

Burlington County Institute of Technology

Medford Campus

Westampton Campus

Career and Technical Programs

Career Cluster: *Architecture and Construction*

Program Name: *Architectural and Design Technology*

Program Title: *Architecture and Design*

CIP Code: *151303*

Board Approval Date: August, 2023



Program of Study

→ Grade 9

- ◆ Introduction to Technical Drafting and CAD
- ◆ Advanced Technical Drafting and CAD

→ Grade 10

- ◆ Engineering Drawing and Design I
- ◆ Engineering Drawing and Design II
- ◆ 3D Modeling and Drone Technology

→ Grade 11

- ◆ Advanced 3D Solid Modeling and Presentation I
- ◆ Parametric Modeling and Drone Technology II
- ◆ Advanced 3D Solid Modeling and Presentation II

→ Grade 12

- ◆ Fundamentals of Residential Architectural Design
- ◆ Architectural Design I
- ◆ Architectural Design II
- ◆ Senior Independent Drone Project
- ◆ Architecture & Design Tech School to Work (Optional)



→ Program Descriptor

- ◆ The Architecture & Design Technology program has been developed to equip the student with computer drafting and design skills. In this curriculum, the student will learn technical and computer skills that will be applied to the architectural, manufacturing & design fields. In addition to computer aided drafting, students will develop an understanding of Computer Aided Manufacturing (CAM) by using the Computer Aided Design (CAD) software to power a 3D Printer. Throughout the course, students will build a professional portfolio. The program requires students to use hands-on skills in collaboration with critical thinking and reasoning skills. Science, Technology, Engineering and Mathematics (STEM) projects will reinforce understanding of industry standards involved with designing real-world mechanical products. This course will use theory sessions, cooperative learning and individualized projects to allow students to share and discuss ideas with each other. In today's team oriented work environment, cooperative learning skills will help ensure student success in their career field. The program also introduces students to Drone Technology. . These aircraft may be remotely controlled or can fly autonomously through software - controlled flight plans. The course will allow students to design, build and program existing drones and fly them safely.

→ Program Outcome

- ◆ The design of a building, theme park, or automobile involves far more than appearance. These things must also be functional, safe, economical, and must suit the needs of the people who use them. It's an architect's or designer's job to take all these things into consideration when they design buildings and products. The student who successfully completes the Architecture & Design Technology program can continue their education at a two or four-year college working towards a career as an architect, civil engineer, mechanical engineer or industrial design technician. They also have the opportunity to enter our School to Work program or seek employment upon graduation as a CAD operator. Successful



Architecture & Design Technology graduates are eligible to earn Industry Valued Credentials in CAD and Drone piloting. Additionally, they may earn college credit through Post-Secondary Articulations with some local colleges.

→ Work Based Learning Opportunities

- ◆ Simulated Workplace Experience: Tech Drawing projects such as floor plans with in house with or outside clients who need basic technical drawings. Clients will submit hand sketches to be modified into viable working drawings that can be used to create an end product. Work may be collaborative - based on the number of students.
- ◆ Simulated Workplace Experience: Students will participate in joint projects with other programs such as construction technology, welding, HVAC, plumbing, and electrical to complete drawings for the manufacturing and installation of construction trades projects.
- ◆ Non-Hazardous Career Preparation: Students will work with companies such as Taylor, Wiseman, and Taylor, Lockheed Martin, PemFab, ScientifiX, and Kobolak & Son, inc. Activities will include working with engineers and drafters in a civil, surveying, and land planning environment. Students will perform work CAD and other related duties.
- ◆ School Based Enterprise: Students are offering design and build services in school and publicly for 3D modeling, laser engraving / cutting, and vinyl cutting graphics for stickers, posters, and tee shirts. Services will be documented as a real business and profits will be used to grow the business.

→ Industry Valued Credentials

- ◆ Autodesk Certified User Certification for AutoCAD, Inventor Professional, and Revit current versions.
- ◆ Part 107 Remote Pilot Certificate
- ◆ Career Safe OSHA 10



Course Descriptions

1. Grade 9

- a. *Intro to Technical Drawing and Computer Aided Design:* The course is designed to introduce the student to technical drawing, including career opportunities in the various drafting and design disciplines. The student will develop basic skills in sketching and computer aided drafting. Development of the importance of Industry standards of technical drawing will be covered. Shop safety procedures will be emphasized. Line, geometric drawing assignments & STEM projects will be utilized in developing the student's drafting ability on the Computer-Aided Design (CAD) system.
- b. *Advanced Technical Drafting and Computer-Aided Design:* This course is designed to develop the student's skills in setup, editing and plotting in CAD. Orthographic projection, geometric construction & dimensioning will be a primary focus of this course. An introduction to section drawing techniques, auxiliary view projection and assembly drawings will be used in developing the student's ability. Additionally, sketching assignments and specialized STEM projects may be used to enhance the student's understanding of the principles of drafting and design. Introductory concepts of architectural drawing may also be covered.

2. Grade 10

- a. *Engineering Drawing and Design I and II* These courses are designed to develop the student's knowledge of industry standards for dimensioning, creating sectional views & auxiliary views. Students will use manual sketching & CAD techniques to apply general rules of dimensioning & describe the basic principles of geometric dimensioning & tolerancing. The course also develops the student's ability to use visualization skills by creating different types of sectional views to view the inside of an object. The students will also be able to create the true size & shape of an inclined plane by developing auxiliary views. Students will be introduced to 3D modeling technology on CAD software. Students will develop and demonstrate a working knowledge of the various types of pictorial drawings used in technical illustration. Specifically, they will cover axonometric drawings in isometric form, oblique drawings using



cabinet and cavalier projection as well as one and two - point perspective drawings. Architectural basics, such as site plans, floor plans, sections and details will also be introduced.

- b. *3D Modeling and Drone Technology* Students will learn the methodology employed in pattern and development drawing, used in the creation of three-dimensional objects from two-dimensional layout drawings. Culminating projects, such as packaging design, may be employed to reinforce understanding of basic techniques. Students will continue to develop their 3D modeling skills by using the CAD *Inventor* software to create virtual solid models. Students will create models from 2D objects using the REVOLVE, EXTRUDE, SWEEP, and LOFT tools in CAD. In this course, students will also be introduced to Drone Technology. The first level drone allows the students to build a small frame, solder flight control circuit boards, trim remote controllers & fly drones. They will also have an opportunity to design their own drone frames on the CAD software & 3D print frames.

3. Grade 11

- a. *Advanced 3D Solid Modeling and Presentation I and II* Students will continue development of their skills by using the CAD software to create virtual solid models. They will also use the CAD boolean operations to combine & subtract composite models. Students will also be able to adjust, edit & plot solids in CAD. In this course, the students will be able to create real world objects & show how they interrelate by generating working / assembly drawings. Using the 3D CAD software will allow the students to explore CAM (Computer Aided Manufacturing). The students will have the ability to apply solid modeling to virtually create real world objects and use the 3D printer to make products. Previous CAD concepts may also be reinforced using AutoCAD software. Previously introduced architectural concepts will be expanded through the use of dedicated architectural software and scale modeling.
- b. *Parametric Modeling and Drone Technology* Students will use 3D parametric modeling software to aid in the development and understanding of assembly drawings along with basic principles of design. 3D software will be used to generate part, drawing and assembly files. Specifically, the students will learn the terminology, formulas and calculations used to generate a spur gear and pinion. The principles and design of simple cam profiles will also be covered. The general types of mechanical fasteners found in industry will be explored, with a special emphasis on the nomenclature and callouts for threaded fasteners. 3D printing will be used where applicable to prototype and validate student projects.



Continued study of Drone Technology will be accomplished through design, construction and elementary programming concepts. Students will be challenged to develop improvements or innovations to existing drone designs.

4. Grade 12

- a. *Fundamentals of Residential Architectural Design* This course continues the students' knowledge of REVIT architectural software. It expands on the exploration of residential design through the development of common detail drawings used in the construction process. The student will develop an advanced understanding of residential design through various assignments including plot plans, foundation plans, details, floor plans, electrical and mechanical, door and window schedules and elevations. The culminating activity will be to develop a unique and personalized design. Three-dimensional building and component drawings will also be included in the course. Scaled models may be constructed using various media such as foam board, balsa and basswood.
- b. *Architectural Design I and II* This course allows the student to apply concepts from Fundamentals of Residential Architectural Design. The students will be expected to use the design process to plan & design a residential dwelling. The students will use the REVIT Architecture software to illustrate floor plans, elevations, wall sections & topography surfaces. Cost estimation & site surveying will also be a part of the course. Continued Drone Technology will be accomplished through design, construction and elementary programming concepts. Students will be challenged to develop improvements or innovations to existing drone designs. Flight Mechanics, basic flight-related terminology describing the actions of the drone while in mid-air, and the logic behind the parts of the vehicle that cause those actions to take place will be covered. Pitch, roll, and yaw will be explained in the context of a drone. In addition, piloting skills, photography, image processing and continued safety training will be included.
- c. *Senior Independent Drone Project* Students will have the opportunity to pursue instructor approved, class related independent project(s) based on student needs, interest and ability. The project(s) will be grade level appropriate and will reinforce material and concepts learned to date. Emphasis will be on student centered learning and will provide the opportunity to explore new career related topics.
- d. *Architecture and Design Technology School to Work(Optional)* This experience is available to qualified students that have the ability to demonstrate their skills and proficiencies in Architecture, design or



construction setting. Students will earn credit and income during their school to work experiences in their field of study. Students must provide their own transportation to be qualified for this opportunity. This experience is coordinated by the school to work coordinator and must have the recommendation of the Architecture & Design Technology instructor.



Curriculum Maps

Course: Safety

Unit: OSHA 10

Length: 1 Week

Standards

- 9.3.12.AG-FD.1 Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.
- 9.3.12.AC-CST.5 Apply practices and procedures required to maintain jobsite safety.
- 9.3.12.AR.2 Analyze the importance of health, safety and environmental management systems, policies and procedures common in arts, audio/video technology and communications activities and facilities.
- 9.3.12.ED.4 Evaluate and manage risks to safety, health and the environment in education and training settings.
- 9.3.HT-RFB.2 Demonstrate safety and sanitation procedures in food and beverage service facilities.
- 9.3.HU-ED.5 Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.
- 9.3.LW.4 Conduct law, public safety, corrections and security work tasks in accordance with employee and employer rights, obligations and responsibilities, including occupational safety and health requirements.
- 9.3.LW-ENF.8 Explain the appropriate techniques for managing crisis situations in order to maintain public safety.
- 9.3.MN.3 Comply with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 9.3.MN-HSE.3 Demonstrates a safety inspection process to assure a healthy and safe manufacturing environment.
- 9.3.MN-HSE.5 Evaluate continuous improvement protocols and techniques in health, safety and/or environmental practices.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.



- 9.3.12.TD-HSE.1 Describe the health, safety and environmental rules and regulations in transportation, distribution and logistics workplaces.
- 9.3.12.TD-OPS.3 Comply with policies, laws and regulations in order to maintain safety, security and health and mitigate the economic and environmental risk of transportation operations.

Essential Question(s)

- Why is it important to practice safety?
- What do safe practices look like in my industry?
- How can I keep myself and others safe?

Content

- Walking working surfaces
- Emergency action plans
- Fire protection
- Electrocution hazards
- Personal protective equipment
- Hazard communication
- Materials handling, storage, use and disposal.

Skills

- Explain why OSHA is important to workers.
- Explain workers rights under OSHA
- Discuss employer responsibilities under OSHA.
- Discuss the use of OSHA standards.
- Explain how OSHA inspections are conducted.
- Utilize helpful worker safety and health resources.
- Identify hazards in the workplace associated with walking and working surfaces.



- Identify best practices for eliminating or controlling hazards associated with walking and working surfaces in the workplace.
- Recognize employer requirements to protect workers from walking and working surface hazards.
- Recognize benefits of an Emergency Action Plan.
- Identify elements of the Fire Protection Plan.
- Identify conditions under which evacuation actions may be necessary in an emergency situation.
- Identify conditions under which shelter-in-place may be necessary in an emergency situation.
- Identify characteristics of an effective emergency escape route.
- Recognize the five types of fire extinguishers, including the types of fires they can extinguish.
- Review requirements for proper maintenance of portable fire extinguishers.
- Identify major electrical hazards.
- Describe types of electrical hazards.
- Describe electrical protection methods.
- Recognize employer requirements to protect workers from electrical hazards.
- Recall employer responsibilities toward affected employees regarding PPE.
- Identify when face and head protection should be used.
- Recall which types of hand and foot protection should be used in a specific situation.
- Recognize the differences between respirator types.
- Identify the differences between full-body protection levels.
- Identify the employer's responsibilities under the HCS, including training requirements.
- Identify components of a Hazard Communication program.
- Describe requirements of the different types of Hazard Communication labels.
- Locate pertinent information about chemicals on labels, including other forms of hazard communication, to ensure "right to understanding" provisions of GHS requirements.
- Identify types of material handling equipment.
- Describe hazards associated with material handling activities (e.g., storage, use, and disposal).
- Identify methods to prevent hazards associated with material handling equipment.
- Recognize employer requirements to protect workers from material handling hazards
- Identify the main causes of machinery accidents.



- Recognize basic machinery parts that expose workers to hazards.
- Recognize workplace situations involving machinery that requires guarding.
- Identify the requirements for safeguards.
- Identify types of machine guards including types of devices used to safeguard machines.
- Identify strategies to control chemical hazards.
- Identify strategies to control biological hazards.
- Identify strategies to control physical hazards.
- Identify strategies to control ergonomic hazards.
- Identify OSHA requirements pertaining to bloodborne pathogens.
- List the potential routes of exposure from bloodborne pathogens.
- Identify the risks associated with Human Immunodeficiency Virus (HIV), Hepatitis B, and Hepatitis C Virus.
- Identify methods of preventing transmission of bloodborne pathogens & managing occupational exposures.
- Restate methods of the safe disposal of sharps.
- Recount steps which should be taken in the event of an exposure to a potential bloodborne pathogen.
- Recognize risk factors associated with work-related musculoskeletal disorders (MSD)s.
- Identify good posture.
- Describe safe lifting techniques.
- Identify ergonomic control methods for eliminating/reducing work-related MSDs.
- Identify the number one cause of death for U.S. teens.
- List eight risk factors for young drivers.
- Identify the biggest risk factor for young drivers.
- Define distracted driving.
- Provide examples and/or causes of distracted driving.
- Identify the biggest risk factor for distracted driving
- Discuss the risk of having other young passengers in the car.
- List some actions employers should take to keep employees safe while driving.
- List some actions employees can take to safely drive on the job.
- Define the term violence.
- Recall who is at risk for encountering workplace violence.



- Describe workplace violence prevention strategies.
- Identify how to StartSafe and StaySafe to prevent or lessen workplace violence.
- Recognize the costs of workplace accidents.
- Recognize the benefits of implementing an effective safety and health program.
- Describe the elements of an effective safety and health program.
- Identify three methods to prevent workplace hazards.

Assessments

- OSHA 10 Assessment and Certificate

Course: CTE

Unit: Career Awareness

Length: Woven Throughout

Standards

- 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.
- 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
- 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. •



- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.
- 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
- 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
- 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
- 9.2.12.CAP.11: Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education
- 9.2.12.CAP.12: Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients.
- 9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market.
- 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income
- 9.2.12.CAP.15: Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.
- 9.2.12.CAP.16: Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments. •
- 9.2.12.CAP.17: Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice. •
- 9.2.12.CAP.18: Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding). •



- 9.2.12.CAP.19: Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income.
- 9.2.12.CAP.20: Analyze a Federal and State Income Tax Return
- 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business.
- 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.
- 9.2.12.CAP.23: Identify different ways to obtain capital for starting a business

Essential Question(s)

- How does one prepare for a career?
- How does one improve marketability?
- Why is career planning important?
- What are the risks in starting a business?

Content

- There are strategies to improve one's professional value and marketability.
- Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
- An individual's income and benefit needs and financial plan can change over time.
- Securing an income involve an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans
- Understanding income involves an analysis of payroll taxes, deductions and earned benefits.
- There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals

Skills

- Act as a responsible and contributing community member and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions.



- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity, increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Assessments

- Career Research Project
- Resume/Cover Letter

Course: Intro to Technical Drawing and CAD

Length: Semester

Standards

- 9.2.12.CAP.8 Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests) used by employers in various industry sectors.
- 9.3.12.B.1 Use vocabulary, symbols and formulas common to architecture and construction.
- 9.2.12.CAP.3 Investigate how continuing education contributes to one's career and personal growth.

Essential Question(s)



- What is Drafting?
- What types of careers exist in the Drafting field.
- What kinds of safety procedures relate to the CAD/Drafting shop?

Content

- Introduction to Drafting:
 - Understand the foundational concepts of drafting as a discipline.
- Exploratory Drafting:
 - Explore different aspects of drafting to gain a comprehensive understanding.
- Drafting Equipment:
 - Learn to use and become familiar with essential drafting equipment.
- Shop Safety:
 - Understand and practice safety measures in the drafting environment to ensure a secure workspace.

Skills

- Class Rules and Safety:
 - Understand and adhere to class rules and safety protocols.
- Shop Requirements and Dress Code:
 - Comprehend shop requirements, including the dress code for the drafting class.
- Basic Math Skills:
 - Demonstrate proficiency in basic math skills required for drafting.
- Safety Procedures in the Shop:
 - Define and follow safety procedures specific to the drafting shop environment.
- Tools Used in the Shop:
 - Define and become familiar with the tools used in the drafting shop.
- Different Types of Programs:
 - Understand and distinguish between different types of drafting programs used in the class.
- Safety Test:
 - Successfully pass a safety test that covers shop safety procedures and protocols.

Assessments



- Written/Oral quizzes and tests
- Shop review and safety quiz
- Quizzes on how to read a scale
- Written exam on simple math problems
- Daily practical
- Observation Practical

Course: Advanced Technical Drawing and CAD

Length: GR9 S2

Standards

- 9.3.12.B2.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.O1.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.12.O1.5 Apply the knowledge learned in STEM to solve problems

Essential Question(s)

- Why are we still learning to draw by hand?
- How can complex objects be broken down into simple geometric shapes?
- How can geometric construction be helpful to designers?
- What is the role of Orthographic Projection in MultiView Drawing?
- What are the three most common views used in orthographic projection

Content

- Drafting Hand Tool Equipment:
 - Identify and become familiar with common hand tools used in drafting.



- Demonstrate the proper usage and handling of drafting hand tools.
- Understand the maintenance and care of drafting hand tool equipment.
- Board Drawing Basics:
 - Understand the fundamentals of board drawing in drafting.
 - Learn how to set up a drawing board for effective drafting work.
 - Practice basic drawing techniques on a drafting board.
- Lettering:
 - Develop skill in precise and legible lettering for drafting purposes.
 - Understand the importance of consistent and clear lettering in technical drawings.
 - Practice different styles of lettering commonly used in drafting.
- Scales and Scaling:
 - Learn about different types of scales used in drafting.
 - Understand how scaling works and its importance in creating accurate drawings.
 - Practice scaling drawings to different dimensions using appropriate scales.
- Geometric Construction:
 - Understand the fundamental principles and techniques of geometric construction.
 - Apply geometric construction methods to create precise and accurate figures and shapes.
- Parallels:
 - Define and identify parallel lines in geometric constructions.
 - Use parallel lines in constructing various shapes and figures.
- Perpendicular:
 - Define and identify perpendicular lines in geometric constructions.
 - Apply the concept of perpendicular lines to construct right angles and other geometric shapes.
- Tangents:
 - Understand the concept of tangents in relation to circles and other shapes.
 - Construct tangents to circles and explore their applications in geometric construction.
- Polygons:
 - Define polygons and their essential characteristics.
 - Explore the construction of various polygons using geometric methods.
- Inscribing:
 - Learn how to inscribe polygons within circles using geometric construction techniques.
 - Apply inscribing methods to create polygons with specific properties.
- Circumscribing:
 - Understand the concept of circumscribing polygons around circles.



- Practice circumscribing techniques to create polygons with specific attributes.
- Orthographic Projection (MultiView Drawing):
 - Understand the fundamental concept of orthographic projection in multiview drawing.
 - Apply orthographic projection techniques to represent objects accurately in multiple views.
- Alphabet of Lines in Orthographic Projection:
 - Familiarize with the various types of lines used in orthographic projection drawings (e.g., visible, hidden, center, dimension, etc.).
 - Apply the correct type of line for each specific purpose in orthographic projection.
- Identify Best Front View Using Front View Consideration Rules:
 - Learn and apply the front view consideration rules to identify the most suitable front view of an object for orthographic projection.
- Three Principal Views:
 - Define and understand the concept of three principal views in orthographic projection (top, front, right-side).
 - Practice representing objects using the three principal views.
- 1st Angle Projection:
 - Understand the principles of first angle projection and its application in orthographic projection.
 - Create drawings using the first angle projection method.
- 3rd Angle Projection:
 - Understand the principles of third angle projection and its application in orthographic projection.
 - Create drawings using the third angle projection method.
- Use of Hidden Lines:
 - Understand the purpose of hidden lines in orthographic projection.
 - Properly use hidden lines to represent features that are not visible in a specific view.
- Line Precedence:
 - Understand the hierarchy of line precedence in orthographic projection.
 - Apply line precedence rules to ensure clarity and readability in drawings.

Skills

- Identify Various Drafting Tools:
 - Be able to recognize and name a range of drafting tools used in technical drawing.
 - Understand the purpose and function of each tool, as well as the situations in which they are commonly used.



- Understand How Each Tool is Used:
 - Gain a comprehensive understanding of the specific role and application of each drafting tool.
 - Learn the proper techniques for using these tools effectively to create technical drawings.
- Demonstrate the Ability to Use Each Tool Properly:
 - Develop proficiency in handling and using each drafting tool correctly.
 - Practice using the tools in various drafting tasks, showcasing proper technique and precision.
- Recreate Basic Technical Drawings:
 - Be capable of recreating simple technical drawings, including basic geometric shapes, lines, and annotations.
 - Demonstrate the ability to accurately reproduce existing technical drawings, paying attention to details and proportions.
- Emphasize Line Work Technique Showing Neatness and Accuracy:
 - Focus on mastering line work techniques in drafting, including line weight, style, and consistency.
 - Produce neat and accurate line work in technical drawings, showcasing a high level of attention to detail and precision.
- Geometric Skills
 - Identify basic geometric shapes such as angles and polygons
 - Bisect lines, arcs and angles Construct various polygons
 - Solve both technical and mathematical problems through geometric construction with hand tools and CAD
 - Graphically use the Pythagorean Theorem
 - Divide lines into a given number of equal divisions
- Orthographic Projection Skills:
 - Create standard orthographic views of given objects.
 - Use and place Visible, Center, Hidden, and other linetypes as needed.
 - Show hidden features by the use of hidden lines.
- Projection Format:
 - Create orthographic views in 3rd Angle Projection Format.
 - Identify 1st Angle Projection Drawings.
- View Selection:
 - Select appropriate front views based on object characteristics.
- Clarity and Readability:
 - Apply techniques of line precedence to ensure clear and readable drawings.



Assessments

- Vocabulary Identification
- Multi tier level quiz with true, false, matching and multiple choice questions
- Proper cleaning, storage, handling and usage of tools i.e., triangles compass, protractor
- Unit Repetition
- Verbal and visually identify the most common geometric shapes
- Correctly construct assigned projects geometrically
- Increasingly more difficult geometric drawings
- Create drawings with correct methodology as applied to Orthographic Projection, 3rd Angle Projection rules , Hidden Lines and Line Precedence
- Daily Participation

Course: Engineering Drawing and Design I

Length: Semester

Standards

- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
- 9.3.ST-ET.1 Use STEM concepts and processes to solve problems involving design and/or production.
- 4.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects.
- 4.G.CO.13 Construct various geometric constructions for design applications.

Essential Question(s)

- When is an Auxiliary view required?
- What is the true size and shape?



- What is a pictorial drawing and why is it used?
- What is an isometric drawing, and how is it used?
- What are the basic types of Pictorial views?
- What is pattern development and how is it used by industry?
- How are pattern development drawings different from other technical drawings?
- What is the difference between parallel & radial line developments?
- What is a wired edge, hem, and seam and why are they used?

Content

- Auxiliary and Revolved View Drawings:
 - Understand the purpose and use of auxiliary view drawings in representing inclined surfaces.
 - Learn how to create auxiliary views to depict objects with inclined features accurately.
 - Comprehend the concept of revolved view drawings and their application in showing cylindrical or symmetrical objects from different angles.
- True Length Lines:
 - Define true length lines and their significance in technical drawings.
 - Learn to calculate and accurately represent true length lines in various views.
 - Apply true length lines in multiview drawings to maintain accuracy and consistency.
- Circles as Ellipses:
 - Understand the geometric relationship between circles and ellipses in technical drawing.
 - Learn to represent circles as ellipses when viewed at an angle in orthographic projections.
 - Apply this concept to ensure accuracy when drawing circles in inclined views.
- Single and Multi-View:
 - Differentiate between single-view and multi-view drawings.
 - Understand the advantages and limitations of each approach in conveying object information.
 - Apply the appropriate approach based on the purpose and complexity of the object being represented.
- Pictorial Drawing & Design:
 - Understand the fundamental concepts of pictorial drawing.
 - Learn the importance of pictorial drawings in design and communication.
- Isometric Projection:
 - Master the principles of isometric projection.
 - Be able to create accurate isometric drawings of objects.



- Isometric Axis:
 - Understand the role of the isometric axis in creating isometric projections.
 - Apply proper isometric axes to accurately represent objects.
- Oblique Projection:
 - Learn the principles and application of oblique projection in technical drawing.
 - Be able to create oblique projections of objects with different inclinations.
- Cabinet Projection:
 - Understand the concept of cabinet projection.
 - Be able to create cabinet projections of objects with specific angles and dimensions.
- Cavalier Projection:
 - Learn about cavalier projection and its use in technical drawings.
 - Be able to create accurate cavalier projections of objects.
- General Pictorial Drawing:
 - Understand the concept and purpose of general pictorial drawings.
 - Be able to create general pictorial drawings to effectively communicate design concepts.
- One-Point Perspective:
 - Master the principles of one-point perspective in drawings.
 - Apply one-point perspective to represent objects with depth and distance.
- Vanishing Points:
 - Understand the role of vanishing points in perspective drawing.
 - Learn to properly position and use vanishing points to create realistic drawings.
- Perspective Drawing:
 - Learn the fundamentals of perspective drawing.
 - Be able to create drawings with realistic depth and proportions using perspective techniques.
- Two-Point Perspective:
 - Master the principles of two-point perspective in drawings.
 - Apply two-point perspective to represent objects from different angles and orientations.
- Developments and Patterns:
 - Understand the concept and purpose of developments and patterns in drafting.
 - Learn how developments and patterns are used to create two-dimensional representations of three-dimensional objects.
- Radial Line Development:
 - Master the principles of radial line development.
 - Be able to create accurate radial line developments for objects with radial symmetry.



- Parallel Line Development:
 - Learn the techniques and principles of parallel line development.
 - Be able to create parallel line developments for objects with linear or planar symmetry.

Skills

- Projection Lines:
 - Continue to use projection lines effectively to aid in creating accurate drawings.
 - Understand the purpose of projection lines and their role in maintaining proportional relationships between views.
- Auxiliary Views:
 - Identify situations where an auxiliary view is needed, especially for objects with inclined or non-orthogonal surfaces.
 - Learn to recognize when the standard orthogonal views are not sufficient to convey the true shape of an object.
- True Size and Shape:
 - Determine the true size and shape of inclined surfaces in a three-dimensional object.
 - Apply geometric principles to accurately represent the true proportions of inclined surfaces in technical drawings.
- Auxiliary and Revolved Views:
 - Develop the skills to create various auxiliary views that accurately represent angular or inclined elements of an object.
 - Understand the process of generating auxiliary and revolved views to provide a more comprehensive understanding of the object's geometry.
- Understanding Pictorial Drawings:
 - Identify and describe various types of pictorial drawings, such as isometric, oblique, and perspective.
 - Understand the purpose and advantages of using different pictorial drawing styles.
- Axonometric Projections:
 - Demonstrate a comprehensive understanding of the three types of axonometric projection: isometric, cavalier, and cabinet.
 - Know when and how to use each type of axonometric projection to accurately represent objects.
- Practical Application of Axonometric Styles:
 - Create drawings in the cavalier, normal (orthographic), and cabinet oblique styles, showcasing a



- practical understanding of each style's principles.
- Understand the differences in projection angles, scale, and proportions in these styles.
- Perspective Drawings:
 - Create various 1 & 2 point perspective drawings, demonstrating the ability to convey depth and spatial relationships.
 - Apply the principles of perspective to create drawings that accurately depict objects from different angles and orientations.
- Isometric Drawings:
 - Apply the skills learned to make isometric drawings from 2D layouts.
 - Convert two-dimensional layouts or plans into isometric drawings to visualize objects in three dimensions.
- Methods for Producing Patterns:
 - Identify and describe various methods used in producing patterns in drafting, including common techniques like parallel and radial line development.
- Principles of Pattern Development:
 - Understand and describe the fundamental principles underlying the process of pattern development.
 - Learn how these principles ensure accuracy and consistency in creating patterns.
- Parallel and Radial Line Development:
 - Explain both the parallel line and radial line development methods in detail.
 - Understand the differences between these methods and when each is most suitable for creating specific types of patterns.
- Material Impact on Pattern Fabrication:
 - Describe how the choice of material affects the fabrication of the actual pattern.
 - Understand considerations such as material thickness, flexibility, and other factors that influence pattern creation for different materials.
- Pattern Development for Geometric Shapes:
 - Develop patterns for various geometric shapes such as cylinders, prisms, pyramids, and cones.
 - Apply pattern development techniques to accurately create templates for these common geometric objects.

Assessments



- Verbal and visual identification of auxiliary surfaces
- Oral and written evaluations, quizzes, tests, vocabulary identification
- Drawing simple auxiliary
- Understand and define pictorial vocabulary terms
- Identify the three categories pictorial drawings
- Create properly spaced pictorial drawings of simple objects
- Complete increasingly more complex object pictorial drawings
- Multi tier level quizzes and tests
- Prepare pattern development drawings for simple geometric shapes
- Assemble 3-D paper models of shapes
- Produce thin gauge sheet metal HVAC ductwork drawings
- Correctly use bend allowances

Course: Engineering Drawing and Design II

Length: Semester

Standards

- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
- 9.3.ST-ET.1 Use STEM concepts and processes to solve problems involving design and/or production.
- 4.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects.
- 4.G.CO.13 Construct various geometric constructions for design applications.
- 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.
- 9.3.ST-ET.2 Display and communicate STEM information.

Essential Question(s)



- Why are threads and fasteners so important?
- How are they specified?
- What types are most commonly used in industry?
- Why are working drawings used?
- Name five types of information used in a detail drawing?
- How do detail drawings differ from assembly drawings?
- What factors influence design?
- How are new ideas brought to reality?
- What is the design process?

Content

- Methods for Producing Patterns:
 - Identify and describe various methods used in producing patterns in drafting, including common techniques like parallel and radial line development.
- Principles of Pattern Development:
 - Understand and describe the fundamental principles underlying the process of pattern development.
 - Learn how these principles ensure accuracy and consistency in creating patterns.
- Parallel and Radial Line Development:
 - Explain both the parallel line and radial line development methods in detail.
 - Understand the differences between these methods and when each is most suitable for creating specific types of patterns.
- Material Impact on Pattern Fabrication:
 - Describe how the choice of material affects the fabrication of the actual pattern.
 - Understand considerations such as material thickness, flexibility, and other factors that influence pattern creation for different materials.
- Pattern Development for Geometric Shapes:
 - Develop patterns for various geometric shapes such as cylinders, prisms, pyramids, and cones.
 - Apply pattern development techniques to accurately create templates for these common geometric objects.
- Detail Drawings:
 - Understand the purpose and importance of detail drawings in engineering and design.
 - Learn how detail drawings communicate precise information about an object or component.
- Characteristics of Detail Drawings:



- Familiarize with the essential characteristics of detail drawings, including accuracy, clarity, completeness, and standardized conventions.
- Recognize the role of detail drawings in providing comprehensive instructions for manufacturing and assembly.
- Size, Shape, and Specification Information:
 - Learn how to accurately represent size and shape information in detail drawings, using appropriate scaling and proportions.
 - Understand how specification information, such as material, finish, and tolerances, is crucial for ensuring proper production.
- Notes:
 - Understand the purpose of notes in detail drawings and their role in conveying additional information or instructions.
 - Learn how to write clear and concise notes that enhance the understanding of the drawing's intent.
- Dimensions:
 - Master the skill of dimensioning in detail drawings, including linear, angular, and geometric dimensions.
 - Learn how to use dimensions effectively to indicate size, tolerances, and relationships between features.
- Vocabulary Expansion:
 - Learn new technical vocabulary specific to detail drawings and engineering terminology.
 - Enhance communication skills by using precise language when discussing and documenting technical details.
- Design Process:
 - Understand the key stages and components of the design process, including conceptualization, ideation, iteration, refinement, and finalization.
 - Learn how to effectively apply the design process to create innovative and functional solutions.
- Form Follows Function:
 - Grasp the principle that form should be derived from the intended function of a product or object.
 - Learn how to apply the "form follows function" concept to create designs that prioritize usability and efficiency.
- Manufacturing Process in Design:
 - Recognize the crucial role of the manufacturing process in design decisions.
 - Understand how design choices impact manufacturability, cost, material selection, and production efficiency.



Skills

- Threads and Fasteners:
 - Understand the fundamental concepts of threads and fasteners in engineering and design.
- Thread Terminology:
 - Learn and become familiar with essential terminology related to threads, including terms such as pitch, thread diameter, and thread direction.
- Permanent Fasteners:
 - Know the types and characteristics of permanent fasteners, which are designed to remain in place after installation without regular removal.
- Semi-Permanent Fasteners:
 - Understand the concept of semi-permanent fasteners, which allow for some disassembly and reassembly while providing a secure hold for repeated use.

- Working Detail Drawing:
 - Explain why working drawings are needed.
 - Discuss the differences between detail & assembly drawings
 - Prepare simple & more complexed detailed drawings
- Understanding Design:
 - Describe the fundamental aspects of design, including aesthetics, functionality, materials, and user experience.
 - Grasp the holistic nature of design, considering both form and function.
- Design Process Knowledge:
 - Demonstrate a working knowledge of the design process, from ideation to prototyping and refinement.
 - Understand the iterative nature of design and the importance of feedback in the process.
- Engineering Design Models:
 - Use both traditional and current engineering design models to develop and refine designs.
 - Stay updated with the latest design methodologies and tools.
- Manufacturing Impact on Design:
 - Develop a working knowledge of manufacturing processes and their significant role in design decisions.
 - Understand how design choices influence manufacturability, cost, and production efficiency.



- Hands-on Skills:
 - Demonstrate the use of basic hand and power tools commonly used in the design and fabrication process.
 - Apply hands-on skills to turn design concepts into tangible prototypes or models.

Assessments

- Verbally and visually
- Identify fastener terms
- Draw detailed, schematic and
- Simplified threads
- Create drawings using various other fasteners using CAD Techniques
- Create detail drawings
- Sketches of a new design or invention based on given parameters
- Detail and assembly drawings of a new design
- Safety test / quizzes

Course: 3D Modeling and Drone Technology

Length: Semester

Standards

- 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.
- 9.3.ST-ET.2 Display and communicate STEM information.
- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.

Essential Questions



- What are three coordinates needed to locate any point in 3D space?
- In a 2D drawing, what is the value for the Z coordinate?
- What purpose does the right-hand rule serve?
- What is the definition of a viewport?
- What does UCS stand for and what function does the workplane serve?
- What is the function of the 3D modeling ribbon & panels?
- What does wireframe construction mean?
- How can *Inventor* software be used to create 3D solids?
- How is *Inventor* used
- To create working drawings?
- What is a drone or UAV (Unmanned Aerial Vehicle) ?
- What are the essential components that make up a 110 mm drone?

Content

- Introduction to Three-Dimensional Modeling:
 - Understand the purpose and significance of three-dimensional (3D) modeling in design and visualization.
 - Grasp the advantages of 3D modeling over two-dimensional representations.
- The Coordinate System:
 - Learn the fundamentals of the coordinate system and its importance in 3D modeling.
 - Understand how the coordinate system enables precise positioning of objects in 3D space.
- Understanding UCS Planes:
 - Familiarize with the concept of User Coordinate Systems (UCS) and their role in 3D modeling.
 - Learn how UCS planes help define orientation and perspective in a 3D environment.
- X, Y, and Z Axes:
 - Master the understanding of the X, Y, and Z axes in the context of 3D modeling.
 - Apply this knowledge to manipulate objects in three dimensions and accurately position them in the coordinate system.
- History of UAVs:
 - Understand the evolution and significant milestones in the history of Unmanned Aerial Vehicles (UAVs), commonly known as drones.
 - Explore the historical context and various applications of UAVs in different industries.
- Drone Assembly and Soldering:



- Master the ability to read and interpret assembly diagrams and schematics specific to drones.
- Learn the process of assembling drone components, including proper placement and connection.
- Component Assembly:
 - Develop proficiency in assembling various components required for UAV operation, such as frames, motors, flight controllers, and power systems.
 - Ensure the correct assembly to achieve a functional and safe UAV.
- Soldering Techniques:
 - Learn the proper techniques for soldering components, with a focus on soldering the flight controller and motors to ensure reliable connections.
 - Understand the importance of soldering for electrical stability and safety in UAVs.
- Flight Simulation:
 - Explore the use of flight simulation software to virtually operate and test UAVs in a controlled environment.
 - Learn how to simulate different flight scenarios, understanding the behavior and responsiveness of drones.

Skills

- Understanding 3D Space and Navigation:
 - Learn new vocabulary related to 3D modeling and design to effectively communicate ideas.
 - Describe how to locate points in 3D space, understanding how coordinates work in three dimensions.
 - Explain the right-hand rule in 3D visualization to comprehend orientation and alignment in a consistent manner.
- Software Interface and Navigation Tools:
 - Explain the function of the ribbon in the CAD software, understanding its role in accessing various commands and tools.
 - Identify the functions of the viewport controls and the Viewcube, which are essential for navigating and manipulating the 3D environment.
- 3D Object Display and Visual Styles:
 - Display 3D objects from preset Isometric viewports, utilizing standard views for better visualization.
 - Set visual styles to enhance the appearance of 3D objects, choosing appropriate styles for different presentations.
- Basic 3D Object Creation:
 - Use the CAD software to create a basic 3D object by using wireframe construction, understanding how



to define the structure and form of the object.

- Learn Drone Terminology:
 - Familiarize yourself with key terms and concepts used in the world of drones, including terminology related to components, flight modes, and control systems.
- Interpret and Create Drone Assembly Documents:
 - Develop the ability to read and understand drone assembly documents, such as diagrams, schematics, and instruction manuals.
 - Gain proficiency in creating clear and accurate assembly documents for drones.
- Basic Soldering Techniques:
 - Master the fundamental soldering techniques required for connecting drone components, ensuring secure and reliable electrical connections.
 - Understand the importance of proper soldering in maintaining the integrity of drone systems.
- Mechanical Assembly Techniques:
 - Learn essential mechanical assembly techniques, such as proper component placement, attachment methods, and ensuring structural stability in drone construction.
- Flying on a Simulator:
 - Utilize drone flight simulation software to practice piloting skills in a controlled virtual environment.
 - Develop the ability to handle various flight scenarios and master drone control on a simulator.

Assessments

- Demonstrate the ability to navigate through the 3D modeling workspace.
- Create wireframe 3D models & display in layout.
- Multi tier level quizzes and tests .
- Assembly and schematic prints
- 110 mm Drone Assembly
- Flight simulation

Course: Advanced 3D Solid Modeling and Presentation I & II

Length: 2 Semesters



Standards

- 9.3.ST.6 Demonstrate technical skills needed in a chosen STEM field.
- 9.3.ST-ET.2 Display and communicate STEM information.
- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues. 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.AC-DES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.

Essential Question(s)

- How are new ideas initiated?
- What is the design process?
- What is good design?
- What is a solid primitive?
- What is a solid composite?
- Which types of mathematical calculations are used in the construction of solid models?
- How are two or more solids combined to make a composite solid?
- What is the function of the Union, Subtract & Intersect commands?
- What is 3D printing



- What materials are used in 3D printing
- How can 3D CAD drawings be converted to .stl files?
- What settings are available to control 3D print output?
- What is the difference between a solid model & a surface model?
- How can you create solid models with the Revolve, Extrude, Sweep, and Loft commands?
- How can you create a surface model from 2D objects?

Content

- Basic Design Process:
 - Understand the fundamental steps involved in the design process, from problem identification to solution implementation.
 - Familiarize with the iterative nature of the design process, emphasizing continuous improvement and refinement.
- Identify Problem or Need:
 - Develop the ability to identify and define a specific problem or need that requires a design solution.
 - Learn how to gather relevant information, conduct research, and clarify the problem statement.
- Explore Possible Solutions:
 - Explore creative brainstorming techniques to generate a variety of potential solutions for the identified problem or need.
 - Understand the importance of considering multiple approaches and evaluating the feasibility of each solution.
- Understanding Primitives:
 - Familiarize with basic geometric primitives commonly used in 3D modeling and computer-aided design.
 - Gain a clear understanding of the fundamental characteristics and properties of each primitive shape, including BOX, CONE, SPHERE, TORUS, WEDGE, and CYLINDER.
- Utilizing Primitives:
 - Learn how to create and manipulate 3D models using the specified primitives, including techniques for resizing, rotating, and positioning.
 - Explore the versatility of primitives in constructing more complex shapes and objects.
- Composite Objects:



- Understand the concept of composite objects, which involve combining multiple primitives to create intricate 3D structures.
- Learn how to build composite objects by utilizing a combination of the listed primitives, exploring the creative possibilities they offer.
- Creating Complex Shapes:
 - Apply the knowledge of primitives and composites to construct more elaborate 3D shapes, demonstrating the ability to combine different primitives in innovative ways.
 - Gain practical experience in designing and creating complex 3D models using the foundational primitives.
- Understanding 3D Printing:
 - Explain the fundamental differences between a 3D printer and a standard 2D printer, including the concept of layer-by-layer additive manufacturing in 3D printing.
 - Grasp the concept of creating physical objects from digital files using 3D printing technology.
- Creating 3D Prints:
 - Describe the step-by-step sequence of operations required to transform a part file (.ipt) into a 3D print.
 - Understand the workflow, software interactions, and considerations involved in the process of preparing a 3D model for printing.
- 3D Printer Management:
 - Read, adjust, and modify the settings on a 3D printer, including parameters such as layer height, print speed, material temperature, and support structures.
 - Learn how to optimize the 3D printing settings to achieve desired print quality, accuracy, and reliability.
- Understanding 3D Modeling Concepts:
 - Comprehend the concept of "Revolution" in 3D modeling, involving the creation of objects by revolving a 2D profile around an axis line.
 - Learn the significance of the axis line as a fundamental element in revolution-based modeling.
- Mastering Extrusions:
 - Gain proficiency in creating 3D shapes through the process of extrusion, where a 2D closed profile is extended along a path to form a 3D object.
 - Understand the versatility of extrusions in creating various geometries.
- Closed Profiles and Join Command:
 - Recognize the importance of closed profiles in 3D modeling, as they enable the creation of solid



- objects.
- Learn how to use the "Join" command to combine separate 3D objects or surfaces into a single connected entity.
- Utilizing Sweep and Loft:
 - Explore the "Sweep" command, which involves moving a closed profile along a path to create complex 3D shapes.
 - Understand the "Loft" command, which allows for the creation of transitional shapes between two or more profiles.
- Path and Loft Profiles:
 - Familiarize yourself with the concept of a "Path" in 3D modeling, which guides the movement of profiles or shapes.
 - Learn how to use loft profiles, which are the closed or open cross-sectional shapes that form the transitional geometry in a loft operation.

Skills

- Understanding Basic Aspects of Design:
 - Describe the foundational elements and principles of design, including aesthetics, functionality, and user-centered considerations.
 - Grasp the holistic nature of design, considering various aspects such as form, function, materials, and user experience.
- Mastery of the Design Process:
 - Demonstrate a working knowledge of the design process, encompassing ideation, iteration, prototyping, testing, and finalization.
 - Understand the importance of an organized and structured approach to problem-solving through design.
- Utilizing Engineering Design Models:
 - Use both traditional and concurrent engineering design models to develop and refine designs, considering various constraints and requirements.
 - Stay updated with modern design methodologies and collaborative approaches in concurrent engineering.



- Understanding Manufacturing and Its Impact:
 - Build a working knowledge of manufacturing processes and their significant influence on design decisions.
 - Recognize how design choices can impact manufacturability, cost, and production efficiency.
- Hands-on Skills with Tools:
 - Demonstrate the use of basic hand and power tools commonly used in the design and fabrication process.
 - Apply hands-on skills to create prototypes, models, or mock-ups based on design concepts.
- Acquiring Vocabulary:
 - Learn new terminology and vocabulary specific to 3D modeling and computer-aided design.
 - Familiarize with key terms related to solid modeling, commands, and techniques.
- Constructing 3D Solid Primitives:
 - Develop the ability to create basic 3D solid primitives such as boxes, cones, spheres, tori, wedges, and cylinders.
 - Understand the foundational process of building these shapes in a 3D space.
- Creating Complex Solids with UNION:
 - Learn how to use the UNION command to combine multiple 3D solid primitives and create more intricate objects.
 - Explore the power of combining shapes and understanding the concept of additive solid modeling.
- Subtracting Portions with the Subtract Command:
 - Master the use of the subtract command to remove specific portions from a 3D solid object.
 - Understand the concept of subtractive solid modeling and its applications in creating complex forms.
- Understanding 3D Printing Materials:
 - Discern between the properties of ABS and PLA, two common 3D printing materials, including factors such as strength, flexibility, temperature resistance, and suitability for different applications.
- Preparing CAD Files for 3D Printing:
 - Export CAD files from their original format into the .stl format, which is widely used for 3D printing.
 - Learn the importance of file compatibility and the .stl format's ability to represent 3D geometry.
- File Management and Printing Settings:
 - Load, open, and adjust file settings to prepare for a successful 3D print job.
 - Understand how to navigate and manage files in the 3D printing software, making necessary adjustments to ensure optimal print quality.
- Creating 3D Solid Models:
 - Understand the process of converting 2D profiles into 3D solid models.



- Gain proficiency in using 2D profiles as the foundation for constructing complex 3D objects.
- Learn to extrude, revolve, or use other techniques to transform 2D profiles into fully-formed 3D solids.
- Producing Working Drawings with 3D Models:
 - Comprehend the importance of representing 3D solid models in working drawings.
 - Learn how to incorporate 3D models within the context of a working drawing.
 - Practice the process of printing out 3D solid models in a format that facilitates the construction and understanding of the object.

Assessments

- Vocabulary identification
- Create sketches of a new design or invention based on given parameters
- Create detail and assembly drawings of a new design
- Safety test / quizzes
- Multi tier level quizzes and tests.
- Use CAD software to make basic 3D solid objects
- Demonstrate the setup of 3D Printer & slicer software.
- 3D Print real world objects from CAD software designs.
- Use CAD software to make more complex 3D solid objects & print / Plot objects to scale

Course: Parametric Modeling & Drone Technology II

Length: Semester

Standards

- 9.3.ST-ET.2 Display and communicate STEM information.
- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.



- 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
- 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.AC-DES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- What is the role of framing systems in residential construction?

Essential Question(s)

- What are dimensions and how are they properly used?
- What three things should be dimensioned on every object?
- What are parametric constraints in CAD?
- What is the definition of parametric modeling?
- What are working Drawings used for?
- Name types of information provided on a detailed drawing.
- How does an assembly drawing differ from a detail drawing?
- What is a subassembly drawing?
- What is the purpose of a bill of materials?
- What is the reason for a parts list?

Content



- Understanding Dimensioning:
 - Gain a clear understanding of the purpose and importance of dimensioning in technical drawings.
 - Learn the role of dimensioning in conveying precise measurements and information about objects.
- Orthographic Projection:
 - Comprehend the principles and techniques of orthographic projection, a fundamental method for representing three-dimensional objects on two-dimensional drawings.
 - Learn how to create orthographic views, including front, top, and side views.
- Dimension Practice:
 - Engage in practical exercises to apply dimensioning principles on various technical drawings.
 - Develop the ability to accurately place dimensions on objects, considering the appropriate scales and alignment.
- Dimensions of Height, Width, and Depth:
 - Master the art of dimensioning objects in terms of their height, width, and depth.
 - Learn to represent objects in their three-dimensional form through appropriate dimensioning.
- Rules of Dimensioning:
 - Familiarize with the standard rules and conventions of dimensioning, including placement, format, and alignment of dimensions.
 - Understand how to apply these rules to ensure clarity and consistency in technical drawings.
- Dimensioning Variables:
 - Explore the factors that affect dimensioning choices, such as the type of object, the level of detail required, and the intended use of the drawing.
 - Develop the ability to adapt dimensioning techniques based on the specific variables of each drawing.
- Understanding Dimensional Constraints:
 - Grasp the purpose and significance of dimensional constraints in parametric design.
 - Learn how dimensional constraints contribute to precise control over the size and shape of objects.
- Utilizing Dimensional Constraint Commands:
 - Explore the various commands and tools available for applying dimensional constraints in design software.
 - Gain proficiency in using these commands to create accurate and dynamic parametric designs.
- Designing with Constraints:
 - Develop the ability to design objects while considering and applying dimensional constraints.
 - Understand how constraints impact the design process, allowing for easier modifications and maintaining design intent.
- Detail Drawings:



- Understand the purpose and importance of detail drawings in engineering and manufacturing.
- Learn to create accurate and comprehensive detail drawings that convey essential information about a component or assembly.
- Required Information:
 - Gain proficiency in identifying and including the necessary information in detail drawings.
 - Learn to provide key details such as dimensions, tolerances, materials, finishes, and notes.
- Assemble Drawings:
 - Develop the ability to create assembly drawings that show the arrangement and relationships between multiple components.
 - Understand the role of assembly drawings in visualizing how parts fit together to form a complete product.
- Sub-assemblies:
 - Learn to create sub-assembly drawings that focus on specific groups of components within a larger assembly.
 - Understand how sub-assemblies contribute to a more organized and manageable design process.
- Parts Lists and Bill of Materials (BOM):
 - Gain proficiency in creating accurate parts lists that itemize each component in an assembly.
 - Learn to generate a comprehensive Bill of Materials (BOM) that provides essential information about components, quantities, and materials.
- Information Presentation:
 - Understand how to present information effectively on detail drawings for clear communication.
 - Master techniques for organizing and laying out information to enhance readability.
- Balloon Tags & Leader Lines:
 - Develop skills in using balloon tags and leader lines to reference specific components in an assembly.
 - Learn to create clear and organized references that aid in assembly and manufacturing.
- Drawing Setup:
 - Learn the process of setting up and configuring drawings, including title blocks, borders, and scale.
 - Gain proficiency in preparing drawings for presentation and printing.

Skills

- Dimensioning Proficiency:
 - Demonstrate the proper use of dimensions in technical drawings.
 - Utilize dimensioning rules appropriately to ensure clarity, accuracy, and consistency.



- Designing Real-World Objects:
 - Learn to create practical and functional real-world objects.
 - Develop the ability to design objects that meet specific size requirements.
- Using Parametric Constraints:
 - Understand the concept of parametric constraints in design.
 - Gain proficiency in converting standard dimensions into parametric constraints.
- Understanding Working Drawings:
 - Define what constitutes a working drawing and its purpose in the design and manufacturing process.
 - Explain why working drawings are essential for communicating design intent, fabrication, and assembly.
- Detail and Assembly Drawings:
 - Discuss the key differences between detail drawings and assembly drawings.
 - Understand how detail drawings focus on individual components, while assembly drawings show the relationships and arrangement of multiple components.
- Information on Working Drawings:
 - Identify the critical information provided on working drawings, including dimensions, tolerances, materials, finishes, and annotations.
 - Recognize the importance of comprehensive and accurate information for successful manufacturing and assembly.
- Creating Complex Detail and Assembly Drawings:
 - Develop the skills necessary to prepare complex detail drawings that accurately represent individual components.
 - Gain proficiency in creating assembly drawings that depict the assembly of intricate and interconnected parts.

Assessments

- Vocabulary identification
- Dimension project
- Create samples of dimensions
- Tests / quizzes
- Use CAD software to make real world objects that can be used for Universal Design.
- Develop detailed working drawings on CAD software.
- Create real world objects & display how they are assembled on a sheet.



Course: Fundamentals of Residential Architectural Design

Length: Semester

Standards

- 9.3.ST-ET.2 Display and communicate STEM information.
- 9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM.
- 9.3.ST-ET.5 Apply the knowledge learned in STEM to solve problems.
- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues. 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.AC-DES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- What is the role of framing systems in residential construction?

Essential Question(s)

- What is the purpose of a sectional view?
- How is hatching used in a sectional view?
- What does the phrase “Form Follows Function” mean?



- How are Design elements and principles used in architecture?
- What is meant by the term “Architectural Styles”
- Describe Post & Lintel Construction
- Which European countries and styles had the greatest impact on early American Architecture?
- Can you identify different architectural styles in your own town?
- Can you list the hardware components of a typical CAD system?
- What are the advantages of using a CAD system instead of manual drafting?
- What are the steps in creating an Architectural drawing plan set?
- Explain why certain sides of a house receive the most light & heat.
- How would you use solar planning, wind control & vegetation for a residence of your own design?
- What is the difference between an open & closed plan?
- What is the main function of a living room?
- Where should the dining room be located in a house?
- What is the primary function of a porch / patio?
- What is the purpose of a Lanai?
- Name the types of stairs that turn 90, 180 & 360 degrees?
- List the types of entrances and tell the function of each type.

Content

- Understanding Sectional Views:
 - Comprehend the purpose and importance of sectional views in technical drawings.
 - Learn how sectional views reveal the internal details of objects that cannot be fully understood from external views.
- Hatch Patterns and Cutting Plane Lines:
 - Understand the role of hatch patterns in representing materials in sectional views.
 - Master the technique of using cutting plane lines to define the area and direction of the sectional view.
- Orthographic Projection in Sections:
 - Gain proficiency in creating sectional views while maintaining orthographic projection principles.
 - Learn how to integrate sectional views seamlessly into orthographic projections.
- Dimensioning Practices in Sectional Views:
 - Explore best practices for dimensioning objects in sectional views.
 - Understand how to communicate essential dimensions, tolerances, and other information in section drawings.



- Types of Sectional Views:
 - Identify and describe various types of sectional views, including full, half, removed, revolved, offset, and broken-out sections.
 - Learn when and how to use each type of sectional view based on the specific design and communication requirements.
- Section Drawings:
 - Develop the ability to create accurate and well-labeled section drawings.
 - Learn to effectively communicate complex geometry and internal features using sectional views.
- Understanding Architecture & Design:
 - Explore the fundamental principles and concepts of architecture and design.
- Recognize the essential role of design in shaping functional and aesthetically pleasing structures.
- Form Follows Function:
 - Understand the principle that the form and design of a structure should be driven by its intended function.
 - Apply the "form follows function" concept to create designs that prioritize functionality and purpose.
- Interior Design:
 - Gain an introduction to the world of interior design.
 - Understand the significance of interior design in creating harmonious and functional living or working spaces.
- Fostering Creativity:
 - Emphasize the role of creativity in the architectural and design process.
 - Cultivate creative thinking skills to develop innovative and unique design solutions.
- Elements of Design:
 - Identify and describe the essential elements of design, including line, form, space, color, and texture.
 - Learn how to manipulate these elements to create visually appealing and functional designs.
- Principles of Design:
 - Understand the fundamental principles of design, including balance, rhythm, emphasis, proportion, and unity.
 - Apply these principles to create designs that are visually pleasing and well-structured.
- Development of Architectural Forms:
 - Understand the historical significance of architectural forms in shaping the built environment.
 - Explore the fundamental concepts behind architectural forms such as post and lintel, arches, domes, and vaults.
 - Analyze the structural and aesthetic elements of each architectural form.



- Post & Lintel, The Arch, The Dome, The Vault:
 - Distinguish between different architectural forms, including post and lintel, arches, domes, and vaults.
 - Examine the construction techniques and historical contexts in which each architectural form was utilized.
 - Recognize the unique advantages and challenges posed by each architectural form.
- Development of Architectural Styles:
 - Explore the evolution of architectural styles across different time periods and cultures.
 - Understand how societal, cultural, and technological changes influence the development of architectural styles.
 - Identify key characteristics, motifs, and defining features of various architectural styles.
- Different Architectural Styles:
 - Recognize and describe different architectural styles, such as Gothic, Renaissance, Baroque, Neoclassical, Modernism, etc.
 - Analyze the aesthetics, materials, and design principles that define each architectural style.
 - Understand the cultural and historical contexts that gave rise to specific architectural styles.
- Challenges in New Architecture:
 - Discuss the contemporary challenges faced by architects in designing innovative and sustainable structures.
 - Explore the integration of new materials, technologies, and environmental considerations in modern architectural design.
 - Investigate how architectural solutions address urbanization, climate change, sustainability, and the needs of diverse communities.
- Understanding CAD Software:
 - Define Computer-Aided Design (CAD) and its role in architectural and design fields.
 - Identify the various types of drawings used in CAD, including 2D and 3D drawings.
 - Differentiate between 2D and 3D drawings and understand their respective purposes and applications.
- 2D Drawings:
 - Create and interpret 2D architectural drawings, including floor plans, elevations, sections, and site plans.
 - Understand the importance of accurate 2D drawings in conveying architectural design and construction details.
- Floor Plans:
 - Develop skills in creating floor plans, showcasing accurate representation of a building's layout.
 - Understand the use of floor plans in architectural visualization and space planning.



- Elevation:
 - Demonstrate the ability to create elevation drawings, depicting vertical views of the building's exterior.
 - Understand the significance of elevation drawings in showcasing building façades and design features.
- Sections:
 - Create sectional views that display interior details and structural elements of a building.
 - Explain the importance of sectional views in understanding the building's spatial arrangements and construction.
- Site Plan:
 - Develop skills in creating site plans, illustrating the relationship between the building and its surroundings.
 - Understand the use of site plans in urban planning, landscaping, and site analysis.
- 3D Drawings:
 - Explore 3D modeling techniques, including wireframes, surface models, and topography.
 - Understand the advantages of 3D drawings in visualizing the three-dimensional aspects of a building design.
- CAD System and Commands:
 - Familiarize with common drawing commands, editing commands, and utility commands in CAD software.
 - Demonstrate proficiency in using CAD commands to create and modify architectural drawings.
- Architectural Applications:
 - Apply CAD skills to create architectural drawings, including floor plans, elevations, and sections.
 - Understand how CAD is utilized in architectural design, documentation, and communication.
- Creating Specific Drawings:
 - Develop proficiency in creating specific architectural drawings, such as wall sections, footings to ridge, elevations, and sectional views.
 - Understand the purpose and significance of these drawings in conveying architectural details and design intent
- Understanding Design Considerations:
 - Define the concept of orientation in architectural design and its impact on building performance.
 - Explain the significance of energy-efficient design in reducing environmental impact and minimizing operational costs.
- Solar Design:
 - Demonstrate an understanding of solar design principles, including passive solar heating and



- daylighting strategies.
- Apply solar design techniques to optimize energy efficiency and occupant comfort in architectural projects.
- Land & Structure Integration:
 - Explain the importance of integrating architectural design with the surrounding landscape.
 - Demonstrate the ability to harmonize the building structure with the natural environment, considering site conditions and aesthetics.
- Wind Control:
 - Understand the role of wind control in architectural design for ventilation, comfort, and energy efficiency.
 - Apply wind control strategies to enhance the indoor environment and reduce the need for mechanical ventilation.
- Ergonomic Planning:
 - Demonstrate an understanding of ergonomic principles in architectural design for human comfort and usability.
 - Apply ergonomic planning to create spaces that promote well-being, functionality, and ease of use.
- Human Dimensions:
 - Explore the concept of human dimensions in architecture and its influence on space planning and design.
 - Create designs that consider human scale, movement patterns, and accessibility for a user-friendly environment.
- Safety Factors:
 - Identify safety factors and considerations in architectural design, including building codes and regulations.
 - Design spaces that prioritize occupant safety, fire prevention, emergency egress, and structural stability.
- Ecological Design:
 - Explain the importance of ecological design in promoting sustainability and reducing the environmental impact of buildings.
 - Incorporate ecological design principles, such as green building techniques and materials, into architectural projects.
- Understanding Living Area Design:
 - Define the concepts of open and closed living area plans.
 - Differentiate between open and closed living area layouts and their implications for space



functionality.

- Living Room Design:
 - Understand the function of the living room within a home.
 - Discuss the importance of location, orientation, and size and shape considerations for the living room.
 - Explore different decor styles suitable for the living room and their impact on the overall design.
- Dining Room Design:
 - Understand the purpose and function of the dining room in residential spaces.
 - Discuss optimal location, orientation, and size and shape considerations for a functional dining room.
 - Explore various decor options that complement the dining room's role and enhance the overall design.
- Family Room Design:
 - Define the function and significance of the family room in modern homes.
 - Explore ideal locations, orientations, and size and shape considerations for a comfortable and functional family room.
 - Discuss decor choices that align with the family room's purpose and enhance the overall ambiance.
- Recreation Room Design:
 - Understand the purpose and function of a recreation room in residential spaces.
 - Discuss suitable locations, orientations, and size and shape considerations for an engaging recreation room.
 - Explore decor themes that enhance the recreational aspects of the room and complement the overall design.
- Understanding Outdoor Living Spaces:
 - Define the primary function of porches, patios, lanais, and swimming pools in residential environments.
 - Identify the different types of porches, patios, and lanais based on design and usage.
 - Explore the diverse functions of outdoor spaces and their impact on overall home design.
- Porches:
 - Discuss the function of porches in terms of providing outdoor seating and enhancing the entrance.
 - Determine suitable locations for porches based on their intended use and orientation for natural light.
 - Explore decor options for porches, considering their style, aesthetic, and complementary elements.
 - Understand the impact of size and shape on the usability and aesthetics of a porch.
- Patios:
 - Understand the versatile functions of patios, including relaxation, entertainment, and dining.
 - Identify appropriate locations for patios, considering accessibility, privacy, and outdoor views.
 - Discuss decor choices for patios, including furniture, plants, lighting, and materials.



- Analyze the relationship between patio size and shape and its effectiveness for various activities.
- Lanais:
 - Explore the tropical and open-air nature of lanais, common in Hawaiian and other designs.
 - Discuss the function of lanais as outdoor lounging spaces, often integrated with the living area.
 - Identify ideal locations for lanais in relation to prevailing winds, views, and indoor access.
 - Consider decor options for lanais, incorporating local materials and capturing a relaxed ambiance.
- Swimming Pools:
 - Focus on the size and shape considerations for swimming pools based on user needs and available space.
 - Understand the importance of area and volume calculations in pool design and maintenance.
 - Explore the integration of swimming pools with outdoor spaces, considering aesthetics and safety.
- Traffic Patterns:
 - Understand the concept of traffic patterns in architectural design.
 - Analyze the importance of well-planned traffic flow for functionality and user experience.
- Halls:
 - Design effective hallway layouts that facilitate smooth movement between rooms.
 - Consider factors such as width, length, intersections, and clearances in hallway design.
- Stairs:
 - Design safe and efficient staircases that meet building codes and provide easy vertical circulation.
 - Explore various stair designs, including straight, curved, and spiral stairs.
- Materials & Lighting:
 - Select appropriate materials for floors and walls that enhance traffic flow and durability.
 - Incorporate proper lighting design to improve visibility and create a welcoming environment.
- Size & Shape:
 - Explore the impact of size and shape on traffic patterns in different spaces.
 - Understand how room dimensions and layouts influence movement and circulation.
- Calculations:
 - Use architectural calculations to determine factors like the required width of halls and stairs.
 - Apply formulas to assess optimal spacing and flow in various architectural elements.
- Entrances:
 - Design inviting and functional entryways that guide users seamlessly into a building.
 - Consider factors such as doors, vestibules, signage, and accessibility in entrance design.



Skills

- Understanding Sectional Views:
 - Describe what a sectional view is and its significance in technical drawings.
 - Explain the purpose of sectional views in revealing internal details of objects.
- Types of Sectional Views:
 - Identify and differentiate between various types of sectional views, such as full, half, removed, revolved, offset, and broken-out sections.
 - Understand the specific applications and advantages of each type of sectional view.
- Sectioning Techniques and Symbols:
 - Explain the concept of sectioning and how it is applied in technical drawings.
 - Identify and describe symbols, section lines, and other features used to represent sectional views.
- Preparing Correct Sectional View Drawings:
 - Develop the ability to create technical drawings with accurately depicted sectional views.
 - Ensure that drawings with sectional views are correctly labeled, and internal features are represented accurately.
- Relating Design Concepts to Architecture:
 - Understand how design concepts play a pivotal role in shaping architectural solutions.
 - Recognize the connection between design principles and the functionality and aesthetics of architectural structures.
- 2. Identifying Six Elements of Design:
 - Learn and distinguish the six key elements of design: Line, Form, Space, Color, Texture, and Typography (or Shape, depending on the context).
 - Understand the significance of each element in contributing to the overall design and appearance of architectural works.
- Applying Design Principles to Architecture:
 - Demonstrate the ability to apply design principles, such as balance, rhythm, emphasis, proportion, unity, and others, to an architectural project.
 - Create architectural designs that not only meet functional requirements but also exhibit visually pleasing and harmonious aesthetics.
- Understanding Historical Architectural Styles:
 - Recognize and distinguish between various historical architectural styles, such as Gothic, Renaissance, Baroque, Neoclassical, etc.



- Identify the key periods, cultural contexts, and geographic influences associated with each architectural style.
- Describe the overall characteristics, motifs, and architectural features that define each style.
- Identifying Distinct Characteristics:
 - Analyze and articulate the specific characteristics that set each historical architectural style apart from others.
 - Understand how elements such as building materials, forms, ornamentation, proportions, and spatial arrangements contribute to the distinctiveness of each style.
 - Recognize common themes or design principles within architectural styles and explain their significance.
- Influence of Materials and Construction Methods:
 - Explore the connection between architectural styles and the available materials and construction techniques of their respective eras.
 - Discuss how advancements in materials, engineering, and construction technology shaped the evolution of architectural styles.
 - Understand how the limitations and possibilities of different materials influenced the design and structural aspects of buildings in each period.
- Relating Materials to Architectural Styles:
 - Examine specific instances where material availability and technological innovations contributed to the emergence or transformation of architectural styles.
 - Discuss how changes in materials influenced the aesthetics, functionality, and sustainability of architectural designs.
 - Identify key architectural innovations that were made possible due to advances in construction materials and methods.
- Understanding Computer-Aided Architectural Design (CAD):
 - Define Computer-Aided Architectural Design and its significance in modern architectural practices.
 - Explain the advantages of using CAD for architectural drawings in terms of accuracy, efficiency, and visualization.
- Familiarity with Computer Hardware:
 - Identify various types of computer hardware components used in architectural CAD.
 - Understand the functions and roles of key hardware components such as CPU, RAM, graphics card, and storage devices.
- Architectural CAD Software Skills:
 - Demonstrate the ability to use an Architectural CAD program proficiently.



- Develop proficiency in creating a range of architectural drawings including floor plans, elevations, cross sections, details, and site drawings.
- Floor Plans:
 - Create accurate floor plans using an Architectural CAD program.
 - Understand the importance of floor plans in representing the layout and spatial organization of a building.
- Elevations:
 - Develop skills in generating elevation drawings through the CAD program.
 - Recognize the significance of elevations in illustrating the visual appearance of building facades.
- Cross Sections:
 - Utilize the CAD program to create cross-sectional views that highlight internal details of a building.
 - Explain the role of cross sections in conveying structural and spatial information.
- Details:
 - Use the CAD software to develop detailed drawings of specific architectural elements.
 - Understand how detailed drawings provide crucial information for construction and assembly.
- Site Drawings:
 - Create site drawings using the Architectural CAD program to illustrate the relationship between the building and its surroundings.
 - Recognize the importance of site drawings in site planning, landscaping, and context analysis.
- Sustainable Site Planning and Solar Energy:
 - Orient a house on a lot to maximize solar energy utilization.
 - Recognize the importance of solar orientation for energy efficiency and comfort.
 - Understand how proper building placement can optimize natural light and minimize the need for artificial lighting.
- Ergonomic Design:
 - Design structures ergonomically to prioritize user comfort and functionality.
 - Consider human scale, movement patterns, and usability in architectural design.
 - Demonstrate the ability to create spaces that promote well-being and efficiency.
- Pollution Prevention and Sustainable Design:
 - Recognize the role of architecture in preventing pollution and minimizing environmental impact.
 - Integrate sustainable design principles to reduce resource consumption and waste.
 - Understand the importance of selecting eco-friendly materials and incorporating energy-efficient features.
- Indoor Living Spaces:



- Identify the functions of an indoor living area room.
- Design indoor living area room
- Combine indoor living area rooms to create a simple closed / open floor plan.
- Designing Outdoor Living Spaces:
 - Use CAD software to create detailed designs of a porch, patio, and lanai.
 - Incorporate functional elements and aesthetic considerations into the CAD designs.
 - Ensure proper orientation, accessibility, and integration with the home's architecture.
- Designing a Backyard with a Swimming Pool:
 - Utilize CAD software to design a backyard layout that includes a swimming pool.
 - Integrate the pool with other outdoor features, such as seating areas, landscaping, and walkways.
 - Consider safety measures, privacy, and views in the backyard design.
- Calculating Area and Volume of Swimming Pools:
 - Apply appropriate mathematical formulas to calculate the area of swimming pools.
 - Use relevant equations to determine the volume of water that a swimming pool can hold.
 - Ensure accurate measurements and conversions to obtain precise area and volume calculations.
- Evaluating Traffic Patterns:
 - Determine the effectiveness of existing traffic patterns in a house.
 - Analyze the flow of movement between rooms to identify areas for improvement.
- Efficient Hallway Planning:
 - Plan hallways that function effectively to connect different areas of the house.
 - Consider factors such as width, length, intersections, and clearances in hallway design.
- Space Calculation for Stairways:
 - Calculate the correct space needed for stairways, considering safety and comfort.
 - Apply building codes and guidelines to ensure proper stair dimensions.
- Entrance Design Guidelines:
 - Understand and apply guidelines for effective entrance design.
 - Consider factors such as accessibility, aesthetics, and functionality in creating inviting entryways.
- Foyer and Entry Design:
 - Design a functional and aesthetically pleasing foyer for a home.
 - Integrate features like doors, vestibules, storage, and seating in the entry design.
 - By organizing the objectives in this manner, the list covers a comprehensive range of tasks related to evaluating and designing traffic patterns within a house, including hallways, stairways, entrance design guidelines, and creating a welcoming foyer.



Assessments

- Vocabulary recognition
- Multiple choice questions
- Unit note-taking
- Drafting written performance tests
- Sectional view drawings
- Complete Architectural Features Project
- Student generated Power Point or Slides on different architectural styles.
- Simple structure design Project.
- Sustainable site plan drawing.
- Interior design project
- Deck design project
- Floor plan design with hallways
- Stair drawings
- Entrance design plan

Course: Architectural Design I

Length: Semester

Standards

- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.



- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues. 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.AC-DES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- What is the role of framing systems in residential construction?

Essential Question(s)

- Why is the work triangle important in planning the size and arrangement of the kitchen?
- Why is proximity of the kitchen to living and dining areas important?
- What is Revit software and how is it used in Residential Architectural Apps?
- What is the purpose or function of the service area?
- How is the concrete volume calculated for patios, walk and driveways?
- How many bedrooms are required in a typical residence?
- How should the sleeping area be situated in respect to the living and eating areas?
- What are the two main types of foundation wall construction?
- What is the purpose of a floor plan in an architectural drawing?
- What are the 3 main areas of a residential design?
- What is the “Golden Ratio” of room design?

Content

- Kitchen Design Considerations:
 - Understand the essential functions and types of kitchens in residential design.
 - Explore the impact of location, decor, size, and shape on kitchen design.



- Apply planning guidelines to optimize the functionality and efficiency of a kitchen.
- Introduction to Revit Software:
 - Familiarize yourself with the basic concepts and user interface of Autodesk Revit.
 - Understand the importance of Revit in modern architectural and interior design.
- Revit Floor Plans:
 - Create accurate and detailed floor plans using Revit software.
 - Explore the various tools and features for drawing walls, doors, windows, and other elements.
- Adding Components (Kitchen and Bath) in Revit:
 - Learn how to incorporate kitchen and bath components into Revit floor plans.
 - Understand the process of placing fixtures, appliances, cabinets, and other elements in the design.
- Sections, Elevations, and Datums:
 - Create informative and detailed sections and elevations in Revit.
 - Use datums to ensure consistency and precision in the design representation.
- 3D View Tools:
 - Master the use of 3D view tools in Revit to visualize the kitchen design in three dimensions.
 - Create compelling 3D presentations of the kitchen design.
 - By organizing the objectives in this manner, the list covers a comprehensive range of topics related to kitchen design considerations, Revit software introduction, practical skills in using Revit for floor plans, components, sections, elevations, datums, and 3D visualization.
- Utility Room Objectives:
 - Function, Types, Location, Decor, Size & Shape:
 - Understand the various functions of utility rooms in residential spaces, such as laundry, storage, or mechanical purposes.
 - Identify different types of utility rooms, such as laundry rooms, mudrooms, or utility closets, and their specific design considerations.
 - Determine optimal locations for utility rooms within a home, considering accessibility and convenience.
 - Apply principles of interior decor to utility rooms, making them functional yet aesthetically pleasing.
 - Determine appropriate size and layout for utility rooms based on their intended use and available space.
- Garage & Carports Objectives:
 - Function, Types, and Locations:
 - Define the primary functions of a garage, including vehicle storage, workspace, and potential



- multi-use areas.
 - Identify various types of garages, such as attached, detached, or integrated into the home's design.
 - Determine suitable locations for garages based on property layout and user needs.
 - Discuss the function and benefits of carports as an alternative to traditional garages.
- Driveway Objectives:
 - Size & Materials:
 - Calculate the appropriate size of a driveway based on the number of vehicles and other factors.
 - Discuss different materials commonly used for driveways, such as concrete, asphalt, gravel, and pavers.
 - Consider the practical and aesthetic aspects of driveway materials in relation to the overall property design.
- Storage Areas Objectives:
 - Function, Types, and Locations:
 - Understand the purpose of storage areas in residential settings, including the organization and safekeeping of belongings.
 - Identify various types of storage areas, such as walk-in closets, pantries, or basement storage, and their respective design requirements.
 - Determine optimal locations for storage areas within the home based on user needs and accessibility.
- Objectives for Bedrooms:
 - Understand the primary functions of bedrooms in a residential setting.
 - Recognize different types of bedrooms, such as master bedrooms, guest bedrooms, and children's bedrooms.
 - Determine suitable locations for bedrooms within a floor plan, considering factors like privacy and accessibility.
 - Explore various decor options for bedrooms, including color schemes, furniture placement, and lighting.
 - Understand how the size and shape of bedrooms can impact comfort and functionality.
- Objectives for Bathrooms:
 - Recognize the essential functions of bathrooms in a home.
 - Identify different types of bathrooms, such as master bathrooms, shared bathrooms, and powder rooms.
 - Determine optimal locations for bathrooms within a floor plan, considering convenience and



- plumbing requirements.
- Explore various decor choices for bathrooms, including fixtures, tiles, and storage solutions.
- Understand the impact of the size and shape of bathrooms on their usability and aesthetics.
- Objectives for Driveways:
 - Determine the appropriate size for driveways based on the number of vehicles and their maneuverability.
 - Explore various driveway materials, considering factors like durability, cost, and aesthetic appeal.
 - Understand the importance of proper drainage and grading for driveways to prevent water accumulation.
 - Recognize the role of driveways in enhancing curb appeal and providing safe access to the property.
- Objectives for Storage Areas:
 - Understand the function of storage areas in a home for organizing and maintaining a clutter-free environment.
 - Identify different types of storage areas, such as closets, pantries, and utility rooms.
 - Determine suitable locations for storage areas within a floor plan, considering accessibility and usage patterns.
 - Explore various storage solutions and organizational strategies to optimize space and improve functionality.
- Objectives for Floor Plan Development:
 - Understand the overall design process in architecture and interior design, from project definition to completion.
 - Recognize the importance of defining the scope and objectives of a design project.
 - Learn effective methods for analyzing a design project, including site analysis, client needs, and project goals.
 - Develop skills in creating conceptual design ideas that align with project requirements.
 - Learn how to evaluate and refine design concepts based on functionality, aesthetics, and client feedback.
- Objectives for Design Development:
 - Gain proficiency in functional space planning, considering the purpose and flow of each room or area.
 - Learn techniques for planning spaces that meet specific functional needs, such as living rooms, kitchens, and bedrooms.
 - Develop the ability to create accurate and detailed floor plan sketches, including furniture placement and traffic flow.
 - Understand the importance of accommodating special needs in design, such as accessibility for



- individuals with disabilities.
- Recognize the unique considerations involved in designing public buildings, including entrances, floors, and traffic areas.
- Explore outdoor design considerations, including landscaping, outdoor seating, and circulation.
- Objectives for Residential Design:
 - Gain an understanding of the unique challenges and considerations in designing residential spaces.
 - Learn how to create floor plans for residential homes that maximize space, functionality, and aesthetic appeal.
 - Explore various residential design styles and how they influence floor plan layouts and interior elements.
 - Understand the importance of planning for lavatory facilities in residential spaces.
 - Develop skills in designing entrances that provide a welcoming and functional introduction to residential buildings.

Skills

- Efficient Kitchen Design Guidelines:
 - Apply industry best practices and guidelines to create an efficient kitchen layout.
 - Utilize ergonomic principles to ensure the kitchen design is functional and user-friendly.
 - Consider workflow, traffic flow, and accessibility for optimal efficiency.
- Determining Kitchen Shape, Size, and Location:
 - Analyze the available space and determine the most suitable shape for the kitchen layout.
 - Consider factors such as the overall size of the kitchen in relation to the entire home and its location within the floor plan.
- Planning the Kitchen Work Triangle:
 - Understand the concept of the kitchen work triangle (the relationship between the stove, sink, and refrigerator).
 - Design a practical and balanced work triangle to enhance the efficiency of the kitchen layout.
- Aesthetically Consistent Kitchen Decor:
 - Incorporate design elements to ensure a harmonious and consistent aesthetic for the kitchen.
 - Select appropriate color schemes, materials, and finishes to create a visually pleasing environment.
- Cross Section for Standard Base & Base Cabinets:
 - Demonstrate the ability to create accurate cross-sectional views of standard base and base cabinets.
 - Understand the construction and assembly of these components within the kitchen design.



- Utility Room Objectives:
 - Determine Equipment: Understand the various types of equipment typically included in a utility room, such as washer, dryer, water heater, HVAC system, utility sink, and storage units.
 - Evaluate Location: Evaluate the best location for a utility room within a residential layout, considering factors like plumbing, electrical connections, access to outdoor vents, and proximity to main living areas.
- Garage and Carport Objectives:
 - Design a Garage: Develop a comprehensive design for a garage, including considerations for the number of vehicles, storage needs, workspace, lighting, and accessibility.
 - Design a Carport: Create a functional and efficient carport design that offers protection for vehicles while integrating it harmoniously with the overall architectural design.
- Driveway Objectives:
 - Calculate Area: Calculate the required area for garages and driveways based on the number and size of vehicles, turning radius, and any additional space for maneuvering.
- Storage Locations Objectives:
 - Design Storage in Floor Plan: Integrate storage locations effectively into a floor plan, considering the layout of each room, accessibility, and the specific storage needs of the residents.
- Sleeping Areas:
 - Plan & draw bedrooms for a sleeping area.
 - Plan and draw baths appropriate to the size and arrangement of the floor plan.
 - Design an efficient bath.
- Designing Floor Plans:
 - Understand the design process and its significance in creating accurate and functional floor plans.
 - Apply the principles of space planning, traffic flow, and functionality in the development of floor plans.
 - Utilize design guidelines and standards to ensure compliance with building codes and regulations.
 - Design original floor plans that meet the specific needs and preferences of clients or users.
 - Incorporate elements of aesthetics, such as balance, proportion, and harmony, in the floor plan design.
 - Learn how to create floor plans that optimize natural lighting, ventilation, and energy efficiency.
 - Demonstrate proficiency in using CAD (Computer-Aided Design) software for precise and professional floor plan drafting.



- Multi tier level quizzes and tests.
 - Multiple Kitchen plans at $\frac{1}{2}$ " = 1'-0" scale
 - Cross section drawing of basic cabinet / countertop layout at $\frac{3}{4}$ " = 1'-0" scale.
 - Interior elevations
 - Floor Plan Drawings
 - Site Drawings
 - Foundation & Footing Plan drawings
 - Cross section drawing showing structural components.
-

Course: Architectural Design II

Length: Semester

Standards

- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues. 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.AC-DES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.



- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- What is the role of framing systems in residential construction?

Essential Question(s)

- What is the function of the footing?
- How does a foundation wall differ from a footing?
- What are the two main types of foundation wall construction?
- What components of the 450mm Drone can be improved to protect and to improve flight?
- What are the essential components that make up a 450 mm drone?
- How can cameras & other equipment adversely affect a UAS

Content

- Objectives for Foundation Materials & Components:
 - Understand the various types of foundation materials commonly used in construction.
 - Identify the key components of a foundation system, including footings, walls, piers, and slabs.
 - Differentiate between different types of foundations, such as crawl space, slab-on-grade, and basement foundations.
 - Explain the purpose and significance of fireplaces in residential construction.
 - Develop an understanding of foundation drawings, including their layout, details, and annotations.
 - Recognize the importance of proper foundation design and its impact on the overall structural integrity of a building.
 - Learn about the appropriate selection of foundation materials and components based on site conditions, building requirements, and local codes.
 - Demonstrate the ability to interpret and apply foundation drawings for construction and building projects.
- Understanding Floor Framing:
 - Identify the key components of floor framing systems, such as joists, beams, headers, and subfloor materials.
 - Comprehend the different types of floor framing plans used in residential and commercial



construction.

- Wall Framing and Elevations:
 - Explore the various wall framing systems, including platform framing and balloon framing.
 - Develop the ability to create detailed wall framing elevations showing stud placement, headers, and openings.
 - Understand the construction methods for exterior and interior walls, including the installation of windows and doors.
- Stairs and Roof Framing:
 - Study the design and construction of stairs, including proper riser and tread measurements.
 - Examine roof framing systems, including components, materials, roof pitch, and framing methods.
 - Differentiate between various roof types, such as gable, hip, and shed roofs.
- Integration of Framing Systems:
 - Learn how to integrate floor, wall, and roof framing systems to create a cohesive structural framework.
 - Understand the role of detail drawings in conveying specific construction instructions for various framing components
- Drone Terminology:
 - Define and correctly spell essential drone-related terms, including components, flight modes, control inputs, and aerial maneuvers.
 - Understand the technical vocabulary used in the drone industry to communicate effectively.
- Drone Assembly:
 - Demonstrate the ability to assemble a drone using the provided components, following proper guidelines and safety procedures.
 - Familiarize students with the different components of a drone, such as the frame, motors, propellers, flight controller, and electronic speed controllers (ESCs).
- Component Assembly:
 - Understand the purpose and function of each drone component and correctly connect them to build a functional drone.
 - Learn to identify and troubleshoot common assembly issues to ensure a successful build.
- Programming the Flight Controller and Remote:
 - Program the flight controller (e.g., 450 flight controller) to configure flight modes, calibrate sensors, and set up essential parameters.
 - Configure the remote control (RC) to establish proper communication with the drone's flight controller.
- Flight Simulation:



- Utilize flight simulation software to practice flying a virtual drone, enhancing piloting skills and familiarity with control inputs.
- Simulate different flight scenarios to improve proficiency and responsiveness in real-world situations.
- Flight Safety Checklist:
 - Develop a comprehensive pre-flight safety checklist to ensure that all necessary precautions are taken before every drone flight.
 - Emphasize the importance of safety protocols and adherence to regulations to minimize risks during drone operations.

Skills

- Identify Foundation Components and Materials:
 - Recognize the key elements of a foundation system, including footings, walls, columns, and slabs.
 - Understand the materials commonly used in foundation construction, such as concrete, rebar, and masonry.
- Draw Foundation Plans:
 - Develop the ability to create accurate and detailed foundation plans.
 - Utilize CAD software or manual drafting techniques to produce foundation drawings.
 - Include essential elements in foundation plans, such as dimensions, annotations, structural details, and elevations.
- Floor Systems:
 - Identify and describe the key components of floor systems, including joists, beams, headers, and subfloor materials.
 - Understand the function of each floor component in supporting the overall structure.
 - Develop the ability to draw a comprehensive floor framing plan that clearly depicts the placement and arrangement of structural parts.
- Wall Framing:
 - Draw an exterior wall framing elevation and plan, showcasing the framing members, such as studs, headers, and sill plates.
 - Create an interior wall framing elevation and plan, detailing the layout of wall components within the structure.
 - Produce detailed drawings of wall sections, illustrating how various materials and components are integrated.
- Roof Framing:



- Describe the different roof framing members and their roles in supporting the roof structure.
- Understand the various methods used in roof framing, such as rafters, trusses, and beams.
- Calculate roof pitch, a critical parameter for determining the angle of the roof.
- Framing Details and Elevations:
 - Develop the skill to draw framing details that provide construction instructions for various components, such as connections, joints, and supports.
 - Create framing elevations that showcase the vertical arrangement of framing members, aiding in the visual understanding of the structure.
- Drone Terminology:
 - Familiarize students with essential drone-related terms, including components, flight modes, navigation, and aerial maneuvers.
 - Develop a working knowledge of the technical vocabulary used in the drone industry for effective communication.
- Safety Procedures & Precautions for UAVs:
 - List and explain comprehensive safety protocols for flying and operating UAVs (Unmanned Aerial Vehicles).
 - Emphasize the importance of adhering to safety guidelines to prevent accidents, protect people and property, and comply with regulations.
- Interpreting Drone Assembly Documents:
 - Teach students how to interpret and understand drone assembly documents, including diagrams, schematics, and instructions.
 - Enable students to follow assembly instructions accurately, ensuring successful drone builds.
- Mechanical Assembly Techniques:
 - Introduce various mechanical assembly techniques, such as proper component installation, secure connections, and structural integrity.
 - Develop students' skills in assembling drones, focusing on precision, attention to detail, and efficient assembly practices.
- Flying on a Simulator:
 - Provide hands-on experience in flying a virtual drone using flight simulation software.
 - Allow students to practice flight maneuvers, navigation, and control inputs in a controlled environment to build piloting skills.
- Programming the Remote Controller:
 - Instruct students on programming the remote controller for proper communication with the drone's flight controller.



- Teach the configuration of control inputs, flight modes, and customization of remote control settings.

Assessments

- Multi tier level quizzes and tests.
- Foundation & Footing Plan drawings
- Cross section drawing showing structural components
- Floor Framing Detail Plan
- Exterior & Interior Wall Elevations
- Roof Plan Drawing
- Section view showing structural detail and components
- Assembly and schematic prints
- 450 mm Drone Assembly
- Drone pilot safety
- Flight simulation
- Flight challenges

Course: Senior Independent Drone Project

Length: Semester

Standards

- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues. 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.



- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- What is the role of framing systems in residential construction?

Essential Questions

- What components of the 450mm Drone can be improved to protect and to improve flight?
- What are the essential components that make up a 450 mm drone?
- How can cameras & other equipment adversely affect a UAS

Contents

- Drone Terminology:
 - Define and explain essential drone-related terms, including components, flight modes, navigation, and aerial maneuvers.
 - Enable students to use correct terminology to effectively communicate about drones.
- Drone Assembly:
 - Demonstrate the process of assembling a drone, from unpacking components to fully assembled UAV.
 - Develop students' hands-on skills in assembling a drone correctly, ensuring all parts are properly connected.
- Component Assembly:
 - Teach specific techniques for assembling individual drone components, such as motors, propellers, flight controllers, and power distribution systems.
 - Ensure students understand the role and function of each component and can assemble them accurately.
- Programming the 450 Flight Controller and Remote:
 - Provide instructions on programming the flight controller and remote control for optimal drone performance.
 - Enable students to configure control inputs, flight modes, and adjust settings to suit different flying scenarios.
- Flight Simulation:
 - Introduce students to drone flight simulation software.



- Allow students to practice piloting a virtual drone, mastering flight maneuvers, navigation, and handling different scenarios.
- Flight Safety Checklist:
 - Establish a comprehensive flight safety checklist for pre-flight and post-flight procedures.
 - Emphasize the importance of following safety guidelines to ensure safe operation, minimize risks, and prevent accidents.

Skills

- Learn drone Terminology
- List Safety procedures & precautions for flying & operating UAV's
- Interpret and create drone assembly documents
- Mechanical assembly techniques
- Flying on a simulator
- Programming Remote Controller

Assessments

- Multi tier level quizzes and tests.
- Assembly and schematic prints
- 450 mm Drone Assembly
- Drone pilot safety
- Flight simulation
- Flight challenges

Course: Architecture & Design Tech School to Work (Optional)

Length: Semester

Standards

- Standard 9.1 Personal Financial Literacy: This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance.



Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- Standard 9.2 Career Awareness, Exploration, Preparation and Training: This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- Standard 9.3: Career and Technical Education: This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.
- Standard 9.4 Life Literacies and Key Skills:

Essential Question(s)

- How to promote the development of curricula and learning experiences that reflect the vision and mission of Career Readiness, Life Literacies and Key Skills as stated at the beginning of this document; foster greater coherence and appropriate progressions across grade bands;
- How to establish meaningful connections among the major area of study;
- How to prioritize the important ideas and core processes that are central and have lasting value beyond the classroom; and
- How to reflect the habits of mind central to Career Readiness, Life Literacies and Key Skills that lead to post-secondary success.

Content

- OSHA Awareness:
 - Understand the purpose and significance of Occupational Safety and Health Administration (OSHA) regulations in the architectural field.
 - Recognize the importance of adhering to safety guidelines to ensure a safe working environment.
- Architectural Disciplines:
 - Explore and identify the various disciplines involved in the architectural design process, such as structural engineering, interior design, landscape architecture, and more.
 - Understand how these disciplines collaborate to create comprehensive architectural projects.
- Design Project Types:
 - Differentiate between residential, commercial, and civil design projects.
 - Learn the unique requirements, considerations, and challenges associated with each project type.



- Project Completion Knowledge:
 - Comprehend the entire project lifecycle, from conceptualization to project completion.
 - Understand the various phases, timelines, and deliverables involved in architectural projects.
- Mechanical Systems Integration:
 - Recognize the role of mechanical systems (HVAC, plumbing, electrical, etc.) in architectural projects.
 - Learn how to integrate these systems seamlessly into project documents, ensuring functionality and compliance.

Skills

- Familiarity with Designated CAD Software:
 - Gain a thorough understanding of the designated Computer-Aided Design (CAD) software.
 - Navigate the software interface, menus, tools, and features effectively.
- Creating Working Drawings:
 - Demonstrate the ability to generate accurate and comprehensive working drawings using the designated CAD software.
 - Implement various drawing commands, such as line, circle, rectangle, and others, as necessary for the project.
- Utilizing CAD Tools:
 - Utilize advanced features and tools within the CAD software to enhance the quality and efficiency of working drawings.
 - Learn to work with layers, annotation, dimensions, hatching, and other essential CAD functions.
- Project Specifics:
 - Understand the specific requirements of the project or task at hand.
 - Apply the appropriate CAD tools and techniques to create working drawings tailored to the project's needs.
- Accuracy and Precision:
 - Develop the skill to create drawings with a high level of accuracy and precision.
 - Pay attention to detail, proper scaling, alignment, and consistent use of units within the CAD software.

Assessments

- Sustained interactive experiences with professionals from business and industry that are designed to deepen student knowledge and develop essential skills related to a chosen career pathway.
- Work Based Learning Survey Forms



- Document checklist
- Employer Contact Form
- Employer Evaluation of Work Based Learning Program
- Employer Survey
- Evaluation of Prospective Work Site

Resources

→ Course Resources

Westampton:

Eng. Drawing & Graphic Technology McGraw Hill 1993 007 022347 - 5
Res. Dwg using AutoDESK Revit SDC Publication 2015 13 978 1 58503 977 7
Beginners Guide to SOLidworks 2016 SDC Publication 2016 13 978 1 58503 959-0



AutoCAD 2016 Tutorial SDC Publication 2015 13 978 1 58503 959-3
AutoDesk Inventor SDC Publication 2015 13 978 1 58503 961 - 6
AutoCad 2016 Instructor SDC Publication 2016 13 978 1 58503 952-4
Solidworks 16 Basic Tools SDC Publication 2016 978 - 1 - 63057 - 001 - 9
Green from Ground Up Taunton Press 2008 978 1 56158 973 9
Res. Des. Revit 2018 SDC Publication 2017 978 1 63057 106 1

Medford:

Basic Technical Drawing 1st Macmillan 1974 0-02-232150-0
Civil Engineering & Arch 1st Matteson, Kennedy 2012 1-4354-4164-8
Drafting For Industry 1st Goodheart-Willcox 1978 0-81006-247-6
Autocad and its applications 20th Goodheart-Willcox 2013 978-1-60525-921-5
Jigs and Fixture Designs 1st Delmar 1980 0-8273-1644-1
Mechanical drawing 8th McGraw-Hill 1974 07-022310-6
Architecture Residential Drafting and Design 10th Clois E. Kicklighter 2008 978-1-59070-699-2
Architecture Residential Drafting and Design 11th Clois E. Kicklighter 2014 978-1-61960-184-0
Exploring Drafting 10th John R. Walker 2007 978-1-59070-575-9
Autocad and Its Applications 21st Terence M. Shumaker 2014 978-1-61960-446-9
Engineering Drawing and Design 3rd Madsen 2002 0-7668-1634-6
Architecture Drafting and Design 7th Donald E. Hepler 1998 0-02-637067-0