UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Composites
FY2026 / 9 Credits (270 Clock-Hours)

Composites

Institutions: Davis, Ogden-Weber, Snow

Technical Certificate (Catalog Year: 2026, 9 Credits/270 Clock-Hours Required, CIP: 15.0617)

Foundational Courses (9 Credits/270 Clock-Hours)		**Credits**	**Clock-Hours**
TECM 1000	Composite Basics	2	60
TECM 1010	Basic Composite Fabrication	2	60
TECM 1100	Advanced Composite Materials	3	90
TECM 1110	CNC Composite Processes	2	60
Supplemental Courses			
Davis (16 Credits/480 Clock-Hours)			
TECM 1020	Blueprint Reading	1	30
TECM 1120	Composite Repair and Part Finish Introduction	1	30
TECM 1140	Advanced Composite Repair and Part Finish	2	60
TECM 1200	Autoclave Processing	1	30
TECM 1300	Lean Manufacturing	1	30
TECM 1400	Introduction to Composite Engineering	2	60
TECM 1410	Carbon fiber Part Skinning	1	30
TECM 1440	Pattern and Mold Construction	2	60
TECM 1800	Composite Capstone I	1	30
TECM 1810	Composite Capstone II	2	60
TEBP 1100	Digital Literacy	2	60
TEDR 1225	Production Drafting Basics	2	60
MATH 1000	Math I	1	30
WKSK 1400	Workplace Success	2	60
WKSK 1500	Job Seeking Skills	1	30
Ogden-Weber (11 Credits/330 Clock-Hours)			
TECM 1020	Blueprint Reading	1	30
TECM 1130	Composite Repair	2	60
TECM 1200	Autoclave Processing	1	30
TECM 1500	NDI Methods for Composites	2	60
TECM 1600	Composite Tool Making and Vacuum Infusion	2	60
TECM 1800	Composite Capstone I	1	30
TECM 1810	Composite Capstone II	2	60
Snow (11 Credits/330 Clock-Hours)			
TECM 1020	Blueprint Reading	1	30
TECM 1040	Workplace Success	1	30
TECM 1200	Autoclave Processing	1	30
TECM 1210	Filament Winding	2	60
TECM 1220	Quality Assurance	2	60
TECM 1230	Metrology	1	30
TECM 1800	Composite Capstone I	1	30
TECM 1810	Composite Capstone II	2	60

Utah System of Higher Education
Composites
FY2026 / 9 Credits (270 Clock-Hours)

PROGRAM DESCRIPTION

The Composites program introduces students to the ever-expanding utilization of carbon fiber, fiberglass and kevlar. In this program, students will perform and demonstrate industry standards concerning teamwork effectiveness, safety, terminology, composite material lay-ups, quality inspection, and repair in accordance with industry best practices. Upon successful completion of this program, students will be prepared to enter the Composites field as an entry-level Composites technician.

Objectives:

- Discuss composite materials, including their composition, structure, and properties.
- Use the manufacturing processes involved in producing composite materials, including lay-up techniques, resin infusion methods, and advanced manufacturing techniques.
- Explain the mechanical behavior of composites, including strength, stiffness, and failure mechanisms.
- Identify industries that use composite materials, including aerospace, Department of Defense (D.O.D)., sports and recreation, automotive, marine, and construction.
- Use enhanced problem-solving and critical thinking skills to solve real-world challenges related to composite materials.
- Cultivate composite shop skills through hands-on lay-ups and demonstrations related to composite material.
- Demonstrate effective communication skills for presenting and discussing composite material concepts, applications, and production processes.

FOUNDATIONAL COURSE DESCRIPTIONS

Composite Basics **2 Credits/60 Clock-Hours**

Composite Basics introduces students to the background and history of composite materials. This course covers introductory topics in general composite manufacturing including composite equipment, materials, methods, safety, tools, vocabulary, and processes for proper and quality-assured composite production.

Objectives:

- Define the basic elements of a composite.
- Practice composite lab safety.
- Distinguish various fibers and resin systems.
- Identify a Safety Data Sheet (SDS) and explain its importance.
- Recognize and describe safety requirements and health hazards related to composite materials and manufacturing.
- Describe and use lay-up tools used in the composite manufacturing process.

Basic Composite Fabrication **2 Credits/60 Clock-Hours**

This course will introduce terminology associated with composite fabrication. Students will learn about reinforcement fabrics and resins commonly used in the Composites industry. Students will utilize appropriate processes, properly mix matrix materials, and perform vacuum bag and non-vacuum processes.

Objectives:

- Compare the different techniques used in vacuum bag lay-up and non-vacuum bag lay-ups.
- Demonstrate proper bonding techniques.

- Distinguish and perform the different vacuum bagging techniques and perform successful leak check.
- List and describe the components of a vacuum bagging system.
- Demonstrate correct vacuum bag processes.

Advanced Composite Materials **3 Credits/90 Clock-Hours**

This course introduces prepreg materials, terminology, storage, handling practices, clean room etiquette, lay-up methods, and manufacturing techniques for creating high-quality prepreg materials. Students develop skills in identifying foreign object debris (FOD) in finished parts and exploring applications for core materials.

Objectives:

- Apply proper prepreg material techniques.
- Identify different types of core materials.
- Describe and perform characteristics of advanced composite materials.
- Describe and perform proper orientation and a balanced lay-up.

CNC Composite Processes **2 Credits/60 Clock-Hours**

The CNC Composites course introduces terminology and vocabulary associated with machining composites. Students will demonstrate competency by machining previously made parts with specialized tools and CNC machines. Students will complete projects while practicing filament winders, waterjets, and router tables.

Objectives:

- Identify and explain the use of different types of composite tooling.
- Use different techniques to properly run composite CNC machines.
- Practice CNC safety.

SUPPLEMENTAL COURSE DESCRIPTIONS

Davis

Blueprint Reading **1 Credit/30 Clock-Hours**

This course will cover reading and interpreting engineering drawings and composite blueprints. This course will explore blueprint symbols, views, part orientation related to composite manufacturing and fabrication, and basic Geometric Dimensioning and Tolerancing as a composite technician.

Objectives:

- Explain part tolerance.
- Interpret and describe the technical information provided on industrial prints through drawings, dimensions, and notes.
- Visualize three-dimensional parts from the standard orthographic projections found on prints, and navigate the total manufacturing print, including lines, scale, language, symbols, title blocks, and other components.
- Visualize parts from drawings consisting of multiple views, including basic, auxiliary, partial, and various types of section views.
- Interpret symbols and notes used to communicate special manufacturing requirements that are not directly illustrated and dimensioned.

Composite Repair and Part Finish Introduction **1 Credit/30 Clock-Hours**

In this course, students will learn basic composite repair and paint methods. Students will cover repair assessment, types of damage and repair, and replacing damaged composite materials. Students will learn the steps necessary to produce a finished composite part by doing surface preparation, applying body filler, applying primer, and painting their composite part.

Objectives:

- Perform visual inspections as it relates to damage.
- Describe the types and causes of damage.
- Practice removal of damaged material.
- Demonstrate the skills to return a repaired part back to service life.
- Use proper primer and paint applications.

Advanced Composite Repair and Part Finish **2 Credits/60 Clock-Hours**

In Advanced Composite Repair and Part Finish, Students in this course will cover repair procedures specific to advanced composites. Students will demonstrate how to repair composite parts similar to those found in the aerospace industry. Students will then demonstrate proper structural repairs on parts previously built in other courses. Students will demonstrate competency in composites part finish by applying acquired skills to paint and finish their repaired parts.

Objectives:

- Perform visual inspections as it relates to damage on aerospace grade parts.
- Describe the types and causes of damage to advanced composite parts.
- Practice removal of damaged material on advanced composite parts.
- Demonstrate proper repair procedures for core plug repairs and through part repairs.
- Demonstrate the skills to return an advanced repaired part back to service life.
- Practice surface preparation, including sanding, priming, and painting.
- Use proper primer and paint applications.
- Paint multiple composite parts.

Autoclave Processing **1 Credit/30 Clock-Hours**

This course will cover the vocabulary and safety practices needed for the essential operation of the autoclave and associated software. Students will keep records and reports for jobs using the autoclave. Students will gain the experience necessary for autoclave operation.

Objectives:

- Run a program on the autoclave.
- Define the functions of an autoclave.
- Describe and identify characteristics of curing advanced composite materials.
- Describe and perform the functions of a curing system.
- Properly use and maintain thermocouples.

Lean Manufacturing **1 Credit/30 Clock-Hours**

Lean Manufacturing is used in many businesses and industries to minimize waste, reduce accidents, and operate in a more efficient manner. The main objective of Lean Manufacturing is the concept of continuous and incremental improvements to a product or process while eliminating wasteful or

redundant activities. When waste can be identified and eliminated, a product can be built with more efficiency and higher quality in less time.

Objectives:

- Discuss methods used in Lean Manufacturing to solve problems. (Fishbone Diagram, 5 Whys).
- Identify the 8 types of waste.
- Demonstrate 5S.
- Explain what value-added work means.
- Discuss “traceability”, quality stamps, and an employee’s role in accurately maintaining record of process and part compliance.

Introduction to Composite Engineering **2 Credits/60 Clock-Hours**

Students in this course will fabricate parts from composite materials. Students will do flexural tests of different composite layups. Using collected data, students will design their own layup and test to see the strengths. Students will develop a working set of drawings for a bridge of their own design. Students will then fabricate that design with high strength to weight being the main objective.

Objectives:

- Identify and compare the various physical properties of different composite materials.
- Calculate strength to weight ratios.
- Practice structure design, drawing, and construction with composite materials.
- Demonstrate procedures used in testing composite structures.

Carbon Fiber Part Skinning **1 Credit/30 Clock-Hours**

Carbon Skinning- or wrapping - is used only for cosmetic reasons. The beauty of the various weaves of carbon can make an otherwise unnoticed part become a focal point. In this course, the student will learn methods used to skin a part of their choice. Methods discussed will include part preparation, template making, drapability of fabrics, back wetting, building up resin as a finish topcoat, finish sanding methods, and final polishing.

Objectives:

- Identify the materials needed to carbon fiber skin a part.
- Describe additional techniques to manipulate woven carbon fiber material to conform to a 3-dimensional part.
- Explain the wet layup process in detail.
- Describe uses for epoxy resin.
- Demonstrate time management.
- Execute the processes of sanding and polishing resin to a high luster finish.

Pattern and Mold Construction **2 Credits/60 Clock-Hours**

Pattern and mold making are essential skills for the Composites Technician who wants to create their own custom parts. Whether as an entrepreneur or employee, the ability to develop custom molds allows for the construction of almost limitless composite configurations. Students in this course will follow the mold-making process from start to finish by practicing pattern manufacturing, gel coat application, fiberglass reinforcing, mold troubleshooting and repair, and finishing and pulling a sample part from the mold.

Objectives:

- Explain the terms describing pattern design.

- Demonstrate simple plug fabrication using your pattern design.
- Demonstrate proper gel coat application.
- Demonstrate proper mold reinforcing.
- Demonstrate simple single and multi-piece mold making techniques.
- Discuss Gel Coat repair and mold finishing.

Composite Capstone I **1 Credit/30 Clock-Hours**

This course will build upon prior instruction and experience to meet or exceed industry standards. In collaboration with an instructor, students plan a composite material build, including materials arrangement, blueprint design, and writing a work order to specification and time.

Objectives:

- Develop a personal project in collaboration with instructors.
- Design a blueprint and a work-order for your personal project.
- Develop a cost analysis for your personal project.

Composite Capstone II **2 Credits/60 Clock-Hours**

In this course, students will complete their planned project from the previous capstone project. Students will demonstrate their mastery of composite material building and pave the way for successful careers in the composites industry.

Objectives:

- Produce a composite part using your design.
- Solve issues that arise during the lay-up process.
- Document lessons learned during your personal project.
- Meet original design parameters.

Digital Literacy **2 Credits/60 Clock-Hours**

Digital literacy explores the latest 21st-century technology. Students will practice appropriately and effectively using tools for productivity, collaboration, and communications; finding reliable information; creating content; communicating safely; and identifying credibility and bias in modern digital environments.

Objectives:

- Demonstrate digital citizenship and appropriate interpersonal digital information.
- Describe concepts relating to common digital environments, software, hardware, and operating systems.
- Describe digital security threats and explain how to protect personal devices and digital content.
- Use digital tools and technologies to collaborate.
- Create, edit, and save digital content and manage digital information.
- Navigate the internet and evaluate the integrity of digital information.

Production Drafting Basics **2 Credit/60 Clock-Hours**

The Production Drafting Basics course delves into the practical realm of blueprint reading for manufacturing. Students will learn about industry standards to successfully interpret technical drawings.

Objectives:

- Identify and explain the components of a technical drawing.

- Interpret and analyze information presented on technical drawings.
- Interpret common symbols, abbreviations, and annotations used in technical drawings.
- Apply blueprint reading skills to solve practical problems.
- Use a CAD system as a drafting tool.

Math I **1 Credit/30 Clock-Hours**

Students apply the correct mathematical operation to solve practical problems. Students use whole numbers, fractions, decimals and percents to solve practical problems. Students are introduced to the basics of measurement, geometry, averages, probability, patterns, and simple equations.

Objectives:

- Perform basic geometry.
- Explain how to take proper measurements.
- Find averages using math.

Workplace Success **2 Credits/60 Clock-Hours**

Workplace Success is designed to help students develop essential work habits and attitudes as well as human-relation skills needed to maintain gainful and satisfying employment. Topics include common challenges faced in the workplace, such as presenting yourself professionally, developing a professional work ethic, developing interpersonal skills, navigating office politics successfully, and planning and managing your career.

Objectives:

- Demonstrate a positive attitude and set and accomplish personal and career goals.
- Manage time, stress, organization, and finances.
- Explain conflict resolution, negotiation, and communication in the workplace.
- Display a strong work ethic and illustrate accountability.
- Perform work within a group effectively and discuss the value of negotiation and compromise.
- Describe the basics of public speaking and presenting a professional demeanor.
- Implement career goals and take active control of professional life.

Job Seeking Skills **1 Credit/30 Clock-Hours**

Job Seeking Skills explores how to prepare and successfully apply to potential career opportunities. During this course, you will be presented with essential job-seeking skills needed to find gainful employment.

Objectives:

- Create a professional resume, cover letter and reference sheet.
- Utilize online tools successfully to create an e-portfolio.
- Expand and develop networking skills.
- Utilize online resources effectively to find job openings.
- Demonstrate the ability to fill out job applications in a professional manner.
- Perform successfully in a job interview.
- Demonstrate appropriate follow-up procedures.

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Blueprint Reading **1 Credit/30 Clock-Hours**

This course will cover reading and interpreting engineering drawings and composite blueprints. This course will explore blueprint symbols, views, part orientation related to composite manufacturing and fabrication, and basic Geometric Dimensioning and Tolerancing as a composite technician.

Objectives:

- Explain part tolerance.
- Interpret and describe the technical information provided on industrial prints through drawings, dimensions, and notes.
- Visualize three-dimensional parts from the standard orthographic projections found on prints, and navigate the total manufacturing print, including lines, scale, language, symbols, title blocks, and other components.
- Visualize parts from drawings consisting of multiple views, including basic, auxiliary, partial, and various types of section views.
- Interpret symbols and notes used to communicate special manufacturing requirements that are not directly illustrated and dimensioned.

Composite Repair **2 Credits/60 Clock-Hours**

This course will explore repair methods for basic composite parts, repair assessment, types of damage and repair, replacing damaged composite material, and part reconstruction.

Objectives:

- Identify different types of damages and/or defects.
- Detect different types of damages and/or defects.
- Define terminology associated with composite repair.
- Identify materials used in composite repair.
- Demonstrate proper damage removal, design and repair methods.
- Use application of materials as they pertain to repair processes.
- Demonstrate proper repair processes.

Autoclave Processing **1 Credit/30 Clock-Hours**

This course will cover the vocabulary and safety practices needed for the essential operation of the autoclave and associated software. Students will keep records and reports for jobs using the autoclave. Students will gain the experience necessary for autoclave operation.

Objectives:

- Run a program on the autoclave.
- Define the functions of an autoclave.
- Describe and identify characteristics of curing advanced composite materials.
- Describe and perform the functions of a curing system.
- Properly use and maintain thermocouples.

NDI Methods for Composites **2 Credits/60 Clock-Hours**

In this course students will learn an introduction into five NDI Methods that include Penetrant Inspection or Penetrant Testing Magnetic Particle Inspection, or magnetic Particle Testing, Electromagnet Inspection or Electromagnetic Testing, Radiographic inspection or Radiographic Testing and Ultrasonic Inspection or

Ultrasonic Testing. The students will get an introduction into how to apply each of these methods to locate surface-breaking defects and sub-surface defects in composite materials as well as other types of materials. These NDI methods are used to detect inherent flaws during manufacturing, in-service flaws on products and final products. Students will use state of the art NDI equipment for hand on experience and demonstration of achieved skill.

Objectives:

- Apply five methods of Non-Destructive Inspection. (NDI).
- Explain the different possible types of defects in a composite structure.
- Demonstrate how to find a flaw in a composite part.

Composite Tool Making and Vacuum Infusion **2 Credits/60 Clock-Hours**

This course will explore the advantages and disadvantages of metal and composite tooling and the vacuum infusion process. This course will also cover tooling requirements common to the composites industry. Additionally, this course will explore safe and proper execution of a vacuum infusion process on a given project within the course.

Objectives:

- Identify tooling commonly used in the industry.
- Define terminology associated with tooling.
- Distinguish between the advantages and disadvantages of metal tooling.
- Distinguish between the advantages and disadvantages of composite tooling.
- Explain several molding methods used in the industry.
- Demonstrate proper techniques relating to composite tool making.
- Define terminology associated with the vacuum infusion process.
- Describe the advantages and disadvantages of the vacuum infusion process.
- Demonstrate proper vacuum infusion processes.

Composite Capstone I **1 Credit/30 Clock-Hours**

This course will build upon prior instruction and experience to meet or exceed industry standards. In collaboration with an instructor, students plan a composite material build, including materials arrangement, blueprint design, and writing a work order to specification and time.

Objectives:

- Develop a personal project in collaboration with instructors.
- Design a blueprint and a work-order for your personal project.
- Develop a cost analysis for your personal project.

Composite Capstone II **2 Credits/60 Clock-Hours**

In this course, students will complete their planned project from the previous capstone project. Students will demonstrate their mastery of composite material building and pave the way for successful careers in the composites industry.

Objectives:

- Produce a composite part using your design.
- Solve issues that arise during the lay-up process.
- Document lessons learned during your personal project.
- Meet original design parameters.

Snow

Blueprint Reading — 1 Credit/30 Clock-Hours

This course will cover reading and interpreting engineering drawings and composite blueprints. This course will explore blueprint symbols, views, part orientation related to composite manufacturing and fabrication, and basic Geometric Dimensioning and Tolerancing as a composite technician.

Objectives:

- Explain part tolerance.
- Interpret and describe the technical information provided on industrial prints through drawings, dimensions, and notes.
- Visualize three-dimensional parts from the standard orthographic projections found on prints, and navigate the total manufacturing print, including lines, scale, language, symbols, title blocks, and other components.
- Visualize parts from drawings consisting of multiple views, including basic, auxiliary, partial, and various types of section views.
- Interpret symbols and notes used to communicate special manufacturing requirements that are not directly illustrated and dimensioned.

Workplace Success — 1 Credit/30 Clock-Hours

Workplace Success is an introductory course that provides students with the essential tools to be successful in today's workplace environment. Students will also develop soft skills that apply to real work environments, including communication, writing, planning and organizing, and time management.

Objectives:

- Demonstrate effective workplace communication.
- Analyze issues, make sound decisions, and overcome problems.
- Demonstrate time management skills in the workplace.
- Work effectively and respectfully with others.

Autoclave Processing — 1 Credit/30 Clock-Hours

This course will cover the vocabulary and safety practices needed for the essential operation of the autoclave and associated software. Students will keep records and reports for jobs using the autoclave. Students will gain the experience necessary for autoclave operation.

Objectives:

- Run a program on the autoclave.
- Define the functions of an autoclave.
- Describe and identify characteristics of curing advanced composite materials.
- Describe and perform the functions of a curing system.
- Properly use and maintain thermocouples.

Filament Winding — 2 Credits/60 Clock-Hours

In the Filament Winding course, students will be introduced to the foundational topics of advanced filament winding in composites. Students will be introduced to safety, creating a wind, generating motion, chain/transition wind, viewing, and editing motion.

Objectives:

- Recognize and describe safety requirements and health hazards related to composite filament winding.
- Generate fiber path, helical, circumferential, bottle, and nonlinear fiber paths using carbon fiber, fiberglass, and resin systems.
- Chain/transition winds using segment flags.
- Describe and define materials used in advanced filament winding.

Quality Assurance **2 Credits/60 Clock-Hours**

The Quality Assurance course will introduce students to the quality inspection of manufacturing. After completion of this course, students will understand how to inspect a product and compare it to engineered blueprints to determine quality.

Objectives:

- Demonstrate the basic underlying principles of quality inspection.
- Use hand tools, computer-assisted measurements, and other modern-day inspection methods.
- Demonstrate quality inspection procedures to real-world applications.
- Explain the basics of the CMM.

Metrology **1 Credit/30 Clock-Hours**

Metrology covers introductory topics in basic metrology. Students will be introduced to the fundamental skills and the uses of calipers, micrometers, height gages, scales, and tape measures.

Objectives:

- Demonstrate the proper use of metrology equipment.
- Describe and use calipers and micrometers.
- Describe and use scales and height gages.
- Describe and use a tape measure properly.

Composite Capstone I **1 Credit/30 Clock-Hours**

This course will build upon prior instruction and experience to meet or exceed industry standards. In collaboration with an instructor, students plan a composite material build, including materials arrangement, blueprint design, and writing a work order to specification and time.

Objectives:

- Develop a personal project in collaboration with instructors.
- Design a blueprint and a work-order for your personal project.
- Develop a cost analysis for your personal project.

Composite Capstone II **2 Credits/60 Clock-Hours**

In this course, students will complete their planned project from the previous capstone project. Students will demonstrate their mastery of composite material building and pave the way for successful careers in the composites industry.

Objectives:

- Produce a composite part using your design.
- Solve issues that arise during the lay-up process.
- Document lessons learned during your personal project.

- Meet original design parameters.

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Data Technology
FY2026 / 10 Credits (300 Clock-Hours)

Data Technology

Institutions: Bridgerland, Mountainland

Certificate of Program Completion (Catalog Year: 2026, 10 Credits/300 Clock-Hours Required, CIP: 11.0301)

Foundational Courses (10 Credits/300 Clock-Hours)		**Credits**	**Clock-Hours**
TEDA 1021	SQL Fundamentals	3	90
TEDA 1031	Python Fundamentals	3	90
TEDA 1051	Data Visualization Fundamentals	2	60
TEDA 2051	Data Analytics Capstone Project	2	60
Supplemental Courses			
Bridgerland (5 Credits/150 Clock-Hours Required)			
TEDA 1010	Introduction to Spreadsheet Analytics	1	30
TEDA 1036	Introduction to Machine Learning	2	60
TEDA 1040	Advanced Python for Data Analytics	2	60
TEDA 1065	Manufacturing Analytics	2	60
TEDA 1071	R Fundamentals	2	60
TEDA 1080	Advanced Spreadsheets Analytics	2	60
TEDA 2055	Capstone Project II	2	60
TEDA 2901	Special Applications	4	120
TEDA 2999	Externship	3	135
Mountainland (10 Credits/300 Clock-Hours Required)			
TEDA 1000	Introduction to Data Analytics	1	30
TEDA 1011	Spreadsheet Fundamentals	2	60
TEDA 1036	Introduction to Machine Learning	2	60
TEDA 1052	Data Visualization Fundamentals II	1	30
TEDA 1071	R Fundamentals	2	60
TEDA 1090	Introduction to Database Design	2	60
TEDA 2052	Data Analytics Capstone Project Elective	2	60
TEAM 1590	Introduction to Statistical Process Control	1	30
TEAM 1840	Introduction to Semiconductor Manufacturing	1	30

PROGRAM DESCRIPTION

The Data Technology program prepares students for roles in technology, finance, healthcare, ecommerce, manufacturing and more. The competency-based curriculum provides training through real-world simulations, personalized mentoring, and practical coursework. Students develop skills in initiating data projects, sourcing information, transforming datasets, analyzing data, and presenting results which form an essential toolkit for the field of data analytics.

Objectives:

- Explain data types, data structures, and data sources.
- Diagram the complete data analytics project cycle.
- Identify and articulate data-driven problems and questions.
- Utilize various tools including spreadsheets, SQL, Python, and R for data gathering, data cleaning, and analysis.
- Calculate descriptive statistics, perform exploratory data analysis, and inferential statistics for insights.
- Communicate insights derived from data analysis efficiently and persuasively through visualizations, presentations, and reports.
- Construct SQL queries, querying, filtering, and manipulating data within relational databases.
- Apply machine learning principles for preprocessing, model construction, and evaluation.
- Incorporate industry-standard tools and practices for impactful visualizations and extracting meaningful insights.
- Initiate comprehensive projects applying acquired skills to solve real-world problems, while effectively managing time and objectives.

FOUNDATIONAL COURSE DESCRIPTIONS

SQL Fundamentals **3 Credits/90 Clock-Hours**

This course provides a comprehensive understanding of SQL's foundational principles tailored for data analysis within relational databases. Students develop expertise in constructing SQL queries for data retrieval, focusing on pulling, filtering, aggregating, and joining datasets. Through hands-on projects, they'll apply these skills, learning to extract, filter, and manipulate data effectively, gaining a solid foundation in SQL's role within the realm of data analysis.

Objectives:

- Discuss relational database design layout within a DBMS environment.
- Identify various parts and purposes of SQL queries and keywords.
- Interpret the anticipated output of query requests based on the SQL statement.
- Construct simple SQL queries to pull and filter data in a relational database.
- Execute complex SQL queries to aggregate and join data from multiple tables.

Python Fundamentals **3 Credits/90 Clock-Hours**

This course teaches fundamental Python skills tailored for data analysis, encompassing Python's core syntax, data structures, and procedural programming techniques. Students perform data cleaning, data manipulation, and exploratory analysis using industry-standard libraries, fostering expertise in managing, analyzing, and visualizing data. Through practical projects, learners refine their abilities, gaining confidence to proficiently handle, analyze, and present data using Python. This course cultivates real-

world application skills and sharpens proficiency in data project documentation, serving as a strong foundation for future data science endeavors.

Objectives:

- Describe core Python syntax, data structures, and procedural programming concepts within a Python Integrated Development Environment (IDE).
- Identify specific features and functionalities of the Python IDE, becoming proficient in executing tasks and optimizing workflows within the development environment.
- Clean, manipulate, and analyze data using industry-standard libraries within a Python IDE.
- Illustrate statistical analysis techniques by incorporating loops, joins, functions and decision-making skills.
- Characterize relevant business conclusions as revealed by the data using plots, data frames and aggregation.
- Document and present the project's findings using standard documentation practices.

Data Visualization Fundamentals **2 Credits/60 Clock-Hours**

This course teaches students the core principles of data visualization essential for data analysis. With a focus on practical application using industry-standard tools, participants learn to translate complex datasets into compelling visual stories. Covering visualization design fundamentals, data cleansing, exploration of interactive dashboards, and consistent ethical considerations, learners cultivate aptitude essential for creating impactful visualizations. Through hands-on projects, individuals refine their skills, gaining the ability to extract insights effectively and drive informed decision-making across diverse industries.

Objectives:

- Summarize navigation and tools required to create dashboards in the visualization tool.
- Demonstrate fundamental data cleansing techniques when importing data into the visualization tool, encompassing handling missing values, outliers, and ensuring a standardized data structure.
- Produce a variety of visualizations incorporating bar charts, scatter plots and more within the visualization program.
- Layout visualizations using design best practices ensuring clarity and engagement in visual communication.

Data Analytics Capstone Project **2 Credits/60 Clock-Hours**

This course teaches students to harness their data analytics skills by undertaking a comprehensive capstone project. Using various tools and techniques learned throughout the course of this program, students demonstrate their ability to identify business questions, collect, clean, and analyze data. The culmination of this project involves presenting their meaningful insights and findings through a visualization tool, class presentation and written report.

Objectives:

- Conduct an analysis encompassing the entire data analytics project cycle, from formulating questions to presenting insights.
- Demonstrate problem-solving skills by acquiring, cleaning, and analyzing data to propose actionable solutions for business problems.
- Communicate findings effectively through reports and presentations, employing data visualization for clear and compelling explanations.
- Manage time efficiently by establishing clear objectives and outlining project milestones to ensure effective project management.

SUPPLEMENTAL COURSE DESCRIPTIONS
Bridgerland Technical College

Introduction to Spreadsheet Fundamentals — 1 Credit/30 Clock-Hours

Students will learn the basics of statistical functions and concepts within a spreadsheet framework. Students will learn how to look at data and the basics of describing data. Focus will be on thinking critically about data. Students will build understanding of correlation vs. causation and basic ethics when handling data. Students will practice calculating significant values such as outliers, interquartile ranges, and the differences between types of data.

Objectives:

- Describe the basic concepts of a function.
- Calculate mean, median, mode, standard deviation, interquartile range, linear regression, correlation, and outliers.
- Identify different data types and how they are handled.
- Recognize different types of bias and how it affects data handling.
- Demonstrate proper ethics when handling data.
- Analyze correlation and causation and when they are and are not related.

Introduction to Machine Learning — 2 Credits/60 Clock-Hours

This course teaches the fundamental principles and practical applications of machine learning for data analysis. Students study essential topics including data preprocessing, exploratory data analysis, and the core concepts of supervised and unsupervised learning. Participants perform regression, classification, and clustering techniques using real-world data. This lays the groundwork to start building machine learning pipelines and approaching data science tasks.

Objectives:

- Produce datasets for machine learning through preprocessing data techniques in Python such as handling missing data, outlier treatment and encoding categorical variables.
- Distinguish between supervised and unsupervised learning techniques, like regression, classification, and clustering, using Python.
- Construct machine learning models using Python libraries with real-world datasets.
- Evaluate machine learning models using various validation techniques in Python to gauge their performance and potential limitations.
- Execute end-to-end machine learning projects in Python, encompassing data preprocessing, model construction, evaluation, and drawing insights.

Advanced Python for Data Analytics — 2 Credits/60 Clock-Hours

The Advanced Python for Data Analytics course builds upon the principles learned in Python Programming. In this course, students learn to access remote databases using Python. Students then use the data they have pulled to create, manipulate, and filter data using multiple industry standard libraries essential for data analytics. Students also learn to create ad hoc visualizations with Python ok, code. Students who complete this course are able to use a variety of Python libraries in the data analytics industry to collect, clean, analyze, and present data.

Objectives:

- Create data visualizations using Python code.

- Use filters and aggregations to understand data.
- Use critical thinking to perceive data analytics problems and find their solutions.
- Explain data types and functions for analysis and the use of data.

Manufacturing Analytics **2 Credits/60 Clock-Hours**

The Manufacturing Analytics course provides students with experience working as a data practitioner in the field of manufacturing. Utilizing real-world situations, they gain experience with the types of tasks which are required of data practitioners working in manufacturing. Students go through the data cycle with multiple sets of data and different situations that can arise in manufacturing situations. Students optimize manufacturing data and practice predictive maintenance. They access a Programmable Logic Controller (PLC)-driven manufacturing system to a database and process that data as though in a live working environment utilizing data analysis programs and techniques. Students who complete this course are able to work with manufacturing data.

Objectives:

- Apply techniques learned throughout the program on datasets from the field of manufacturing.
- Analyze data from multiple real-world scenarios.
- Present findings using a visualization tool.
- Setup data transfer from a PLC-driven manufacturing system to a database using Kepware.
- Analyze data in a manufacturing optimization scenario.
- Analyze data in a manufacturing predictive maintenance scenario.

R Fundamentals **2 Credits/60 Clock-Hours**

This course equips students with essential R programming skills for effective data analysis. Beginning with foundational R syntax and data structures, learners progress to topics such as data cleaning, data manipulation, and exploratory data analysis through relevant statistical packages. Engaging in hands-on projects, students become capable in data handling, analysis, and visualization techniques using an IDE.

Objectives:

- Describe core R syntax, data structures and programming concepts.
- Identify specific features and functionalities of the R IDE.
- Clean, manipulate, and analyze data using industry-standard libraries within an R learning environment.
- Practice incorporating statistical analysis techniques including calculating descriptive statistics, performing hypothesis tests and linear regression.
- Articulate and present the project's analysis and findings effectively using data visualization skills and clear documentation.

Advanced Spreadsheets Analytics **2 Credits/60 Clock-Hours**

This course will teach students how to use spreadsheets for data analysis. Students will learn how to pull data from the web into a spreadsheet and what to do with that data afterward. This will include how to find and filter information and how to use basic data-related tools used in industry for data analytics. Students will learn how to create visualizations and dashboards in spreadsheets. We will also go over custom functions and macros to automate repeated tasks.

Objectives:

- Source data from the web into a spreadsheet.
- Prepare a raw dataset for analysis using spreadsheets.
- Employ tools for data searching, merging, splitting, and indexing.

- Use spreadsheet functions to answer questions about a dataset.
- Use PivotTables to identify important data points.
- Create dashboards and visualizations to describe data.
- Use spreadsheets to create statistical calculations.
- Create custom tools and workflows with scripting and macros.

Data Analytics Capstone Project II **2 Credits/60 Clock-Hours**

In the Capstone Project II course, students expand on their project completed in Capstone Project I by further refining stage(s) in the data cycle such as: data collection, data cleaning, data transformation, data visualization, and/or data storytelling. They analyze strengths and weaknesses in the project and assess changes that would improve the quality and clarity of the work. They will decide how best to expand and/or refine their data project and then present to their peers that analysis. They show their analysis of the project and describe how they expanded upon their data project from Capstone I. Students who complete this course are able to complete an advanced data-based project from the proposal stage all the way to presenting their findings.

Objectives:

- Apply techniques learned throughout the program to collect, clean, transform, and analyze real world data.
- Present findings using a visualization tool.
- Demonstrate industry best-practices and ethics throughout.
- Report on the differences between both capstone projects and the reasons those changes were made.
- Explain key decisions made and significant findings.

Special Applications **4 Credits/120 Clock-Hours**

The Special Applications course gives students the opportunity to expand their knowledge in a specific industry or skill. The student participates in defining how this information applies to data analytics and demonstrates how the skills learned within the Data Analytics program relate to this knowledge or skill. Students will also provide context and industry relevance to provide value to the experience. Students will compile a report on the data analysis opportunities observed throughout the course and how their data analytics knowledge affects their understanding of the situation. Students who complete this course are able to expand their knowledge in a specific industry or skill related to data analytics.

Objectives:

- Illustrate context of industry-relevance and data analysis opportunities.
- Define data analysis opportunities within a specific industry or skill.
- Report on observed data analysis opportunities.
- Identify the data analysis tool(s) best used within the scope of the course.

Externship **3 Credits/135 Clock-Hours**

The Data Analytics Externship course gives students real-world experience in a work-based environment. Entry-level data practitioner skills such as data collection, data cleaning, data transformation, data visualization, and/or data storytelling are utilized in a non-simulated work environment. Students coordinate with faculty and business partners to define or analyze key goals and scope of the externship as well as stakeholder needs. At the end of their externship, students present an example of what they have completed within the time frame of the externship. Work-based activities will be provided by cooperating businesses. Students who complete this course have real world experience applying what they have learned throughout their time in the program.

Objectives:

- Apply techniques learned throughout the program to collect, clean, transform, and analyze real world data.
- Present findings using a visualization tool.
- Utilize the data cycle in a live work-based environment.
- Use company defined programs and data to complete job duties within the scope of data analytics-related work.
- Demonstrate ability to follow reasonable employer directions and/or mandates.

Mountainland Technical College

Introduction to Data Analytics — 1 Credit/30 Clock-Hours

This course covers the basics of data analytics, utilizing spreadsheets, statistics, and exploratory data analysis. Students journey through the data analytics project cycle by defining the problem, preparing the information, analyzing the data, visualizing insights and presenting results. As they engage in this course, students organically develop problem-solving acumen and hone critical thinking skills essential for data analysis.

Objectives:

- Describe the data analytics project cycle.
- Explain the role of spreadsheets for practical data analysis.
- Practice gathering, cleaning, and examining data.
- Calculate descriptive statistics for numerical and categorical variables.
- Illustrate meaningful results and communicate them effectively through informative visualizations and presentations to peers.

Spreadsheet Fundamentals — 2 Credits/60 Clock-Hours

This course teaches essential spreadsheet skills for data analysis while integrating basic statistical principles. Students become proficient in spreadsheet functionalities such as data entry, formatting, and formula use, progressing to techniques like identifying outliers, employing descriptive statistics, examining relationships between variables, and harnessing the power of pivot tables for comprehensive data summarization and analysis using spreadsheets. Through practical exercises and real-world case studies, students learn to navigate spreadsheet software effectively, analyze data sets, and derive meaningful insights, culminating in the ability to apply statistical concepts within spreadsheet environments for informed decision-making and analysis.

Objectives:

- Recognize basic functions and tools within a spreadsheet environment.
- Develop analytical reasoning by identifying and addressing data challenges methodically, applying statistical techniques to derive meaningful conclusions.
- Describe how to view, enter and edit data, including moving, copying and filling data.
- Demonstrate fundamental statistical concepts within spreadsheets, calculating descriptive statistics, and quantifying relationships between variables.

Introduction to Machine Learning — 2 Credits/60 Clock-Hours

This course teaches the fundamental principles and practical applications of machine learning for data analysis. Students study essential topics including data preprocessing, exploratory data analysis, and the

core concepts of supervised and unsupervised learning. Participants perform regression, classification, and clustering techniques using real-world data. This lays the groundwork to start building machine learning pipelines and approaching data science tasks.

Objectives:

- Produce datasets for machine learning through preprocessing data techniques in Python such as handling missing data, outlier treatment and encoding categorical variables.
- Distinguish between supervised and unsupervised learning techniques, like regression, classification, and clustering, using Python.
- Construct machine learning models using Python libraries with real-world datasets.
- Evaluate machine learning models using various validation techniques in Python to gauge their performance and potential limitations.
- Execute end-to-end machine learning projects in Python, encompassing data preprocessing, model construction, evaluation, and drawing insights.

Data Visualization Fundamentals II **1 Credit/30 Clock-Hours**

This course teaches students the core principles of data visualization essential for data analysis. With a focus on practical application using industry-standard tools, participants learn to translate complex datasets into compelling visual stories. Covering visualization design fundamentals, data cleansing, exploration of interactive dashboards, and consistent ethical considerations, learners cultivate aptitude essential for creating impactful visualizations. Through hands-on projects, individuals refine their skills, gaining the ability to extract insights effectively and drive informed decision-making across diverse industries.

Objectives:

- Implement interactive features and design dashboards or reports that facilitate user engagement, enabling intuitive exploration and understanding of data.
- Extract meaningful insights and build visualizations to solve real-world data challenges within the tool to address specific business or analytical needs.
- Ensure ethical data handling and transparent communication of insights, maintaining accuracy and adhering to ethical standards while conveying findings to diverse stakeholders.

R Fundamentals **2 Credits/60 Clock-Hours**

This course equips students with essential R programming skills for effective data analysis. Beginning with foundational R syntax and data structures, learners progress to topics such as data cleaning, data manipulation, and exploratory data analysis through relevant statistical packages. Engaging in hands-on projects, students become capable in data handling, analysis, and visualization techniques using an IDE.

Objectives:

- Describe core R syntax, data structures and programming concepts.
- Identify specific features and functionalities of the R IDE.
- Clean, manipulate, and analyze data using industry-standard libraries within an R learning environment.
- Practice incorporating statistical analysis techniques including calculating descriptive statistics, performing hypothesis tests and linear regression.
- Articulate and present the project's analysis and findings effectively using data visualization skills and clear documentation.

Introduction to Database Design — 2 Credits/60 Clock-Hours

This course familiarizes students with practical techniques in designing, constructing, and managing database systems. Through exploration of database design, development, and management, students explore strategies that optimize stored data, ensuring its integrity and maximizing its value. By learning these skills, students gain proficiency in creating, implementing, and maintaining databases crucial for efficient information systems.

Objectives:

- Apply essential database design principles, including normalization, within a DBMS environment on a sample database.
- Implement, manage, and modify databases using SQL in a DBMS, ensuring data integrity and structure.
- Modify database efficiency within a DBMS by refining queries and structures.
- Troubleshoot and address database-related issues within a DBMS setting.

Data Analytics Capstone Project Elective — 2 Credits/60 Clock-Hours

This course teaches students to harness their data analytics skills by undertaking a comprehensive capstone project. Using various tools and techniques learned throughout the course of this program, students demonstrate their ability to identify business questions, collect, clean, and analyze data. The culmination of this project involves presenting their meaningful insights and findings through a visualization tool, class presentation and written report.

Objectives:

- Conduct an analysis encompassing the entire data analytics project cycle, from formulating questions to presenting insights.
- Demonstrate problem-solving skills by acquiring, cleaning, and analyzing data to propose actionable solutions for business problems.
- Communicate findings effectively through reports and presentations, employing data visualization for clear and compelling explanations.
- Manage time efficiently by establishing clear objectives and outlining project milestones to ensure effective project management.

Introduction to Statistical Process Control — 1 Credit/30 Clock-Hours

Statistical Process Control is an introduction to statistical process control (SPC) for students interested in semiconductor careers, as well as those who wish to gain an overview of basic SPC practices. Semiconductor focused students will gain basic knowledge to maintain control of critical manufacturing processes. Course material includes overview and benefit, common cause vs. special cause variation, distributions and histograms, basic statistics, process capability, standard deviation, sigma, and control chart basics.

Objectives:

- Define and use basic statistics such as mean, median, standard deviation, normal (bell curve) vs. skewed distributions.
- Identify differences between control and spec limits.
- Process capability.

Introduction to Semiconductor Manufacturing — 2 Credits/60 Clock-Hours

Introduction to Semiconductor Manufacturing is a course for students interested in semiconductor careers, as well as those who wish to gain an overview of basic semiconductor processing.

Utah System of Higher Education
Data Technology
FY2026 / 10 Credits (300 Clock-Hours)

Semiconductor focused students will gain basic knowledge of overall process flow and logic gate device functionality. Course material includes definition of a semiconductor, n-type and p-type doping, geometries and units of measure, basic semiconductor manufacturing, process module overviews, clean room overview and protocols, and automated material handling system (AMHS) overview.

Objectives:

- Identify semiconductor basics.
- Define N-type, P-type doping, PN junction.
- Identify MOSFET/CMOS structure and logic gate function.

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

Drafting and Design

Institutions: Bridgerland, Davis, Dixie, Ogden-Weber, Salt Lake, USU-Eastern

Technical Certificate (Catalog Year: 2026, 16 Credits/480 Clock-Hours Required, CIP: 15.1302)

Foundational Courses (16 Credits/480 Clock-Hours) (BOTH Foundation Courses and One Specialization)		**Credits**	**Clock-Hours**
Foundational Courses – All Areas (7 Credits/210 Clock-Hours)			
TEDR 1000	Technical Drafting	4	120
TEDR 1010	Advanced Technical Drafting	3	90
Specializations			
Architectural Drafting Emphasis (Bridgerland, Davis, Dixie, Ogden-Weber, USU-E) (9 Credits/270 Clock-Hours)			
TEDR 1100	Residential Drafting	3	90
TEDR 1110	Introduction to Building Information Modeling	3	90
TEDR 2800	Capstone Project	3	90
Mechanical Drafting Emphasis (Bridgerland, Davis, Dixie, Ogden-Weber, Salt Lake, USU-E) (9 Credits/270 Clock-Hours)			
TEDR 1200	Parametric Solid Modeling	3	90
TEDR 2200	Advanced Solid Modeling	3	90
TEDR 2800	Capstone Project	3	90
Civil Drafting Emphasis (Ogden-Weber, Salt Lake) (9 Credits/270 Clock-Hours)			
TEDR 1130	Commercial Drafting	3	90
TEDR 1300	Civil Drafting	3	90
TEDR 2800	Capstone Project	3	90
Supplemental Courses			
Bridgerland (14 Credits/420 Clock-Hours)			
TEDR 1003	Career and Workplace Relations	1	30
TEDR 1015	Applied Technical Math	1	30
TEDR 1020	Computer Illustration	2	60
TEDR 1130	Commercial Drafting	3	90
TEDR 1170	Structural Steel Detailing	3	90
TEDR 1210	Mechanical Design	4	120
TEDR 1220	Production Drafting	4	120
TEDR 1240	Rapid Prototyping	1	30
TEDR 2000	Portfolio Development	1	30
TEDR 2050	Small Business	2	60
TEDR 2110	Intermediate Architectural Drafting	4	120
TEDR 2205	Solid Modeling Certification	3	90
Davis (14 Credits/420 Clock-Hours)			
TEDR 1030	Materials and Methods I	2	60
TEDR 1031	Materials and Methods II	2	60
TEDR 1135	Commercial Drafting I	2	60
TEDR 1136	Commercial Drafting II	3	90
TEDR 1160	Design Integration	3	90
TEDR 1165	Virtual Design for Construction	1	30
TEDR 1221	Production Drafting I	1	30
TEDR 1222	Production Drafting II	2	60
TEDR 1223	Production Drafting III	2	60
TEDR 1225	Production Drafting Basics	2	60
TEDR 1230	Reverse Engineering	3	90
TEDR 1245	Rapid Prototyping	2	60
Dixie (14 Credits/420 Clock-Hours)			
TEDR 1015	Applied Technical Math	1	30
TEDR 1115	Applied Building Modeling	3	90
TEDR 1150	Architectural Print Reading	1	30

November 21, 2024

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

TEDR 1180	Residential Construction Documents	3	90
TEDR 1181	Commercial Construction Documents	4	120
TEDR 1205	Parametric Applications	3	90
TEDR 1250	Mechanical Print Reading	1	30
TEDR 1260	Drafting GD&T, FEA, CAM	1	30
TEDR 2810	Architectural Special Projects	2	60
Ogden-Weber (14 Credits/420 Clock-Hours)			
TEDR 1035	Construction Materials and Methods	3	90
TEDR 1108	Architectural CAD Modeling Interior Design	4	120
TEDR 1120	Residential Architectural Design	4	120
TEDR 1125	Structural Design	4	120
TEDR 1145	Architectural Rendering	3	90
TEDR 1220	Production Drafting	4	120
TEDR 1255	Engineering Drawings	4	120
TEDR 1270	Metal Processes	3	90
TEDR 1275	Milling Machining	3	90
TEDR 1280	Surface Modeling	2	60
TEDR 1310	Civil Design	4	120
TEDR 1320	Civil Surveying	3	90
TEDR 1330	Civil Geographical Information Systems	4	120
TEDR 2100	Advanced BIM	4	120
TEDR 2105	BIM Coordination	3	90
TEDR 2180	Architectural Standards	4	120
TEDR 2181	Commercial Standards	4	120
TEDR 2210	Photoshop for Interior Designers	3	90
TEDR 2220	Mold Design	2	60
TEDR 2230	Machine Power Design	2	60
TEDR 2240	3D Printing and Advanced Manufacturing	3	90
Salt Lake (14 Credits/420 Clock-Hours)			
TEDR 1015	Applied Technical Math	1	30
TEDR 1025	Introduction to AutoCAD	3	90
TEDR 1210	Mechanical Design	4	120
TEDR 1310	Civil Design	4	120
TEDR 1320	Civil Surveying	3	90
TEDR 1330	Civil Geographical Information Systems	4	120
TEDR 1400	Introduction to Engineering and Design	3	90
TEDR 1410	Engineering Graphics	3	90
TEDR 1420	Electronics Drafting	3	90
TEDR 1425	Altium Electronic Drafting	3	90
TEDR 1430	Advanced 3D Modeling	3	90
TEDR 1435	Product Design Fundamentals 3D Printing	3	90
TEDR 1440	Schematic Capture	3	90
TEDR 1450	Robotics in the World	3	90
TEDR 1460	Geometric Dimensioning and Tolerancing	3	90
TEDR 1470	Manual Machine Shop	3	90
TEDR 1475	CNC Programing	3	90
TEDR 1480	Manufacturing Processes	3	90
TEDR 1490	Production Design and Development CAD/CAM	3	90
TEDR 2020	Advanced AutoCAD	2	60
USU - Eastern (14 Credits/420 Clock-Hours)			
TEDR 1003	Career and Workplace Relations	1	30
TEDR 1015	Applied Technical Math	1	30

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

TEDR 1130	Commercial Drafting	3	90
TEDR 1220	Production Drafting	4	120
TEDR 1500	Construction Site Planning	2	60
TEDR 1510	Construction Materials, Methods, and Design	3	90
TEDR 1520	Advanced Design Concepts	3	90
TEDR 1530	Design for Manufacturing	3	90
TEDR 1540	Manufacturing Principles	2	60

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

PROGRAM DESCRIPTION

Students in the Drafting and Design program will be immersed in a project-based curriculum that may be focused on architectural drafting, mechanical drafting, and/or civil drafting. They will receive one-on-one aid from experienced instructors, review best practices, and focus on industry standards. All courses are computer use intensive and competency based. Students will develop a strong working knowledge of visual communication and its technical skills. Upon completion, students are prepared for entry-level employment and/or further continuing their education.

Objectives:

- Develop a general knowledge of the drafting and design industries.
- Define terminology and processes related to drafting and design.
- Demonstrate correct sketching techniques.
- Use visual communication to convey design ideas.
- Interpret and prepare industry standard documents.
- Create accurate 2D and 3D models using the state of industry software.
- Develop drawings that align with industry conventions and standards.
- Practice redlining and iterating designs.
- Create physical models.

FOUNDATIONAL COURSE DESCRIPTIONS

Foundational Courses

Technical Drafting **4 Credits/120 Clock-Hours**

The Technical Drafting course is designed to help students develop and build familiarity with fundamental drafting concepts. Discussion concepts will include preparing industry standard documents using a drafting software.

Objectives:

- Explore various design fields including architecture, mechanical design, and/or civil design.
- Use sketching to communicate designs.
- Use a CAD system as a drafting tool.
- Develop, modify, and plot CAD drawings.

Advanced Technical Drafting **3 Credits/90 Clock-Hours**

The Advanced Technical Drafting course explores Computer Aided Drafting (CAD) to prepare and iterate advanced industry standard documents. Using these documents, students will then create a physical 3D model.

Objectives:

- Conceptualize and sketch architectural and mechanical designs.
- Use a CAD system as an advanced drafting tool.
- Practice iterating architectural and mechanical designs.
- Create a physical 3D model.

Architectural Drafting Emphasis

Residential Drafting — 3 Credits/90 Clock-Hours

The Residential Drafting course serves as an introduction to residential design and explores emerging CAD tools to design a code-compliant home. Students will learn about residential materials and methods of construction to prepare construction documents that align with industry standards.

Objectives:

- Describe the function of architectural drawings.
- Define terminology and processes related to residential design and construction.
- Explore form, function, and sustainability in design and construction.
- Identify areas for review and iteration through redlining.
- Create a set of construction documents.
- Explain the need for and apply the ADA (Americans with Disabilities Act) in design.

Introduction to Building Information Modeling — 3 Credits/90 Clock-Hours

The Introduction to Building Information Modeling course teaches 3D architectural tools to explore Building Information Modeling (BIM). Students will demonstrate their learning of architectural drafting skills including architectural detailing, rendering, and methods of construction to prepare architectural documents that align with industry standards.

Objectives:

- Use 3D modeling to communicate design intent.
- Create architectural documents.
- Explain the importance and purpose of BIM.
- Quantify model information.

Capstone Project — 3 Credits/90 Clock-Hours

The Capstone Project course applies program-acquired skills and knowledge through a comprehensive student-defined project, culminating in a practical demonstration of expertise in drafting. Students will navigate project management, integrating analysis and iteration.

Objectives:

- Develop a project scope.
- Establish clear and achievable objectives.
- Schedule a workflow.
- Develop quality, professional-level drafts that align with objectives.
- Manage project milestones professionally.
- Present completed project.

Mechanical Drafting Emphasis

Parametric Solid Modeling — 3 Credits/90 Clock-Hours

The Parametric Solid Modeling course explores parametric solid modeling, a process of feature and dimension driven design, for the creation of basic models. Students will learn about model/drawing association, best modeling practices, and industry standards.

Objectives:

- Use commands and modeling strategies to create solid model parts and assemblies.
- Define terminology and processes related to parametric modeling.
- Develop drawings from created models.
- Interpret engineering design intent.
- Identify areas for review and iteration through redlining.

Advanced Solid Modeling **3 Credits/90 Clock-Hours**

The Advanced Solid Modeling course explores parametric modeling techniques for creating complex models and assemblies. Students will learn about advanced tools and design methods.

Objectives:

- Create multi-body parts.
- Develop sheet metal parts and drawings.
- Use 3D sketches to model parts and assemblies.
- Apply surface drafting techniques.
- Use tables to formulate equations for manual calculations.
- Create equations, global variables, and configurations to design parametric models.

Capstone Project **3 Credits/90 Clock-Hours**

The Capstone Project course applies program-acquired skills and knowledge through a comprehensive student-defined project, culminating in a practical demonstration of expertise in drafting. Students will navigate project management, integrating analysis and iteration.

Objectives:

- Develop a project scope.
- Establish clear and achievable objectives.
- Schedule a workflow.
- Develop quality, professional-level drafts that align with objectives.
- Manage project milestones professionally.
- Present completed project.

Civil Drafting Emphasis

Commercial Drafting **3 Credits/90 Clock-Hours**

This course covers commercial and structural design techniques using 3D parametric CAD software. This course will introduce the interface and basic building components of the software to create levels, grids systems, and various views. This course will introduce how linking a structural project with an architectural model provides efficient project updates between design teams. This course will focus on structural columns, walls, foundations, reinforcement, beams, framing systems, and basic Building Information Modeling (BIM) practices and applications.

Objectives:

- Demonstrate basic drawing and/or editing tools.
- Identify levels and grids.
- Create the necessary views.
- Link an architectural model to a structural project.
- Adding structural columns and/or walls.

- Adding foundations and/or structural slabs.
- Create structural reinforcement.
- Create beams and framing systems.
- Create construction documents.
- Annotate construction documents.
- Create detailing.
- Create scheduling.

Civil Drafting **3 Credits/90 Clock-Hours**

The Civil Drafting course will teach the basic skills and concepts needed to design land development projects including concepts related to civil engineering and surveying in general. This course will provide a solid foundation that can be used to perform basic civil design tasks to organize project data, work with points, create and analyze surfaces, model road corridors, create parcel layouts, perform grading and volume calculations, and layout pipe networks.

Objectives:

- Create and edit parcels and print parcel reports.
- Create points and point groups and work with survey figures.
- Create and manage styles and label styles.
- Create, edit, view, and analyze surfaces.
- Create and edit alignments.
- Create data shortcuts.
- Create sites, profiles, and cross-sections.
- Create assemblies, corridors, and intersections.
- Create grading solutions.
- Create gravity fed and pressure pipe networks.
- Perform quantity takeoff and volume calculations.
- Use plan production tools to create plan and profile sheets.

Capstone Project **3 Credits/90 Clock-Hours**

The Capstone Project course applies program-acquired skills and knowledge through a comprehensive student-defined project, culminating in a practical demonstration of expertise in drafting. Students will navigate project management, integrating analysis and iteration.

Objectives:

- Develop a project scope.
- Establish clear and achievable objectives.
- Schedule a workflow.
- Develop quality, professional-level drafts that align with objectives.
- Manage project milestones professionally.
- Present completed project.

SUPPLEMENTAL COURSE DESCRIPTIONS

Bridgerland

Career and Workplace Relations — 1 Credit/30 Clock-Hours

The Career and Workplace Relations course is designed to help students gain insight into how their skills and professionalism enhance relationships between management and coworkers. Instruction includes employment skills such as communication, critical thinking, professional etiquette, and team dynamics.

Objectives:

- Identify personal and transferable skills, competencies, and/or abilities.
- Create an industry specific resume, cover letter, thank you letter, reference list, and online presence.
- Demonstrate effective interviewing skills.
- Submit an application for an industry specific position.
- Demonstrate effective use of job search websites.

Applied Technical Math — 1 Credit/30 Clock-Hours

The Applied Technical Math course includes introductions to geometry, algebra, and trigonometry as they apply to the drafting and design industry standards. Students will practice solving basic geometric, algebraic, and trigonometric equations.

Objectives:

- Solve equations using basic geometry.
- Solve equations using basic algebra.
- Solve equations using basic trigonometry.

Computer Illustration — 2 Credits/60 Clock-Hours

This course is designed to teach students techniques and procedures for developing illustrations and renderings using a personal computer and current industry standard illustration software.

Objectives:

- Use a computer system as a creation and rendering tool.
- Operate current industry illustration software.
- Integrate graphics into physical media.
- Export projects into different file types.

Commercial Drafting — 3 Credits/90 Clock-Hours

This course covers commercial and structural design techniques using 3D parametric CAD software. This course will introduce the interface and basic building components of the software to create levels, grids systems, and various views. This course will introduce how linking a structural project with an architectural model provides efficient project updates between design teams. This course will focus on structural columns, walls, foundations, reinforcement, beams, framing systems, and basic Building Information Modeling (BIM) practices and applications.

Objectives:

- Demonstrate basic drawing and/or editing tools.
- Identify levels and grids.
- Create the necessary views.

- Link an architectural model to a structural project.
- Adding structural columns and/or walls.
- Adding foundations and/or structural slabs.
- Create structural reinforcement.
- Create beams and framing systems.
- Create construction documents.
- Annotate construction documents.
- Create detailing.
- Create scheduling.

Structural Steel Detailing **3 Credits/90 Clock-Hours**

This course covers topics such as: the fundamentals of structural design, structural steel detailing of beams, columns, braces, templates, bill of materials, welding symbols, and creation of construction documents to industry standards.

Objectives:

- Identify structural shapes and sizes.
- Identify miscellaneous steel shapes and applications.
- Demonstrate connection types, bolted, welded, knife, and bearing.
- Create a bill of materials.
- Identify job specifications.
- Demonstrate AISC standards.
- Create structural steel construction documents.

Mechanical Design **4 Credits/120 Clock-Hours**

This course explores advanced mechanical design features including threads, fasteners, gears, cams, jigs, fixtures, and weldments. Concepts also include measuring techniques, types of fit and their function, and advanced working drawings.

Objectives:

- Identify measuring tools utilized in machine shops and production drawings.
- Produce different types of threads on drawings.
- Produce working drawings involving weldments.
- Produce drawings utilizing gears, cams, jigs, and fixtures.
- Identify different types of mechanical fasteners.
- Demonstrate methods used for injection molds.

Production Drafting **4 Credits/120 Clock-Hours**

The Production Drafting course makes use of CAD to create industry level production working drawings. Students will learn and use the latest American Society of Mechanical Engineers (ASME) Y14.5 standards for Geometric Dimensioning & Tolerancing (GD&T).

Objectives:

- Apply general tolerancing.
- Identify GD&T symbols.
- Define GD&T terms.
- Establish datums, material conditions, and boundaries.
- Recognize geometric characteristics.

Rapid Prototyping **1 Credit/30 Clock-Hours**

This course provides an introduction to the use of computer aided drafting software and 3D printing. Instruction will be given on items such as: 3D design, 3D printing methods, materials, design optimization, file types, and prototyping uses.

Objectives:

- Create 3D models using CAD software.
- Optimize models for printing.
- Convert 3D model file types.
- Print models using 3D printers.
- Analyze printed models for design revision.

Portfolio Development **1 Credit/30 Clock-Hours**

This course provides students the opportunity to gain deeper knowledge in areas previously studied, create advanced drafting portfolio pieces, and improve previous projects for portfolio presentation.

Objectives:

- Assemble projects into a cohesive portfolio.
- Demonstrate advanced drafting knowledge in portfolio pieces.
- Improve completed projects for display purposes.

Small Business **2 Credits/60 Clock-Hours**

This course teaches students the basics of creating their own small business. Students will create a business plan that will demonstrate an understanding of their industry including competition, demand, location, growth potential, licensing, taxes, financial projections, and legal council needs.

Objectives:

- Conduct an industry analysis.
- Calculate startup costs.
- Determine target customer demographics.
- Develop a business plan.
- Develop an advertising/marketing plan.

Intermediate Architectural Drafting **4 Credits/120 Clock-Hours**

This course is designed to guide students through the development of a complete set of residential building plans. The class includes topics such as: introduction to building codes, site planning, energy conservation, and solar energy alternatives plus detailing stairs, doors, windows, and other architectural elements.

Objectives:

- Draw floor plans.
- Draw exterior and interior elevations.
- Draw sections and details.
- Develop site plans.
- Apply building code principles.
- Develop complete set of construction documents.

Solid Modeling Certification **3 Credits/90 Clock-Hours**

This course gives students advanced solid modeling preparation that is specific to national certification requirements in industry standard software. Students will learn testing applications and complete a series of practice tests before attempting national certification exams.

Objectives:

- Identify areas for study based on certification preparation materials.
- Complete certification level practice tests.
- Complete national certification exams.

Davis

Materials and Methods I **2 Credits/60 Clock-Hours**

The Materials and Methods I course covers the typical materials and construction methods used in residential construction. Students will gain insights into residential construction practices through a blend of practical exercises.

Objectives:

- Define terminology and processes related to residential design and construction.
- Describe building materials used in residential construction.
- Identify building materials in residential construction details.
- Develop construction details.
- Create an energy efficiency compliance report.
- Reproduce typical residential wall section assemblies.

Materials and Methods II **2 Credits/60 Clock-Hours**

The Materials and Methods II course covers the typical materials and construction methods used in commercial construction. Students will gain insights into commercial construction practices through a blend of practical exercises.

Objectives:

- Define terminology and processes related to commercial design and construction.
- Describe building materials used in commercial construction.
- Identify building materials in commercial construction details.
- Develop construction details.
- Create an energy efficiency compliance report.
- Reproduce typical commercial wall section assemblies.

Commercial Drafting I **2 Credits/60 Clock-Hours**

The Commercial Drafting I course delves into building codes, regulations, and compliance standards to create the framework for commercial building projects. Students will use Building Information Modeling (BIM) to create schematic building models.

Objectives:

- Identify the importance of building codes.
- Interpret commercial construction documents.
- Reference the International Building Code.

- Locate requirements for a submittal process.
- Conduct a code analysis.

Commercial Drafting II **3 Credits/90 Clock-Hours**

The Commercial Drafting II course engages Building Information Modeling (BIM) to create precise and detailed building models. Students will develop the necessary skills to translate commercial design and code concepts into professional construction documents.

Objectives:

- Interpret commercial construction documents.
- Reference the International Building Code.
- Create a set of code-compliant construction documents.
- Participate in a mock submittal process.
- Redline drawings by marking up areas for improvement.
- Modify drawings.

Design Integration **3 Credits/90 Clock-Hours**

The Design Integration course explores integrated design, an approach where experts collaborate early to make buildings perform better. Students will discover how combining different design skills leads to more effective solutions for building projects.

Objectives:

- Interpret design consultant drawings.
- Apply principles of Building Information Modeling (BIM).
- Develop construction details.
- Create preliminary construction documents for multiple disciplines.

Virtual Design for Construction **1 Credit/30 Clock-Hours**

The Virtual Design for Construction course explores digital technologies to create virtual representations of construction projects. Students will learn to plan and analyze projects digitally before construction, fostering efficiency.

Objectives:

- Interpret point clouds.
- Apply principles of Building Information Modeling (BIM).
- Develop plans detailing various phases of construction.
- Conduct interdisciplinary clash detection.
- Identify aspects of construction administration.

Production Drafting I **1 Credit/30 Clock-Hours**

The Production Drafting I course delves into the practical realm of blueprint reading for manufacturing. Students will learn about industry standards to successfully interpret technical drawings.

Objectives:

- Identify and explain the components of a technical drawing.
- Interpret and analyze information presented on technical drawings.
- Interpret common symbols, abbreviations, and annotations used in technical drawings.
- Apply blueprint reading skills to solve practical problems.

- Redline technical drawings' by detecting errors, omissions, and discrepancies.

Production Drafting II **2 Credits/60 Clock-Hours**

The Production Drafting II course delves into the practical realm of blueprint reading for manufacturing. From understanding industry standards to utilizing parametric modeling software, students will learn the essentials of creating precise technical drawings.

Objectives:

- Apply methods of baseline dimensioning.
- Adhere to industry standards in technical drafting practices.
- Create production-ready drawings.
- Redline drawings by marking up areas for improvement.
- Modify models, assemblies, and drafts.

Production Drafting III **2 Credits/60 Clock-Hours**

The Production Drafting III course delves into the practical realm of drafting for manufacturing. From understanding industry standards to utilizing parametric modeling software, students will learn about applications of geometric, dimensioning, and tolerancing (GD&T) to create precise toleranced technical drawings.

Objectives:

- Identify and interpret GD&T processes and symbols.
- Apply methods of baseline/datum dimensioning.
- Adhere to industry standards in technical drafting practices.
- Create toleranced production-ready drawings.
- Redline drawings by marking up areas for improvement.
- Modify models, assemblies, and drafts.

Production Drafting Basics **2 Credit/60 Clock-Hours**

The Production Drafting Basics course delves into the practical realm of blueprint reading for manufacturing. Students will learn about industry standards to successfully interpret technical drawings.

Objectives:

- Identify and explain the components of a technical drawing.
- Interpret and analyze information presented on technical drawings.
- Interpret common symbols, abbreviations, and annotations used in technical drawings.
- Apply blueprint reading skills to solve practical problems.
- Use a CAD system as a drafting tool.

Reverse Engineering **3 Credits/90 Clock-Hours**

The Reverse Engineering course involves analyzing products and systems to understand how they work. Students will utilize insights gained to improve the design and function of original items.

Objectives:

- Interpret design engineer drawings.
- Locate design characteristics within manufacturer’s reference materials.
- Develop advanced models and drawings to industry standards.
- Redline drawings by marking up areas for improvement.

- Modify advanced models and drawings.

Rapid Prototyping **2 Credits/60 Clock-Hours**

The Rapid Prototyping course uses design thinking—a problem-solving method emphasizing innovation and user-centered design. Students will create and iterate prototypes to solve design challenges effectively and innovatively.

Objectives:

- Apply principles of design thinking to design challenges.
- Use prototyping to develop solutions to design challenges.
- Evaluate prototype effectiveness through testing and reflection.
- Refine designs based on feedback and user needs.

Dixie

Applied Technical Math **1 Credit/30 Clock-Hours**

Covers topics including introductions to geometry, algebra, and trigonometry as they apply to the drafting and design industry standards.

Objectives:

- Solve equations using basic geometry.
- Solve equations using basic algebra.
- Solve equations using basic trigonometry.

Applied Building Modeling **3 Credits/90 Clock-Hours**

The Applied Building Modeling course expands exposure to BIM through an individual project. Project requirements will include building design to satisfies a buildings functions program that conforms to the specific site constraints of property size zoning requirements and building code requirements.

Objectives:

- Employ BIM three-dimensional capabilities to an architectural project.
- Create floor plans, exterior elevations, section drawings.
- Illustrate the rendering capabilities of BIM.

Architectural Print Reading **1 Credit/30 Clock-Hours**

The course covers the basic knowledge and skills needed to accurately interpret construction drawings for residential and light commercial construction. Understanding construction specifications that accompany construction drawings are covered. Plans are used in the field of architecture, engineering, and planning along with many other technical applications.

Objectives:

- Answer questions that connect construction documents with the construction of buildings.
- Answer questions that connect written specifications and drawings are required to build a project.
- Create material quantities identified in construction documents.
- Compare the role of the various design disciplines that are needed for an architectural project to be constructed, architects, engineers, project managers, and contractors.

- Recognize the basic terminology common to the industry and identify the importance of word clarity in communications between those involved in a project.

Residential Construction Documents **3 Credits/90 Clock-Hours**

This course introduces the industry requirements for residential construction documents. Understanding residential construction methods and materials is essential in the design and construction document phase of a project and is significant emphasis in this course.

Objectives:

- Apply typical organizational drawing conventions used in architectural construction documents through original work.
- Communicate design and construction requirements in technical drawings.
- Research and incorporate materials into a construction project and identify them in a construction document.
- Specify the various materials in construction components, floors, walls, roofs, openings, etc.
- Express through design the basics of energy-efficient buildings.
- Express through design the elements of residential structural systems and how they are employed.

Commercial Construction Documents **4 Credits/120 Clock-Hours**

This course serves as an introduction to commercial design, exploring zoning, code and laws using emerging BIM tools to design functional code-compliant buildings. Discussion concepts will include commercial materials and methods of construction to prepare construction documents that align with industry standards.

Objectives:

- Apply BIM (Building Information Modeling) in a commercial project.
- Create the basics of a construction document for a commercial building.
- Design Presentation Documents.
- Develop designs related to form, function, and space planning.
- Create a commercial Site Plan.
- Develop a structural system for a building.
- Incorporate the applicable ADA and International Building Code requirements in building design.

Parametric Applications **3 Credits/90 Clock-Hours**

This course covers advanced parametric solid modeling. Discussions concepts include complex models, assemblies, photo realistic rendering, and animation along with other tools to check parts and assemblies for proper fit, form, and function.

Objectives:

- Apply knowledge of commands and modeling strategies to create complex solid model parts and assemblies.
- Use various assembly modeling techniques.
- Create and interpret engineering drawings composed of multiple views with standard dimensioning and tolerancing.
- Develop models and drawings to industry standards.

Mechanical Print Reading — 1 Credit/30 Clock-Hours

The purpose of this course is to help students develop a basic understanding of the interpretation of mechanical drawings used in today's industries. Drawing formats, schedules, symbols, dimensions, and notes will be studied to familiarize the students with the standards used world-wide today.

Objectives:

- Identify industry conventions of the various drawing sheets and formats.
- Visualize shapes in various drawing formats, views, and disciplines.
- Interpret both first and third angle projection views.
- Implement the appropriate reading of measuring systems, including scales, rules, calipers and micrometers.
- Identify various fasteners commonly used in manufacturing.
- Define terminology and processes related to parametric modeling.
- Interpret engineering design intent.

Drafting GD&T, FEA, CAM — 2 Credits/60 Clock-Hours

This class covers some of the applications for further processing the solid model using GD&T (Geometric Dimensioning and Tolerancing), FEA (Finite Element Analysis), and CAM (Computer Aided Machining). These applications aid in the further definition of the model's physical form as well as the next steps in the manufacturing process such as 3D prototyping and CAM programs and simulations.

Objectives:

- Identify and integrate the standard dimensions, symbols, and practices unique to the GD&T discipline.
- Model with 3D printers and materials; troubleshoot printing methods; and position parts.
- 3D print with slicing software used to convert the process into G-code.
- Use FEA programs to facilitate the design check and optimization of a part designed by the student using Von Mises Stress and a factor of safety. Plot the results to validate the studies.
- Use the modeling software to take the model into a CAM setup and processing into a functional G-code and simulated machining step operation.

Architectural Special Projects — 2 Credits/60 Clock-Hours

This course examines the various aspects of an architectural project in depth. A project building type will be selected based on viability, community need/support, and economic success. BIM will be used to develop schematic designs. A significant project element and a project's success is site selection.

Objectives:

- Explain the various needs employed in developing the building program elements.
- Demonstrate a logical analysis in a site selection.
- Design a schematic building plan.
- Apply BIM to refine the elements of a schematic plan.
- Describe the materials and structural system using BIM.
- Illustrate the proposed project using BIM 3dimensional capabilities.

Construction Materials and Methods **3 Credits/90 Clock-Hours**

This course describes the uses of various fasteners, the proper use of tools specific to the carpentry trade, how to interpret a set of blueprints and successfully accomplish material take-offs, build a basic floor according to the blueprint drawings, erect walls with window and door openings according to building plans, construct gable and hip roof systems, calculate riser and tread lengths, and cut out a stair stringer.

Objectives:

- Describes building materials used in construction work.
- Identify hand tools and power tools operations, with care and maintenance.
- Define techniques for reading and using construction drawings and specifications.
- Demonstrate procedures for framing floor, wall, roof, and stair systems and proper installation of doors and windows.
- Define the concept of the building envelope and its components.

Architectural CAD Modeling Interior Design **4 Credits/120 Clock-Hours**

This course explores how to create and manipulate architectural entities through simple but effective 3D modeling and how to model many elements within the architectural world.

Objectives:

- Design every element in a room.
- Create from simple to complex architectural structures.
- Acquire furniture and accessories from database.
- Model furniture from scratch.
- Apply colors, textures, and materials.

Residential Architectural Design **4 Credits/120 Clock-Hours**

This course explores family housing, drafting standards, construction principles, and space planning. Students will create a single-family residence using 3D architectural CAD software. The following topics will be explored: floor plans, elevations, roof design, sections, details, interior design, schedules, rendering, site plans, and sheet sets. Additionally, the course will cover interface usage, linework, 2D drawing tools, symbols, annotations, and sheet layout. This course will focus on a home design containing all the elements covered in the course.

Objectives:

- Demonstrate architectural freehand sketching.
- Create Floor Plans.
- Draw exterior and interior elevations.
- Draw sections and details.
- Develop site plans.
- Apply building code principles.
- Create renderings and design visualizations.
- Develop a complete set of construction drawings.

Structural Design **4 Credits/120 Clock-Hours**

This course will cover concepts and principles of building design through parametric 3D models and construction documentation. This course explores the tools necessary to create, document, and print

parametric structural models and integrates Building Information Modeling (BIM) is integrated into all processes.

Objectives:

- Create levels, grids and/or views.
- Change and modify elements.
- Create columns, walls and/or foundations.
- Explain structural reinforcement.
- Create beams, bracing and/or framing.
- Create floors, shafts and/or stairs.
- Apply annotation, details and/or schedules.

Architectural Rendering **3 Credits/90 Clock-Hours**

This course provides basic information about creating interior and exterior designs of architectural models. This course will provide instruction on how to view and navigate within the provided 3D architectural model, managing and creating materials and develop spaces with walls, doors and windows, model floor finishes, ceilings with soffits, casework, custom furniture, restrooms, and light fixtures. Finally, projects in this course will utilize advanced 3D architectural software, photorealistic rendering, and physical models using advanced manufacturing equipment (laser cut materials and 3D printers).

Objectives:

- Identify materials and their usage.
- Create floor and wall finishes.
- Create ceilings with soffits.
- Develop with curtail walls.
- Design stairs and railings.
- Create casework.
- Use furniture and lighting fixtures.
- Create real and artificial lighting.
- Create advanced building models.
- Develop building laser cut and 3D printed models.

Production Drafting **4 Credits/120 Clock-Hours**

The Production Drafting course makes use of CAD to create industry level production working drawings. Students will learn and use the latest American Society of Mechanical Engineers (ASME) Y14.5 standards for Geometric Dimensioning & Tolerancing (GD&T).

Objectives:

- Apply general tolerancing.
- Identify GD&T symbols.
- Define GD&T terms.
- Establish datums, material conditions, and boundaries.
- Recognize geometric characteristics.

Engineering Drawings **4 Credits/120 Clock-Hours**

This course explores the basic information necessary for creating professional drawings in the engineering world. This course will present basic instruction in preparing working drawings using 3D CAD methods, help build the necessary technical skills to communicate engineering drawing ideas in an

understandable, efficient, and accurate manner as well as introduce Geometric Dimensioning & Tolerancing (GD&T).

Objectives:

- Develop sheets and/or views.
- Apply dimensioning methods.
- Apply annotation application.
- Develop sheet formats and/or templates.
- Develop assembly drawing views.
- Develop bill of materials and/or tables.
- Recognize performance and/or display issues.
- Develop drawing references and/or comparison.
- Recognize GD&T processes and/or symbols.
- Apply GD&T to working drawings.

Metal Processes **3 Credits/90 Clock-Hours**

This course will explore principles and techniques of some of the metal manufacturing processes such as sheet metal and weldments. The first area of focus will be the fundamental skills and concepts used to build sheet metal parts and flat pattern layouts. The second area of focus will be the fundamental skills and concepts used to build weldment parts.

Objectives:

- Create sheet metal parts using the flange and convert methods.
- Create multibody sheet metal parts.
- Produce flat pattern developments.
- Create sheet metal parts using forming tools.
- Create structural members using weldments.
- Create pipes and tubing.
- Produce working drawings involving weldments.

Milling Machining **3 Credits/90 Clock-Hours**

This introductory manufacturing course makes use of the combination of 3D printed solid models and a CNC milling machine. Training includes the design of multiple parts that will need milling refinement for completion, the design and 3D printing of clamps that will mount into the mill, securely fasten each different 3D printed model and basic training of the milling process.

Objectives:

- Design 3D models that will need further refinement.
- Design 3D models that will secure designed parts in mill.
- Run programs created for the milling of each designed part.

Surface Modeling **2 Credits/60 Clock-Hours**

This course will explore how to build freeform shapes using engineering CAD software, the difference between solids and surfaces, appropriate usage of surfaces, continuity, general workflow, industry applications of surface models as well as basic and advanced modeling techniques.

Objectives:

- Distinguish the difference between solids and surfaces.

- Identify continuity.
- Demonstrate efficient workflow with surfaces.
- Create basic surface models.
- Create hybrid models.
- Repair surface geometry.
- Use advanced surface tools.
- Create blends and patches.
- Demonstrate use of surfaces in various industries.

Civil Design **4 Credits/120 Clock-Hours**

The Civil Design course will teach more advanced concepts needed in civil drafting through 3D civil design software. Using Civil 3D, students will be able to analyze existing workflows and make changes to improve performance based on the tools and features that are learned and practiced in this course.

Objectives:

- Identify and work with object styles.
- Create, manage, and apply label styles.
- Manage points, and work with point groups.
- Create and edit alignments.
- Define and edit parcels.
- Create and edit profiles and profile views.
- Create corridors and extract information from them.
- Create pipe networks and edit them in plan and profile.
- Create sheets with the plan production tools.
- Manage grading tools.
- Identify and calculate volumes.
- Apply project data with data shortcuts.

Civil Surveying **3 Credits/90 Clock-Hours**

The Civil Surveying course equips technicians with the basic knowledge required to use land-surveying software. Students will learn how to import converted survey data into a standardized environment and to use the automation tools to create an existing conditions plan and topography surface.

Objectives:

- Identify points overview and styles.
- Manage points and coordinate transformations.
- Create points and drafting.
- Create point groups and reports.
- Manage point security and editing.
- Identify survey networks.
- Manage surfaces.
- Apply surface editing.
- Apply surface labels and analysis.

Civil Geographic Information System **4 Credits/120 Clock-Hours**

This course covers Geographic Information Systems (GIS) and manipulating related information within industry standard software. This course will explore how to capture, analyze, manipulate, manage, and present all types of geographical data as well as working project from initial ideas to design presentation.

This course will explore concepts related to data driven maps (digital and printed presentational material), interactive web maps, the use of Global Positioning System (GPS) and information gathering systems.

Objectives:

- Evaluate, preview, and/or study project area.
- Create data from various information sources.
- Import data from various information sources.
- Edit data.
- Analyze data.
- Create a digital, interactive, and printed map displaying the analysis and information.
- Present analysis results.
- Use GPS and information gathering tools and hardware.

Advanced BIM **4 Credits/120 Clock-Hours**

This course will explore how Building Information Modeling (BIM) is an approach to the entire building life cycle and focus on how systems need to coordinate, update, and share design data with team members throughout the design construction and management phases of a building's life. This course will further explore a company foundation for BIM focused designs by developing standard templates and custom elements. This course will cover how to use models (architectural specific families, MEP specific families, and structural specific families) in a commercial project and incorporate all aspects of development and design.

Objectives:

- Integrate Building Information Modeling (BIM).
- Create custom templates that include annotation styles, preset views, sheets, and schedules.
- Create schedules and understand their relation to BIM.
- Create material takeoff schedules.
- Create custom wall, roof, and floor types.
- Create casework.
- Create custom system families.
- Create industry specific families.
- Use parametric family geometry, profiles, and annotations.

BIM Coordination **3 Credits/90 Clock-Hours**

This course covers the concept of Building Information Modeling (BIM), which encompasses the entire building life cycle. BIM includes all phases of the design process, from model creation to construction and ending at operations and maintenance. This course will use a BIM workflow to explore how to do design changes throughout the BIM process and how those changes affect the BIM model. This course will explore how to consolidate civil, architectural, structural, and MEP models into one BIM model. This course will cover topics on how to use review and markup tools for communicating issues across disciplines, how to simulate construction as well as finding constructability issues and on-site clashes.

Objectives:

- Recognize the purpose of BIM.
- Apply BIM.
- Consolidate models.
- Review models.
- Analyze models.

- Develop communication of the models.
- Collaborate with Team Members for Clash Solutions.
- Animate construction timelines.

Architectural Standards **4 Credits/120 Clock-Hours**

This course provides the basic information necessary for development of residential and light commercial (Type IV and V buildings) architectural design and construction documents. This course will also serve as a reference for design and construction principles and methods. It is intended to help build the necessary technical skills to communicate architectural ideas in an understandable, efficient, and accurate manner. Students will be assessed through a series of quizzes, visual identification exercises, and comprehensive assessments.

Objectives:

- Explore careers in Architecture, Engineering, or Construction (AEC).
- Demonstrate the application of various guidelines and codes.
- Apply ADA requirements.
- Understand floor plan requirements.
- Determine plot plan needs and requirements.
- Understand footing and foundation requirements.
- Understand sill, floor, wall and ceiling construction.
- Understand door, window and stair construction.
- Understand roof details and elevation views.
- Understand electrical, plumbing and climate control requirements.
- Understand building materials and specifications.

Commercial Standards **4 Credits/120 Clock-Hours**

This course provides the basic information necessary for the development of commercial architectural design and construction documents. This course will also serve as a reference for design and construction principles and methods. It is intended to help build the necessary technical skills to communicate architectural ideas in an understandable, efficient, and accurate manner. Students will be assessed through a series of quizzes, visual identification exercises, and comprehensive assessments.

Objectives:

- Explore careers in Architecture, Engineering, or Construction (AEC).
- Demonstrate the application of various guidelines and codes.
- Apply ADA requirements.
- Understand floor plan requirements.
- Determine plot plan needs and requirements.
- Understand footing and foundation requirements.
- Understand sill, floor, wall and ceiling construction.
- Understand door, window and stair construction.
- Understand roof details and elevation views.
- Understand electrical, plumbing and climate control requirements.
- Understand building materials and specifications.

Photoshop for Interior Designers **3 Credits/90 Clock-Hours**

This course will cover concepts and principles necessary to instruct students who have no experience in Photoshop. Step-by-step demonstrations that are easy to follow for beginning level learners are provided

which instruct on the basic commands and functions of the program. The course covers pedagogical features that are designed to assist teaching and enhance learning.

Objectives:

- Teach visual communications and fundamentals.
- Instruct on the creation of floor plans, elevations, perspectives and isometric views.
- Apply materials, lighting, special effects and entourage.
- Create freehand and presentations drawings.

Mold Design **2 Credits/60 Clock-Hours**

This course teaches procedures necessary for using parametric design tools to create and analyze effective mold designs. It will instruct through different tasks, from designing or repairing a mold, to developing complex parting lines, from making a core in the part mode to advancing through more complex tasks in the assembly mode. Every project is based on real world products. Each of these projects has been broken down and developed into simple, comprehensible steps.

Objectives:

- Provide existing users with in-depth knowledge of software mold making tools.
- Teaches analyzation of parts through plastics wizard and flow simulation.
- Introduces usage of surface tools to repair models for mold making.
- Use step-by-step instructions and projects based on real world products.

Machine Power Design **2 Credits/60 Clock-Hours**

This course will explore modeling and principles of motion and power systems to create a complete working production set of drawings and movable assemblies. These systems include gear, sprocket, thread, fastener, bearing, bushing, spring, and cam creation.

Objectives:

- Produce different types of threads.
- Represent different types of threads.
- Identify different types of fasteners.
- Identify gear, cam, and other motion transfer systems.
- Apply industry standard dimensions to drawings.
- Apply industry standard tolerances and/or fits to drawings.
- Complete entire set of working drawings including proper dimension techniques.
- Create movable assemblies demonstrating full motion of the design.

3D Printing and Advanced Manufacturing **3 Credits/90 Clock-Hours**

This final course explores 3D printing, advanced manufacturing techniques, and modern product design. Various technologies, equipment, model preparation, and general hardware maintenance will be covered. This course will explore how to disassemble, measure, and model all the pieces and parts that make up an approved assembly using CAD software and design changes will take advantage of advanced manufacturing techniques. This course will cover topics on how to use scanned sketches, 3D scanning, and traditional measurement tools. This course allows for team projects to expand the design beyond the abilities of a single drafter and incorporate design changes into the project. This course will focus on a design proposal, high quality product renderings, and the production of working drawings for each part and full assembly.

Objectives:

- Identify modern advanced manufacturing processes.
- Explain possibilities, suitability, and limitations of advanced manufacturing.
- Explain the use of solid, surface, and polygon modeling software packages.
- Explain the production of assemblies.
- Explain measuring using measuring devices.
- Explain the applicable use of 3D scanners.
- Produce a design proposal.
- Produce fully annotated multi-view drawings of parts.
- Produce an exploded assembly drawing including part identification, and a bill of materials.

Salt Lake

Applied Technical Math — 1 Credit/30 Clock-Hours

The Applied Technical Math course includes introductions to geometry, algebra, and trigonometry as they apply to the drafting and design industry standards. Students will practice solving basic geometric, algebraic, and trigonometric equations.

Objectives:

- Solve equations using basic geometry.
- Solve equations using basic algebra.
- Solve equations using basic trigonometry.

Introduction to AutoCAD — 3 Credits/90 Clock-Hours

Basic skills using AutoCad for drawing applications are taught. The course includes draw and modify commands, geometric construction, dimensions, templates, blocks and libraries, hatching, layers, scales, and plotting. Students will also be introduced to 3D CAD.

Objectives:

- Develop, use, and customize drawing templates.
- Use AutoCAD drawing, modification, and reproduction commands.
- Define dimensioning standards and apply them to drawings.
- Develop precision fits and apply them to drawings.
- Create assembly drawings that meet ANSI standards.
- Descriptive geometry, construction techniques and CAD drawing aids utilized in mechanical drawings.
- Demonstrate the creation and use of blocks and block libraries.

Mechanical Design — 4 Credits/120 Clock-Hours

This course explores advanced mechanical design features including threads, fasteners, gears, cams, jigs, fixtures, and weldments. Concepts also include measuring techniques, types of fit and their function, and advanced working drawings.

Objectives:

- Identify measuring tools utilized in machine shops and production drawings.
- Produce different types of threads on drawings.
- Produce working drawings involving weldments.

- Produce drawings utilizing gears, cams, jigs, and fixtures.
- Identify different types of mechanical fasteners.
- Demonstrate methods used for injection molds.

Civil Design **4 Credits/120 Clock-Hours**

The Civil Design course will teach more advanced concepts needed in civil drafting through 3D civil design software. Using Civil 3D, students will be able to analyze existing workflows and make changes to improve performance based on the tools and features that are learned and practiced in this course.

Objectives:

- Identify and work with object styles.
- Create, manage, and apply label styles.
- Manage points, and work with point groups.
- Create and edit alignments.
- Define and edit parcels.
- Create and edit profiles and profile views.
- Create corridors and extract information from them.
- Create pipe networks and edit them in plan and profile.
- Create sheets with the plan production tools.
- Manage grading tools.
- Identify and calculate volumes.
- Apply project data with data shortcuts.

Civil Surveying **3 Credits/90 Clock-Hours**

The Civil Surveying course equips technicians with the basic knowledge required to use land-surveying software. Students will learn how to import converted survey data into a standardized environment and to use the automation tools to create an existing conditions plan and topography surface.

Objectives:

- Identify points overview and styles.
- Manage points and coordinate transformations.
- Create points and drafting.
- Create point groups and reports.
- Manage point security and editing.
- Identify survey networks.
- Manage surfaces.
- Apply surface editing.
- Apply surface labels and analysis.

Civil Geographic Information System **4 Credits/120 Clock-Hours**

This course covers Geographic Information Systems (GIS) and manipulating related information within industry standard software. This course will explore how to capture, analyze, manipulate, manage, and present all types of geographical data as well as working project from initial ideas to design presentation. This course will explore concepts related to data driven maps (digital and printed presentational material), interactive web maps, the use of Global Positioning System (GPS) and information gathering systems.

Objectives:

- Evaluate, preview, and/or study project area.

- Create data from various information sources.
- Import data from various information sources.
- Edit data.
- Analyze data.
- Create a digital, interactive, and printed map displaying the analysis and information.
- Present analysis results.
- Use GPS and information gathering tools and hardware.

Introduction to Engineering and Design **3 Credits/90 Clock-Hours**

An introduction to Electronics, Manufacturing, Product Design, Machining, CAD and the design process. Students will learn to read blueprints and use design tools to create and demonstrate Orthographic Projection, Section views, Dimensioning, Sketching, Assembly drawings, Tolerancing and Fasteners.

Objectives:

- Create basic orthographic projection drawings.
- Apply basic dimensions to drawings.
- Demonstrate correct sketching techniques.
- Create section views and apply dimensions correctly.
- Create basic design and working drawings.
- Interpret and apply basic tolerancing.
- Define terminology related to fasteners.
- Define geometric construction techniques.
- Explain to fundamentals of electronics, manufacturing, and machining technology.

Engineering Graphics **3 Credits/90 Clock-Hours**

Comprehensive applications of 3D CAD-based national (ANSI/ASME) & international ISO) graphics standards, including coordinate & geometric dimensioning and tolerancing. Introduction to Engineering & Technical design solutions related to STEM industries.

Objectives:

- Create and fully constrain sketches using both dimensional and geometric constraints.
- Create 3D model features from sketches using extrude, revolve, cut extrude, sweep loft etc.
- Create 3D model-based features using holes, fillets, blends, chamfers, shell.
- Create multiple 3D model-based features using patterns, arrays, and mirror techniques.
- Create multiple configurations, both manually and using design tables.
- Demonstrate ability to analyze and determine design intent.
- Create 3D CAD solid model components of basic complexity to semi complex mechanical components.
- Create 3D solid model assemblies from multiple different components using dimensional, geometric and mechanical mating constraints.
- Create, read, and understand engineering drawings composed of multiple views.
- Measure and analyze 3D solid models.

Electronics Drafting **3 Credits/90 Clock-Hours**

Drafting and design techniques used in the electronics industry including electronics symbols, schematic and logic diagrams, electro-mechanical design, printed circuit board design, artwork layout, and related industry standards. Students will be using PADS which is a circuit board layout software package and AutoCAD.

Objectives:

- Define material properties for metals, plastics, elastomers, ceramics, and composites.
- Apply proper procedure to create layouts for printed circuit boards.
- Create the detail, artwork and assembly drawings associated with printed circuit boards.
- Design layouts with vendor sheets for drawing package of electro-mechanical assemblies.
- Create connection and/or cable diagrams that meet current industry standards.

Altium Electronic Drafting **3 Credits/90 Clock-Hours**

Altium Education is based on Altium Designer software and is broadly applicable to other ECAD applications, which also use a project-style file structure to store design data. Students will learn to design simple to advanced PCBs and be prepared to advance to industry-level circuit board design and manufacturing courses.

Objectives:

- Identify the terminology related to the PCB industry.
- Identify the Anatomy of a Schematic.
- Create parts from Data sheets and implement them into a design.
- Apply proper procedures to place and route electronic components.
- Identify the PCB Design Workflow.
- Apply different techniques for routing different types of Signals.
- Explain the manufacturing processes of PCBs.

Advanced 3D Modeling **3 Credits/90 Clock-Hours**

Solid modeling with AutoDesk Inventor will be taught. Topics include sketch planes, part construction, extraction of engineering data, assemblies and mating parts, parametric design and related drawings. The Design Center will also be used.

Objectives:

- Develop geometry for solid parts using sketch tools.
- Apply basic 3D modeling commands to create models.
- Practice and utilize parametric modeling functions.
- Utilize advanced modeling tools.
- Create assembly drawings from detail parts.
- Produce 2D orthographic detail and assembly drawings from solid models.

Product Design Fundamentals 3D Printing **3 Credits/90 Clock-Hours**

Product Design is the process of applying principles, experience, and judgment to the development of a technical product to meet a need. Turning ideas into a design, develop detailed part and assembly drawings, implementation, and evaluation will incorporate problem identification. Sketching, gears/cams/shafts, Tolerances, rapid prototyping, and additive manufacturing concepts will be presented.

Objectives:

- Demonstrate ability to create parts using a 3-D software package.
- Practice importing parts using the content libraries.
- Use the design process when creating a part or assembly.
- Define and apply different drive mechanisms to an assembly.
- Apply correct constraints when creating a part and an assembly.

- Use rapid prototyping equipment to print your final project.
- Apply advanced dimensioning to a part to meet different standards.

Schematic Capture **3 Credits/90 Clock-Hours**

Schematic Capture is the process of converting a paper design into an electronic representation that software tools can process. Graphically, schematic capture is the process of arranging components in schematic sheets and defining links between them. Students produce a logical/electrical design that can be used in other design tools to run simulations or create a physical layout.

Objectives:

- Apply correct methods to create and arrange electronic components on a schematic design.
- Create a circuit diagram that includes all the necessary parts and connections.
- Demonstrate the best practices for schematic capture, Documentation, and parts list generation.
- Apply Design Tools to build parts and symbols, create a bill of materials, and define design rules.
- Recognize the trade-offs between different schematic methodologies.
- Explain how to assess different component types and attachment methods.
- Evaluate different schematic notes.

Robotics in the World **3 Credits/90 Clock-Hours**

Robotics technology influences every aspect of work and home life. This technology has evolving usage in many fields that will be discussed in this class such as: healthcare, agriculture, aerospace, business, and everyday society. This course also introduces students to the basic concepts of programming robotics.

Objectives:

- Apply physical science principles to describe behaviors and characteristics of robotics.
- Investigate current applications of robotics in engineering, chemistry, physics and biology.
- Recognize tools and processes used in the field of robotics while visiting a robotics facility.
- Differentiate between realistic outcomes achievable with robotics and the speculative outcomes described in science fiction.
- Evaluate the potential and dangers of robotics.
- Use the Markosian Library online database to obtain published scientific information for inclusion in research papers and class presentations.
- Use the scientific method while participating in a final group project programming their own robot.

Geometric Dimensioning and Tolerancing **3 Credits/90 Clock-Hours**

The use of CAD to create industrial level production working drawings. Includes the latest ASME Y14.5 standards for Geometric Dimensioning & Tolerancing. Topics of discussion will include general tolerancing, symbols and terms, datums, material conditions and boundaries, geometric characteristics, and positional tolerancing.

Objectives:

- Explain the basics of general tolerancing.
- Create drawings with symbols and terms which meet current standards.
- Explain and apply knowledge of datums.
- Explain terms that apply to material conditions and material boundaries.
- Use geometric characteristics to help define modeled parts.
- Explain positional tolerancing and how it applies to a part.

- Use CAD to create professional level engineering drawings.

Manual Machine Shop **3 Credits/90 Clock-Hours**

Basic machine shop theory including safety, setup and operation of lathes and mills, machine and tool performance, metrology, process planning, interpretation of engineering drawings, and an introduction to CNC equipment. Lab experience is included.

Objectives:

- Demonstrate industrial safety specific to the machine shop environment.
- Develop part design improvements for the manufacturability of an existing design.
- Determine the most economical steps to produce parts manufactured in the machine shop.
- Use SPC to determine the stability of a process.
- Carefully select and use metrology equipment found in a machine shop environment.
- Correctly operate manual lathes and mills.
- Use proper machine shop terminology.
- Calculate the cost of parts built in the machine shop.

CNC Programming **3 Credits/90 Clock-Hours**

Basic CNC machine shop theory including G and M programming, operation, and performance of CNC lathes and mills. Lab experience is included.

Objectives:

- Demonstrate general safety precautions relating to machine shop procedures.
- Explain how CNC machines are used in Industry including.
- Demonstrate procedures for setting up and running 3 axis CNC mills and 2 axis CNC lathes.
- Explain and use manual CNC Programming.
- Describe the scope as well as the limits of parts designed to be fabricated using CNC machining.
- Demonstrate use of Computer Aided Manufacturing (CAM) using Feature CAM software.
- Use proper machine shop terminology.
- Calculate the cost of parts built in the machine shop.

Manufacturing Processes **3 Credits/90 Clock-Hours**

A broad analysis of industrial materials and processes used in manufacturing as related to design. Topics include metal forming, casting, machining, non-metals, finishing and assembly, and the principles of material behavior.

Objectives:

- Test and validate material properties for metals, plastics, elastomers, ceramics, and composites.
- Explain material forming processes for rolling, spinning, bending, drawing, and forging.
- Create material casting processes for sand casting, investment casting, full mold casting, shell mold casting, permanent casting and centrifugal casting.
- Explain molding process for injection molding, blow molding, thin film blow molding, and rotational molding.
- Explain or demonstrate separating processes for punching, shearing, turning, milling, grinding. electro discharge machining, and electro chemical machining.
- Demonstrate conditioning processes for heat treating, annealing, tempering, case hardening, plating, and coating.

Product Design and Development CAD/CAM **3 Credits/90 Clock-Hours**

Uses CAD to design and layout advanced production drawings. Uses CAM to create industry level CNC files for production. Uses industry standard reference materials, i.e., Machinery's or Engineers Handbook, ANSI and/or ASME Specifications, GD & T. Course supports the design, drafting, and fabrication for a student's capstone project.

Objectives:

- Create industry standard professional drawings.
- Create industry standard professional CNC programs.
- Identify mechanical engineer's role in an engineering and/or manufacturing organization.
- Identify manufacturing engineer's role in an engineering and/or manufacturing organization.
- Perform cost analysis that determines manufacturability of products.
- Develop ability to search for and interpret industry standard specifications. ANSI, ASME, ASTM.
- Test and validate designs using CAE simulation and actual functional testing.

Advanced AutoCAD **2 Credits/60 Clock-Hours**

Advanced skills using AutoCAD. Includes: introduction to detail and assembly drawings, advanced geometric construction, isometric drawing, auxiliary views, advanced dimensioning, dynamic blocks with attributes, and AutoCAD 3D Modeling.

Objectives:

- Develop, use, and customize drawing templates and profiles.
- Use AutoCAD drawing, modification, and reproduction commands.
- Apply dimensioning standards and setups for different styles of dimensioning applications.
- Create drawings using proper views, and correct dimensioning procedures.
- Create assembly drawings from detailed parts.
- Use descriptive geometry, construction techniques, and CAD drawing aids utilized in mechanical drawings.
- Create and use blocks and block libraries in 2-D drawings.
- Use 3D modeling applications in AutoCAD.
- Input data from a legal description of a property into a CAD drawing.

USU – Eastern

Career and Workplace Relations **1 Credit/30 Clock-Hours**

The Career and Workplace Relations course is designed to help students gain insight into how their skills and professionalism enhance relationships between management and coworkers. Instruction includes employment skills such as communication, critical thinking, professional etiquette, team dynamics, and more.

Objectives:

- Identify personal and transferable skills, competencies, and/or abilities.
- Create an industry specific resume, cover letter, thank you letter, reference list, and online presence.
- Demonstrate effective interviewing skills.
- Submit an application for an industry specific position.
- Demonstrate effective use of job search websites.

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

Applied Technical Math — 1 Credit/30 Clock-Hours

The Applied Technical Math course includes introductions to geometry, algebra, and trigonometry as they apply to the drafting and design industry standards. Students will practice solving basic geometric, algebraic, and trigonometric equations.

Objectives:

- Solve equations using basic geometry.
- Solve equations using basic algebra.
- Solve equations using basic trigonometry.

Commercial Drafting — 4 Credits/120 Clock-Hours

The Commercial Drafting course serves as an introduction to commercial design, exploring zoning, code, and laws using emerging Building Information Modeling (BIM) tools to design functional code-compliant buildings. Students will learn about commercial materials and methods of construction to prepare construction documents that align with industry standards.

Objectives:

- Apply BIM.
- Design presentation documents.
- Develop designs related to form, function, and space planning.
- Create a code-compliant commercial site plan.

Production Drafting — 4 Credits/120 Clock-Hours

The Production Drafting course makes use of CAD to create industry level production working drawings. Students will learn and use the latest American Society of Mechanical Engineers (ASME) Y14.5 standards for Geometric Dimensioning & Tolerancing (GD&T).

Objectives:

- Apply general tolerancing.
- Identify GD&T symbols.
- Define GD&T terms.
- Establish datums, material conditions, and boundaries.
- Recognize geometric characteristics.

Construction Site Planning — 2 Credits/60 Clock-Hours

This course provides the basic skills of interpreting, drawing, and utilizing recorded property descriptions while focusing on understanding how elements such as grade, easements, and setbacks contribute to residential design.

Objectives:

- List the different methods and classifications for property descriptions.
- Interpret recorded property descriptions.
- Identify the required codes and descriptions necessary for construction approval.
- Create a complete residential site plan.

Construction Materials, Methods, and Design **3 Credits/90 Clock-Hours**

This course covers the use of different fasteners, specific carpentry tools, blueprint interpretation, material estimation, basic floor construction, wall building with windows and doors, gable and hip roof systems, calculating stair riser and tread lengths, and cutting stair stringers.

Objectives:

- Describes building materials used in construction work.
- Identify hand tool and power tool operations, with care and maintenance.
- Define techniques for reading and using construction drawings and specifications.
- Model procedures for framing floor, wall, roof and stair systems and proper installation of doors and windows.
- Define the concept of the building envelope and its components.

Advanced Design Concepts **3 Credits/90 Clock-Hours**

This course covers interior and exterior architectural model design. Instructing in 3D model navigation, material and space management, building elements, and lighting. It also includes advanced 3D software, rendering, and physical model creation with laser cutting and 3D printing.

Objectives:

- Create advanced plans for interior finishing and planning.
- Design stairs and railings identifying the code requirements between residential and commercial.
- Develop building laser cut and 3D printed models.

Design for Manufacturing **3 Credits/90 Clock-Hours**

This course comprehensively surveys manufacturing methods, including additive, subtractive, and more. Explore different techniques used in modern manufacturing processes, understand their advantages and limitations, and gain insights into selecting the suitable method for specific design and production needs.

Objectives:

- Analyze the various methods of manufacturing.
- Design projects specifically for the different types of manufacturing.
- Discuss the materials properties that are suitable for products.

Manufacturing Principles **2 Credits/60 Clock-Hours**

This course teaches manufacturing principles, materials, and essential fabrication elements. Gain knowledge in fundamental manufacturing techniques, materials selection, and fabrication processes. Learn how to apply these principles to create functional and efficient products through hands-on projects and practical exercises.

Objectives:

- Create a basic construction schematic for a project that will be constructed in-class.
- Analyze and generate a build list of essential items for the construction of projects.
- Utilize hand and power tools to construct projects as part of a team.

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Drafting and Design
FY2026 / 16 Credits (480 Clock-Hours)

November 21, 2024

UTAH SYSTEM OF HIGHER EDUCATION

Utah System of Higher Education
Web and Graphic Design
FY2026 / 21 Credits (630 Clock-Hours)

Web and Graphic Design

Institutions: Davis, Salt Lake

Technical Certificate (Catalog Year: 2026, 21 Credits/630 Clock-Hours Required, CIP 11.0801)

Foundational Courses (21 Credits/630 Clock-Hours)		**Credits**	**Clock-Hours**
TEWG 1010	Introduction to Web and Graphic Design	3	90
TEWG 1020	Digital Image Editing with Raster Graphics	3	90
TEWG 1030	Digital Illustration with Vector Graphics	3	90
TEWG 1040	Introduction to Web Design with HTML and CSS	3	90
TEWG 1050	Responsive Web Design with Advanced HTML and CSS	3	90
TEWG 1060	Introduction to UX/UI Design	3	90
TEWG 1070	Responsive Web Design with CMS	3	90
Supplemental Courses			
Davis (9 Credits/270 Clock-Hours)			
TEWG 1100	Design with Type	2	60
TEWG 1110	Digital Publishing	3	90
TEWG 1120	Advanced UX/UI Design	3	90
TEWG 1130	Digital Video I	3	90
TEWG 1140	Digital Video II	3	90
TEWG 1150	eMarketing for Designers	3	90
TEWG 1160	Designing for the Real World	3	90
TEWG 1170	JavaScript Fundamentals	3	90
TEWG 1180	Modern JavaScript	3	90
TEWG 1190	Advanced JavaScript Frameworks	3	90
TEWG 1300	Graphic Design Principles	3	90
TEWG 1310	Creative Branding	1	30
TEWG 1320	Social Media Marketing	3	90
TEWG 1330	Color Theory Application in Digital Design	1	30
TEWG 1340	Digital Content Creation	2	60
TEWG 1350	Introduction to 3D	2	60
TEWG 1900	Web and Graphic Design Externship	2	90
Salt Lake (9 Credits/270 Clock-Hours)			
TEDG 1020	Digital Literacy	1	30
TEWG 1200	Design Principles	2	60
TEWG 1210	Introduction to JavaScript	3	90
TEWG 1220	Web Animation	3	90

Utah System of Higher Education
Web and Graphic Design
FY2026 / 21 Credits (630 Clock-Hours)

PROGRAM DESCRIPTION

The Web and Graphic Design program prepares students for entry-level employment in the diverse fields of web development, graphic design, and digital marketing. Students learn to develop websites using industry-standard programming languages, create both print and digital collateral using industry-standard visual design software, and implement effective marketing campaigns using industry best practices. Students create a diverse portfolio of work throughout the program that demonstrates their skills to potential employers.

Objectives:

- Manipulate raster images.
- Create vector graphics and illustrations.
- Apply foundational principles and processes to all visual designs.
- Develop Responsive Websites (Mobile-First / Progressively Enhanced) using HTML, CSS, and JavaScript that will work on all devices and screen sizes.
- Demonstrate server-side and client-side scripting.
- Design dynamic User Interfaces and delightful User Experiences.
- Optimize websites to load quickly and rank highly in search engines.
- Develop custom themes for industry standard Content Management Systems (CMS).
- Establish an online Web & Graphic Design portfolio.

FOUNDATIONAL COURSE DESCRIPTIONS

Introduction to Web and Graphic Design — 3 Credits/90 Clock-Hours

Introduction to Web & Graphic Design explores how storytelling empowers all effective digital marketing and online communication. Students will evaluate and elevate their online presence by creating professional emails, cover letters, resumes, portfolios, and social media accounts.

Objectives:

- Identify individual students' learning styles and present tools for active learning.
- Define graphic design and web design.
- Define the purpose of web and graphic design in digital marketing.
- Describe the different types of digital marketing channels available.
- Utilize storytelling in digital communication.
- Create a resume, cover letter, professional bio, and personal statement.
- Enhance and edit social media profiles to impress clients/employers.
- Create a digital portfolio.

Digital Image Editing with Raster Graphics — 3 Credits/90 Clock-Hours

Digital Image Editing with Raster Graphics explores fundamental and advanced features of industry-standard image editing software for graphic design. Students will edit, enhance, repair, modify, and combine images with text and shapes to create graphics for web and print.

Objectives:

- Explain the basic concepts associated with raster images, digital color spaces, and file formats.
- Define image composition and its main goals.

- Define and recognize principles of composition in graphics: balance, contrast, motion, emphasis, scale, pattern, unity.
- Edit, alter, enhance, repair, combine, and manipulate digital images.
- Adjust size, resolution, and file formats based off the intended final context (print vs web).
- Use selection tools and shortcut keys.
- Work with and organize layers.
- Create a digital portfolio of completed work.

Digital Illustration with Vector Graphics **3 Credits/90 Clock-Hours**

Digital Illustration with Vector Graphics explores fundamental and advanced features of industry-standard vector illustration software for graphic design. Students will edit, enhance, repair, modify, and combine images with text and shapes to create graphics for web and print.

Objectives:

- Examine the formal elements of design: line, shape, color, and texture.
- Use colors and shapes to design signs and symbols.
- Create illustrations with drawing tools.
- Work with type, layers, gradients, blends, and patterns.
- Use brushes, effects, clipping masks, and graphic styles.
- Explore creating images with distortions, gradient meshes, envelopes, and blends.
- Use design concepts and tools to create branded marketing materials.
- Create a digital portfolio of completed work.

Introduction to Web Design with HTML and CSS3 Credits/90 Clock-Hours

Introduction to Web Design with HTML and CSS introduces the latest HTML/CSS techniques to create custom mobile-first responsive websites that automatically scale and adjust their content and layout to fit any screen size.

Objectives:

- Create responsive web pages with HTML5.
- Configure text, color, and page layout with Cascading Style Sheets.
- Configure images and videos on web pages.
- Explore new CSS3 properties.
- Design web pages with best practices.
- Design web pages with accessibility, usability, and search engine optimization considerations.
- Obtain a domain name and a web host.
- Publish web pages to the internet using File Transfer Protocol (FTP).
- Develop a high-quality personal portfolio site.

Responsive Web Design with Advanced HTML and CSS **3 Credits/90 Clock-Hours**

Responsive Web Design with Advanced HTML and CSS introduces the basics of website templating to create a website structure that is easy to maintain. Students will explore advanced CSS techniques and JavaScript libraries to add interactivity and advanced functionality to a website.

Objectives:

- Understand the purpose of a website template and how to create it.

- Utilize CSS3 to style web content.
- Improve workflow with CSS Preprocessors.
- Utilize JSON & JavaScript to organize data.
- Develop a high-quality personal portfolio site.

Introduction to UX/UI Design **3 Credits/90 Clock-Hours**

Introduction to UX/UI Design teaches students the research and design processes necessary to create high-quality user experiences (UX). Students will use industry-standard tools to design and prototype user interfaces (UI) that are intuitive and easy to use.

Objectives:

- Define UX/UI design process from idea to deliverable.
- Define Gestalt Principles.
- Conduct user interviews and data synthesis.
- Explore ideation processes and user empathy.
- Create a storyboard, user flow, and paper prototypes.
- Conduct UI analysis.
- Create wireframes and prototypes.
- Create site maps and effective navigation using information architecture best practices.
- Create design system and UI style guides.
- Understand the value of grids in creating professional designs.
- Create low, mid, and high-fidelity wireframes and prototypes.
- Conduct usability tests and employ an iterative design process.
- Create a case study.

Responsive Web Design with CMS **3 Credits/90 Clock-Hours**

Responsive Web Design with CMS introduces the process for transforming a static site into a dynamic CMS theme. Students will install the CMS locally, modify content, style the site using CSS/JS, and migrate the CMS to a live internet server.

Objectives:

- Setup a development environment.
- Identify the primary components that make up a CMS theme.
- Utilize CSS Preprocessing and JavaScript to add styling and functionality.
- Create a custom child theme.
- Identify and install essential plugins.
- Migrate the site to a live internet server.

Utah System of Higher Education
Web and Graphic Design
FY2026 / 21 Credits (630 Clock-Hours)

SUPPLEMENTAL COURSE DESCRIPTIONS

Davis

Design with Type **2 Credits/60 Clock-Hours**

Typography introduces the history and principles of using type and words as design elements. Throughout this course, you will study the history of letter forms and fonts as well as various techniques for printing documents.

Objectives:

- Identify and discuss the major technological advances in the history of printing.
- Discuss font styles and families and how they have evolved over time.
- Create wood or potato block letters and use them for printing images.
- Apply typesetting terminology and techniques to documents.
- Design a custom family of font styles.
- Identify the principles of effective typography and font usage.
- Create documents that utilize fonts and letter forms as major design elements.

Digital Publishing **3 Credits/90 Clock-Hours**

Digital Publishing examines the basic features of industry standard software – working with tools and palettes to work to place graphics as well as text. Throughout this course, you will explore how to set up new documents with master pages, work with colors and gradients, import and link graphics, draw with vectors, adjust typography, edit text, create tables, work with XML, export to PDF, and color management. Additionally, you will be introduced to transparencies, blending modes, feathered edges, and drop shadows.

Objectives:

- Identify and work with the workspace.
- Set up a document.
- Work with objects, color, and flowing text.
- Edit text and work with typography and styles.
- Create tables, import and modify graphics, work with transparency.
- Printing and exporting.
- Create PDF files with form fields.
- Create a fixed layout ePub and publish online.

Advanced UX/UI Design **3 Credits/90 Clock-Hours**

Advanced UX/UI Design is designed for students to use the knowledge and skills gained from the Introduction to UX/UI Design course to create applications. Students will use industry-standard tools to design and prototype User Interfaces (UI) that are intuitive and easy to use. Upon course completion, students will have three full case studies for their portfolio.

Objectives:

- Define UX/UI design thinking process.
- Conduct user interviews and data synthesis.
- Demonstrate the skills of user empathy and ideation.
- Create storyboard, user flow, paper prototype.

- Conduct UI analysis.
- Define Gestalt principles.
- Describe information architecture while creating site maps and navigation.
- Create Design System and UI style guides.
- Create low, mid, and high-fidelity wireframe and prototyping.
- Conduct usability test and UI iteration.
- Create a case study summary and full case study.
- Present projects orally.

Digital Video I **3 Credits/90 Clock-Hours**

Students in this course will develop skills using industry standard software to capture and edit audio and video, add and manipulate transitions and effects, and export in a variety of different formats.

Objectives:

- Set up a project.
- Import and organize media.
- Edit video with essential techniques.
- Work with clips and markers.
- Add video and audio transitions.
- Edit video with advanced techniques.
- Put clips in motion.
- Edit, mix, and improve audio.
- Add video effects.
- Apply color correction and grading.
- Work with composting techniques.
- Create new graphics.
- Export frames, clips, and sequences.

Digital Video II **3 Credits/90 Clock-Hours**

Students in this course will develop skills using industry standard software for digital post-production video effects. Students will practice using 2D and 3D tools to create compositing, animation, and effects as motion-graphics professionals, visual effects artists, web designers, and video professionals.

Objectives:

- Work with the After Effects interface and workspace.
- Create basic animation using effects and presets.
- Animate text, layers and multimedia presentations.
- Work with shape layers, masks and keying.
- Distort objects with the puppet tools.
- Correct color.
- Rotoscope with Roto Brush tool.
- Build 3D objects and work with 3D features.
- Work with advanced editing techniques.
- Render and output projects.

eMarketing for Designers **3 Credits/90 Clock-Hours**

Students will learn to effectively and affordably market products, ideas, and information using online shopping carts, email marketing, social networking, search engine optimization, crowd funding, video marketing, and printed collateral.

Objectives:

- Integrate an eCommerce Shopping Cart into an existing website.
- Create an Email Marketing Campaign.
- Utilize Social Networking Business Pages.
- Optimize a webpage for Search Engines.
- Develop a Crowd Funding Campaign.
- Script a Marketing Video.
- Implement Digital Conversion Metrics/Analytics.

Designing for the Real World **3 Credits/90 Clock-Hours**

Designing for the Real World explores what it is like to work in the customer-focused design industry. Throughout this course, you will develop brand identities (from concept to production) for clients in the fashion, tech, and/or restaurant industries. You will experience what it is like to work with real customers and practice responding to many of the most common customer requests. Upon completion of this course, you will have two case studies to add to your portfolio along with an intricate understanding of the difficulties that are involved in designing for real world clients.

Objectives:

- Facilitate a client consultation / discovery meeting.
- Create a proposal / quote / contract for client services.
- Manage multiple clients / projects simultaneously.
- Effectively communicate through project management software.
- Define a target audience with user profiles.
- Design business papers and a style guide.
- Create a website to a client's specifications and satisfaction.

JavaScript Fundamentals **3 Credits/90 Clock-Hours**

Students in this course will learn basic JavaScript programming concepts along with the syntax and techniques needed to build and modify simple web applications. Students will also learn to utilize the tools necessary to troubleshoot and debug JavaScript applications. Students will practice and build dynamically functioning applications using JavaScript.

Objectives:

- Define concepts and terms necessary to develop JavaScript applications.
- Identify and apply basic JavaScript concepts including control flow, functions, methods, object literals, the DOM, forms and arrays.
- Use functions and methods.
- Create real-world front-end applications with JavaScript.
- Identify errors in your code.

Modern JavaScript **3 Credits/90 Clock-Hours**

Students in this course will learn advanced JavaScript programming concepts along with the syntax and techniques needed to build and modify web applications. Students will practice and build dynamically functioning applications using modern JavaScript techniques. Students will also be introduced to jQuery and learn about its relation to JavaScript.

Objectives:

- Create more advanced real-world front-end applications with JavaScript.
- Create useful JavaScript driven UI components like popups, drop-downs, tabs, tool tips and more.
- Apply modern, cutting-edge JavaScript features by using modern workflow (Babel and Webpack).
- Use real-time databases to store, retrieve and update application data.
- Use OOP (object-oriented programming) with JavaScript, working with prototypes & classes.
- Explain the basics of jQuery and its relation to the JavaScript library.

Advanced JavaScript Frameworks **3 Credits/90 Clock-Hours**

Advanced JavaScript Frameworks introduces the most popular JavaScript libraries that are used in Front-End Web Development. During this course, you will explore the capabilities of these frameworks and learn how to install, configure, and implement their most common design patterns. Upon completion of this course, you will be prepared to create dynamic web applications full of advanced functionality.

Objectives:

- Recognize the JavaScript framework ecosystem.
- Utilize NPM, Babel, and Webpack.
- Develop highly reusable JavaScript components.
- Manage and update state within an application.
- Build and deploy a web application with a JavaScript framework.

Graphic Design Principles **3 Credits/90 Clock-Hours**

Students in this course will study the principles and processes of graphic design. Students will practice generating design concepts, applying design principles to graphic design formats and disciplines, and using the design elements to create and design for print and screen media. This course aims to build a solid foundation for better graphic design and communication.

Objectives:

- Define graphic design.
- Examine the formal elements: line, shape, color and texture in design.
- Identify and apply visual hierarchy.
- Recognize design principles in graphics: format, balance, visual hierarchy, rhythm, unity, and line of perceptual organization.
- Design with types.
- Identify the 5-phase design process.
- Generate design concepts.
- Use color to design signs and symbols.

Creative Branding — 1 Credit/30 Clock-Hours

Students will develop a comprehensive understanding of the fundamental principles and practical applications of branding in the context of graphic design and marketing. Participants will delve into the anatomy of successful brands through case studies, explore research methodologies, conduct brand analysis, and ultimately apply their knowledge to create and design their unique brand.

Objectives:

- Explain brand components and their impact on consumer perception.
- Analyze and compare existing brands through research methodologies, applying critical thinking skills to identify strengths, weaknesses, opportunities, and threats to propose innovative branding concepts.
- Create a brand identity, demonstrating synthesis and application of the acquired knowledge in a hands-on project encompassing branding basics, research, analysis, and design principles.

Social Media Marketing — 3 Credits/90 Clock-Hours

Students will delve into the intricacies of major social media platforms, learning to leverage them for effective strategic marketing campaigns. Through a comprehensive curriculum, students will gain proficiency in audience analysis, content creation, and campaign optimization. Practical exercises and real-world case studies will empower students to develop a strategic social media marketing plan, ensuring they are well-prepared for the industry's evolving demands.

Objectives:

- Identify the features and functions of major social media platforms for effective marketing.
- Analyze audience characteristics to tailor marketing strategies for specific demographics.
- Apply content creation techniques and optimization strategies across social media platforms.

Color Theory Application in Digital Design — 1 Credit/30 Clock-Hours

This course reviews the principles and applications of color theory in the context of digital design. Students will gain a deep understanding of color terminology, models, harmony, psychology, and their relevance to contemporary design practices. This course equips students with theoretical knowledge and practical skills essential for effective design work by exploring the intersection of color with current trends and technologies in the digital design world. By the end of the course, students will emerge with a solid foundation in color theory and the ability to apply this knowledge in digital design contexts effectively.

Objectives:

- Define the color basics.
- Identify primary, secondary, and tertiary colors.
- Explain the significance of color attributes in design.
- Describe the color models, harmony, and psychology.
- Describe the color in nature and the design industry.
- Select and combine colors for digital design projects.
- Apply color theory principles to create visually appealing compositions.

Digital Content Creation — 2 Credits/60 Clock-Hours

Digital Content Creation explores topics that provide students with experience in AR, 3D, and asset creation to be used in various Adobe software. Students will learn to create and import brushes,

materials, shapes, and colors using their phones or other mobile devices. Students will have opportunities to develop AR experiences, 3D models, and other content to enhance their engagement with their work.

Objectives:

- Define Content Creation as both traditional and digital. Digitize real-world objects to use in digital image creation.
- Describe augmented reality and its current and future roles in the design industry.
- Create product mockups to display logos and other design assets.
- Practice the use of Artificial Intelligence in Design.
- Create assets from the real world.
- Implement the 3D environment in design.

Introduction to 3D **2 Credits/60 Clock-Hours**

This course introduces students to 3D modeling and animation using Blender, a powerful open-source 3D creation suite. Students will learn the fundamentals of 3D design, including modeling, texturing, lighting, and animation while exploring the interface and tools within Blender. Throughout the course, students will complete hands-on projects to create basic 3D models, animations, and render scenes, gaining practical and technical skills in digital artistry. By the end of the course, students will have a good foundation in 3D design principles and the ability to produce their own 3D assets and simple animations.

Objectives:

- Navigate Blender’s interface and customize workspace layouts for efficient workflows.
- Describe the basic principles of 3D modeling, including polygonal modeling, extrusion, and subdivision surfaces.
- Create and manipulate 3D models using Blender's mesh tools and sculpting features.
- Apply textures, materials, and shaders to models for realistic or stylized rendering.
- Set up and adjust lighting in 3D scenes to achieve various visual effects.
- Animate 3D objects and characters using keyframes and timeline editing in Blender.
- Render still images and animated sequences using Blender’s built-in rendering engines.
- Export 3D models and animations in various formats for other applications or 3D printing.
- Troubleshoot and solve common issues encountered in 3D workflows.
- Develop a personal project demonstrating the skills learned throughout the course.

Web and Graphic Design Externship **2 Credits/90 Clock-Hours**

The Web and Graphic Design externship experience helps you transition from a student into a professional role by allowing you to demonstrate the knowledge, skills, and professional attributes learned in the program while working in a professional setting. Students will gain professional exposure to the nature of new media and essential concepts of visual communication learned throughout the program.

Objectives:

- Observe the day-to-day routines of a professional facility.
- Develop and enhance professional skills and responsibility.
- Improve research and design skills.
- Acquire new knowledge and skills of digital media design process and practice.

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Digital Literacy — 1 Credit/30 Clock-Hours

In this course, students will learn to effectively use digital technologies, such as computers and the internet, to find, evaluate, create, and communicate information. Students will demonstrate their ability to complete basic computing tasks such as working with an operating system, creating and managing files and folders, and effectively utilizing internet searches and resources. Students will also be introduced to common terminology and file types that they will encounter in various digital media industries.

Objectives:

- Demonstrate proper file management including the use of cloud storage.
- Demonstrate basic knowledge of the operating system.
- Describe important facts about the internet and how it works.
- Demonstrate the ability to use various browsers and their development tools.
- Explain the various languages used for building websites and how they interact.
- Describe the tools used for web design/development.
- Explain the various tools commonly used by web and graphic designers.

Design Principles — 2 Credits/60 Clock-Hours

Design principles are fundamental guidelines that help designers to make informed decisions about how to create effective and aesthetically pleasing designs. These principles are based on fundamental principles of visual perception, human behavior, and design theory. This course familiarizes students with the principles of design including the use of color, typography, and layout techniques. After completing the course students will be able to use the design principles and elements to effectively communicate a message or fulfill a specific goal.

Objectives:

- Demonstrate understanding of the design process.
- Describe the principles of design.
- Describe primary design elements.
- Use design tools and software to create and manipulate digital designs.
- Develop effective layouts using various layout techniques.
- Analyze and critique designs using visual vocabulary.

Introduction to JavaScript — 3 Credits/90 Clock-Hours

In this course students will learn to the fundamentals of JavaScript, including its syntax and how to work with its major components, such as variables, data types, operators, functions, control structures, objects, and events. Students will also learn to utilize the tools necessary to troubleshoot and debug JavaScript code. After completing this course students will be able to incorporate JavaScript into a website to create interactive user experiences and simple web applications.

Objectives:

- Explain the key features of the JavaScript syntax.
- Demonstrate proper use of JavaScript syntax such as variables, data types, operators, control structures, functions, objects, and events.
- Use JavaScript to interact with the Document Object Model (DOM).
- Troubleshoot and validate JavaScript code using debugging specific tools and methods.

- Incorporate JavaScript into websites.

Web Animation **3 Credits/90Clock-Hours**

The Web Animation course introduces students to a variety of elements involved in website animation—more specifically animations created using HTML, CSS, JavaScript, and JavaScript libraries. Emphasis is placed on the proper use of these scripting and web languages and creating a variety of graphic objects that improve visual styling and interactivity to a website. Also covered in this course is identifying and developing quality web page content such as navigation buttons and dynamic text effects that will enhance and add polish to your web design portfolio.

Objectives:

- Demonstrate an understanding of the principles of animation, such as timing, spacing, and easing.
- Create animations using web animation tools and technologies, such as CSS, JavaScript, and JavaScript libraries.
- Integrate animations into web design.