System (EFIS).
- Engine Indicating and Crew Alerting System (EICAS).
- Flight data computer and Air Data Attitude Heading Reference System (ADAHRS).

Performance Skills

Understand and explain aircraft control systems and proper weight distribution.
- Aircraft structures and flight controls.
- Weight and balance, inspections and pilot maintenance.
- Aircraft instrument systems.

STRAND 7

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
PRIVATE PILOT

Learning that works for Utah
CTE®

Course Description

The Private Pilot ground school will give students the knowledge to take and pass the FAA written exam and prepare them for flight. Some of the areas of study will include aircraft operations, airplane controls, systems, navigation, and weather. Students will also study human factors and safety.

Intended Grade Level	11-12
Units of Credit	Minimum 0.5
Core Code	40.11.00.00.040
Concurrent Enrollment Core Code	40.11.00.13.040
Prerequisite	--
Skill Certification Test Number	Industry Test 959
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Flight
Endorsement 2	--
Endorsement 3	--

STRAND 1

Students will be able to understand, demonstrate, and apply fundamentals of flight.

Standard 1

Students will identify opportunities within aviation.
- Pilot training and license requirements.
- Aviation opportunities and pathways (military, commercial, private, corporate, charter, Emergency Services, cargo, etc.).
- License privileges and limitations.
- Category, class, and type.

Standard 2

Students will understand and identify aircraft systems.
- Parts of an aircraft including flight controls.
- The powerplant and related systems.
- Flight instruments (glass cockpits, steam instruments, etc.).

Standard 3

Students will collaboratively apply aerodynamic principles.
- Four forces of flight (lift, weight, drag, and thrust).
- Generation of lift (Bernoulli's Principle and Newton's Laws of Motion).
- Three axes of flight.
- Effects of center of gravity.
- How aircraft design effects stability.
- Aerodynamics of maneuvering flight.
- Recognize stalls, spins, and recovery techniques.

Standard 4

Students will understand Aviation Physiology affecting Pilot Performance.
- Medical Certificates.
- Aeronautical decision making.
- Aeromedical Factors.

Performance Skills
- Investigate and identify parts of an aircraft.
- Describe Airplane systems.
- Collaboratively engage in discussions of Aerodynamic principles (Instrument failures).

STRAND 2

Students will be able to understand and demonstrate the flight environment and Federal Aviation Regulation/Aeronautical Information Manual (FAR/AIM).

Standard 1

Students will be able to identify the components of safety of flight.
- Right of way.
- Collision Avoidance.
- Visual Scanning.
- Maneuver Safety.
- Minimum Safe Alt.

Standard 2

Students will be able to identify and interpret the airport environment.
- Controlled vs Uncontrolled airports.
- Runway markings and signs and airport lighting.
- Traffic pattern.
- Runway incursions and Land and Hold Short Operations(LAHSO).
- Sources of flight information.

Standard 3

Students will be able to operate safely and effectively within the National Airspace System.
- Controlled and Uncontrolled Airspace.
- Transponders/Automatic Dependent Surveillance-Broadcast(ADS-B).
- Pilot/equipment requirements for airspace.
- Special use airspace.
- Temporary Flight Restrictions(TFR)/Air defense identification zone (ADIZ).
- Intercept procedures.

Standard 4

Students will be able to effectively communicate throughout the flight process.
- Radar and ATC services.
- Radio procedures.
- Proper radio phraseology.
- Universal Coordinated Time (UTC or ZULU).
- Emergency procedures.
- Flight Service and filing flight plans.

Performance Skills
- Identify and describe different air space on charts
- Demonstrate communication and radio procedures in a traffic pattern

STRAND 3

Students will develop and demonstrate an ability to understand and interpret aviation weather products.

Standard 1

Students will be able to recognize meteorology for pilots.
- Basic weather theory.
- Weather patterns.
- Weather hazards.

Standard 2

Students will analyze aviation weather services.
- The forecasting process.
- Printed reports and forecasts.
- Graphic weather products (prognosis chart, surface analysis chart, etc.).
- Sources of weather information (METAR, TAF, PIREP, etc.).
- Interpret weather data.
- Importance of using official aviation weather sources.

Performance Skills
- Read and interpret weather data from reports and charts.

STRAND 4

Students will be able to understand, predict, and calculate performance.

Standard 1

Students will demonstrate and calculate airplane performance.
- Predicting performance (takeoff, climb performance, and landing data).
- Weight, balance, and proper aircraft loading.
- Flight computers (E6B).
- Calculate cross winds.

Performance Skills

Understand performance and navigation.
- Calculate weight and balance
- Calculate takeoff and landing data
- Read and interpret performance charts

STRAND 5

Students will apply navigational skills to the flight planning process.

Standard 1

Students will be able to use navigational skills while flight planning and flying.
- Navigational and aeronautical charts.
- Pilotage and dead reckoning.
- Radio-based navigation (VOR & ADF).
- Satellite/GPS-based navigation.

Standard 2

Students will be able to plan a cross-country flight.
- The flight planning process.
- Navigational Log.
- Obtain all available information in regard to the flight.
- Filing a flight plan.
- Post-flight debrief.

Performance Skills
- Read, understand, and interpret navigational and aeronautical charts
- Complete a navigational log

STRAND 6

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

STRANDS AND STANDARDS
FLIGHT SIMULATOR

Learning that works for Utah
CTE®

Course Description

The Flight Simulator course will give students hands-on experience, training, and knowledge in preparation for the real world experience of flying. Students will learn the basic skills needed to fly an airplane. Some of those skills include takeoffs, climbs, turns, descents, landing, navigating, and much more. Flight simulation provides a safe, low stress and cost effective way to learning some of the basic aviation skills that you will need as a pilot.

Intended Grade Level	11-12
Units of Credit	Minimum 0.5
Core Code	40.11.00.00.048
Concurrent Enrollment Core Code	40.11.00.13.048
Prerequisite	Private Pilot
Skill Certification Test Number	Industry Test 959
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Flight
Endorsement 2	--
Endorsement 3	--

STRAND 1

Students will be able to understand and demonstrate pre-flight procedures.

Standard 1

Students will understand and demonstrate the proper use of checklists for pre-flight planning and procedures.
- Cockpit familiarization.
- Checklists: before start, start/run-up, cruise, shutdown.
- Required documents and inspections.
- Instruments for visual flight rules (VFR) flights.
- Flight controls and control surfaces.
- Review flight maneuvers to be performed.
- VFR scanning outside/inside references.

Standard 2

Students will understand and demonstrate pre-flight preparations.
- Obtain pertinent weather with the appropriate sources of weather.
- Evaluate cross-wind performance before takeoff.
- Identify traffic patterns based on current winds and conditions.
- Anticipate proper radio procedures for flight.
- Review flight plan (route and navigation).
- Review approaches and landings.
- Crew departure briefing.

Standard 3

Students will apply appropriate simulated ground operations.
- Engine start-up.
- Taxi (daytime and nighttime procedures).
- Engine run-up (appropriate checklist use).
- Engine gauges and monitoring.

Performance Skills
- Collaboratively perform the proper use of a pre-flight checklist and crew departure briefing.

STRAND 2

Students will be able to calculate the proper weight and balance; and performance data.

Standard 1

Students will calculate weight and balance and performance data.
- Performance chart calculations.
- Weight and balance calculations.
- Take-off and landing distances.
- Maximum performance take-off and climb.
- Performance approach and landing (short-field or soft-field).

Performance Skills
- Calculate weight and balance.
- Calculate performance data.

STRAND 3

Students will be able to understand and demonstrate flight operations.

Standard 1

Students will fly an aircraft through simulator equipment.
- Take-offs (normal, crosswind, short-field, soft-field).
- Landings (normal, crosswind, short-field, soft-field).
- Airspeed and altitude control.
- Use of outside and inside references.
- Scanning for traffic.

Standard 2

Students will demonstrate performance and ground-reference maneuvers.
- Performance (steep turns, slow flight, power on stall, power off stall).
- Ground-reference (rectangular course, turns around a point, s-turns).

Standard 3

Students will demonstrate basic instrument maneuvers.
- Straight and level flight.
- Constant airspeed climbs.
- Constant airspeed descents.
- Turns to headings.
- Recovery from unusual flight attitudes.

Standard 4

Students will demonstrate proper use of navigational equipment.
- Pilotage and dead reckoning.
- Navigation systems and radar services.
- Diversions.
- Lost procedures.

Standard 5

Students will practice emergency procedures.
- Emergency descent.
- Emergency approach and landing.
- Systems and equipment malfunction.
- Engine failure after liftoff.
- Approach and landing with an inoperative engine.
- Lost communication procedures.

Performance Skills
- Complete a successful emergency flight scenario.
- Complete takeoffs and landings to FAA standards.
- Complete a successful solo flight.
- Complete a successful cross-country scenario (optional).

STRAND 4

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, and re-enforced throughout the strands and standards of the course:
- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability

Other		
Course Code Number	Course Name	Summary
41.00.00.00.050	CTE Internship	Brand new standards document

DRAFT

STRANDS AND STANDARDS
CTE INTERNSHIP

Learning that works for Utah
CTE®

Course Description

CTE Internships provide on the job training opportunities that are related directly to coursework, a career goal, and course of study identified through the College and Career Readiness plan. This Work-Based Learning experience is considered a completer level pathway course and is designed to bridge the gap between school and career. Appropriate supervision by a school/district coordinator must be maintained.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	41.00.00.00.50
Concurrent Enrollment Core Code	41.00.00.13.50
Prerequisite	1-2 Related CTE Courses
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	N/A
Endorsement 2	N/A
Endorsement 3	N/A

ADA Compliant: October 2023

STRAND 1
Internship Participation-student will participate in a high-quality internship.

Standard 1
Students will participate in a paid or unpaid internship where the student is mentored by an employer for approximately 40 hours on site during one course to learn about a particular industry or occupation.

Standard 2
Students will display growth in the learning intentions developed by an LEA and employer to guide student learning.

Strand 2
Alignment with CCR and CTE Pathway Coursework

Standard 1
Students will participate in an internship that aligns with a student's career goals, career pathway, and the Plan for College and Career Readiness (CCR).

Standard 2
Students will participate in an internship where they apply past or ongoing coursework, connecting classroom learning to real-world experience.

Strand 3
Safety Practices and Guidelines

Standard 1
Students will adhere to LEA (Local Education Agency) Workers Comp guidelines.

Standard 2
Students will adhere to all employer and LEA safety policies and procedures.

Standard 3
Students will participate in an internship that has been approved by LEA Work-Based Learning professional through a site safety agreement.

Strand 4
Workplace Readiness

Standard 1
Students will have professional contact information and be able to communicate effectively and professionally with an employer.

Standard 2
Students will receive approval through an (LEA) Work-Based Learning approved verification process prior to the start of the internship. This verification process can include: referral to verify student's consistency and skill readiness, interview process, application process, etc.

Standard 3
Students will demonstrate workplace readiness during the internship by:
- Completing all mandatory internship documentation & requirements
- Arriving on time and properly notifying employer when late or absent
- Completing a timecard
- Dressing appropriately for the internship site
- Follow directions and complete employer assigned work.

Strand 5
Internship Reflection

Standard 1
Students will complete a career related digital portfolio which reflects on the student's overall accomplishments and CTE internship experience that adheres to the State Digital Portfolio Rubric.
- **Profile** - Students will create a career related digital profile that identifies a student's internship selection and the content appeals to future employers.
- **Headshot/Cover Photo**- Students will include a professional headshot and cover photo that appeals to future employers.
- **Headline** - Students will create a headline that describes their career goals and/or internship selection.
- **About/Summary** - Students will include a summary which describes the student's career interests & experiences.
- **Experience** - Students will include current and previous work-related experiences, including the internship experience.
- **Education** - Students will include: School, Dates Attended, Field of Study (pathway) or Focus, and Activities and Societies. GPA (optional)
- **Career Knowledge, Skills, & Abilities** - Students will include educational examples/artifacts that show progression and personal growth relating to their career goals. Examples/artifacts may include: License & Certifications, Volunteer Experience (e.g. religious & community), Honors & Awards.
- **Recommendations, Skills & Endorsements** - Students will include a professional recommendation and/or endorsement which aligns with the student's internship experience.
- **Content**- Students will reflect on their internship through journaling/posting.
- **Student Survey of Employer/Internship**
- **Employer Survey/Exit Interview of Student Intern and Internship Program**

Strand 6
Future Career Planning & Transitioning

Standard 1
Students can demonstrate the ability to analyze relevant employment trends using a job search website or board.