COMPUTER AIDED DESIGN (CAD)	
CURRICULUM/CONTENT AREA	COURSE LENGTH
Applied & Technical Education (ATE)	*1 Term*
GRADE LEVEL	DATE LAST REVIEWED
9 - 12	*2023*
PREREQUISITE(s) *if applicable*	BOARD APPROVAL DATE
	9/10/2024
PRIMARY RESOURCE *if applicable*	

DESIRED RESULTS

COURSE DESCRIPTION AND PURPOSE

Computer Aided Design (CAD) focuses on 3D software design for applications in engineering design and manufacturing. This is a good course for students who are interested in engineering, manufacturing, and/or related fields. Students taking Computer Aided Design (CAD will be introduced to 3D design using advanced 3D modeling and visualization technologies such as Fusion 360, Inventor and AutoCAD. Students will be introduced to the idea of creating 3D models that are suitable for 3D printing, and will learn about the different models and drawing specifications that are required by the different manufacturing technologies available today.

ENDURING UNDERSTANDINGS *Students will understand that...*	ESSENTIAL QUESTIONS *Students will keep considering...*
Creativity, innovation, and critical thinking are essential for success in a technologically advanced world.	Why is creativity and innovation important? How is creativity and innovation used in [name of career pathway]?
	How do teams efficiently and effectively solve problems in an increasingly complex world?
	What strategies and processes can I use to become a more effective creator, thinker and problem solver?
The ability to communicate and collaborate with people with diverse backgrounds and perspectives is key to participation in a global economic society.	Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?

	What is effective teamwork? What strategies can I use/teams use to work better together? How can perspectives and experiences of a diverse group develop innovative solutions to a given problem?
Career and technical education provides pathways to high-demand, high-wage career opportunities, and personal fulfillment.	Why is career and life readiness important? What jobs and careers are available to meet individual and societal needs locally, regionally, and nationally?
	How might technical knowledge and skills influence one's employability and advancement opportunities within various work settings?
	What are employability skills? How do I prepare myself for a career that is in demand now and in 5, 10, or 20 years from now?

PRIORITY CAREER & TECHNICAL STANDARDS
Students will be skilled at...

Creativity, Critical Thinking, Communication and Collaboration
4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.
a: I develop effective resolutions for a given problem, decision or opportunity using available information.
b: I develop and implement a resolution for a new situation using personal knowledge and experience.

Career Development
CD4: Students will identify and apply employability skills.
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.
b: I demonstrate skills related to seeking and applying for employment to find and obtain a desired job.
c: I identify and exhibit traits for retaining employment.
d: I develop positive relationships with others.

Information, Media, Technology
IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.
a: I choose appropriate sources of data and information for a given purpose.
b: I determine the relevance, validity and timeliness of data and information.
c: I select relevant information necessary for making decisions and solving problems
d: I apply data and information to communicate ideas and create new opportunities.

PRIORITY CONTENT STANDARDS
Students will know...

Standard: BB1: Students will analyze the core concepts of technology.

Standard: ENG1: Students will analyze and demonstrate the attributes of design.

Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
Standard: ICT1: Students will analyze, select and use information and communication technologies.
Standard: MNF1: Students will be able to select and use manufacturing technologies.

Potential INDUSTRY-RECOGNIZED CREDENTIALS (IRCs) Opportunties associated with the course	Potential WORK BASED LEARNING (WBL) opportunities associated with the course
Autodesk Fusion certification	
Autodesk Inventor certification	
Potential DUAL CREDIT Opportunties associated with the course	

Unit 1 Technical Sketching		
STAGE 1: Desired Unit Results *What will students understand as a result of the unit?*		**STAGE 2: Assessment Evidence** *By what criteria will performances of understanding be assessed? Through what authentic performance tasks will students demonstrate the desired unit results?*
ESSENTIAL QUESTION (s) *What thought-provoking questions will foster inquiry, understanding, and transfer of learning?*		**Success Criteria with Standards** *The criteria for evaluating performance on standards is constant.*
enter essential question for the unit here, add more rows as needed.		"CTE standards-based Rubric: Throughout course, students and teachers use rubric for communication of success criteria, reflection, goal setting, and feedback. Students continually reflect on and discuss essential questions in their notebook and orally in class.
Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?		
What strategies and processes can I use to become a more effective creator, thinker and problem solver?		
PRIORITY CAREER & TECHNICAL STANDARDS & Learning Targets		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
Creativity, Critical Thinking, Communication and Collaboration **4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.**		
a: I develop effective resolutions for a given problem, decision or opportunity using available information.	4C2.a.15.h: I can determine the best resolution for a problem, decision or opportunity based on given criteria.	*Students will demonstrate thier critical thinking skills learned in class by applying thier knowledge from past activities to new sketching activities. This will be evaluated by the use of a rubric.*
b: I develop and implement a resolution for a new situation using personal knowledge and experience.	4C2.b.5.h: I can apply past experience to develop a course of action for a new situation.	
	4C2.b.6.h: I can use existing knowledge to develop a resolution for a new situation, problem or opportunity.	
Career Development **CD4: Students will identify and apply employability skills.**		
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.9.h: I can use positive workqualities typically desired in each of the career cluster's pathways.	*Students will have thier employability skills evaulated with the use of a rubric to be developed and applied to their daily participation.*
c: I identify and exhibit traits for retaining employment.	CD4.c.4.h: I can model behaviors that demonstrate reliability and dependability.	
d: I develop positive relationships with others.	CD4.d.7.h: I can examine the skills required to enable students to successfully transition to postsecondary opportunities.	
Information, Media, Technology **IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.**		
PRIORITY CONTENT STANDARDS & Learning Targets		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
Standard: ICT1: Students will analyze, select and use information and communication technologies.	**ICT1.c.9.h:** I can generate an authentic graphic Communication example.	*Students will demonstrate their learning from lectures, readings and demonstrations by completing various projects and activities to be evaluated by a rubric.*
Standard: MNF1: Students will be able to select and use manufacturing technologies.	**MNF1.a.9.h:** I can select and apply the appropriate units and scales for situations involving measurement.	
SUPPORTING STANDARDS AND LEARNING TARGETS		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*

Standard: AC1: Students will be able to select and use architecture and construction technologies.	**AC1.b.8.m:** I can demonstrate basic dimensioning skills including the use of: dimension, extension, center and leader lines.	*Students will demonstrate their learning from lectures, readings and demonstrations by completing various projects and activities to be evaluated by a rubric.*
	AC1.b.9.m: I can demonstrate use of the Standard Measuring System to the 1/16" and the Metric Measuring System to millimeters.	
	AC1.b.10.m: I can add, subtract, multiply and divide in the Standard Measuring System to the 1/16" and the Metric Measuring System to millimeters.	
	AC1.b.14.h: I can apply conventional construction measurement processes accurately (i.e., geometric and trigonometric functions).	
Standard: ENG4: Students will develop abilities to apply the design process.	**ENG4.b.5.h:** I can develop and produce a product or system using a design process.	*Students will demonstrate their learning from lectures, readings and demonstrations by completing various projects and activities to be evaluated by a rubric.*
	ENG4.c.6.h: I can evaluate final solutions and communicate observation, processes and results of the entire design process, using verbal, graphic, quantitative, virtual and written means, in addition to design models.	

Stage 3: Learning Activities

A brief summary of the key learning activities- How will students build knowledge & develop skills? How will learning be relevant, accessible, and engaging? How will the learning unforld in a natural flow?

GUIDING UNIT QUESTIONS	STRATEGIES/ACTIVITIES	RESOURCES/MATERIALS
Using Costas Level of Thinking, what questions will hook and hold students so that they develop a deep understanding of the desired results? The guiding questions are more topic-specific to the particular unit. They guide the exploration of the essential questions and rigor of the standards. This may include questions that guide project based/ problem based learning	*What learning strategies and experiences will authentically engage students so that they gain understanding the desired results? This includes strategies and activities that help learners acquire targeted knowledge and skills, make meaning of important ideas, and transfer their learning to new situations. Consider how the learning will be tailored and flexible to address the interests and learning styles of all students.*	*This includes an applicable textbooks, software, industry recognized certification software/tools, subcriptions (such asPLTW), etc.*
analyze the importance of graphic communications		

Unit 2 Computer Modeling		
STAGE 1: Desired Unit Results *What will students understand as a result of the unit?*		**STAGE 2: Assessment Evidence** *By what criteria will performances of understanding be assessed? Through what authentic performance tasks will students demonstrate the desired unit results?*
ESSENTIAL QUESTION (s) *What thought-provoking questions will foster inquiry, understanding, and transfer of learning?*		**Success Criteria with Standards** *The criteria for evaluating performance on standards is constant.*
enter essential question for the unit here, add more rows as needed.		"CTE standards-based Rubric: Throughout course, students and teachers use rubric for communication of success criteria, reflection, goal setting, and feedback. Students continually reflect on and discuss essential questions in their notebook and orally in class.
How might technical knowledge and skills influence one's employability and advancement opportunities within various work settings?		
Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?		
PRIORITY CAREER & TECHNICAL STANDARDS & Learning Targets		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
Creativity, Critical Thinking, Communication and Collaboration **4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.**		
a: I develop effective resolutions for a given problem, decision or opportunity using available information.	4C2.a.15.h: I can determine the best resolution for a problem, decision or opportunity based on given criteria.	*Students will demonstrate thier critical thinking skills learned in class by applying thier knowledge from past activities to new sketching activities. This will be evaluated by the use of a rubric.*
b: I develop and implement a resolution for a new situation using personal knowledge and experience.	4C2.b.5.h: I can apply past experience to develop a course of action for a new situation.	
	4C2.b.6.h: I can use existing knowledge to develop a resolution for a new situation, problem or opportunity.	
Career Development **CD4: Students will identify and apply employability skills.**		
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.9.h: I can use positive workqualities typically desired in each of the career cluster's pathways.	*Students will have thier employability skills evaulated with the use of a rubric to be developed and applied to their daily participation.*
c: I identify and exhibit traits for retaining employment.	CD4.c.4.h: I can model behaviors that demonstrate reliability and dependability.	
d: I develop positive relationships with others.	CD4.d.7.h: I can examine the skills required to enable students to successfully transition to postsecondary opportunities.	
Information, Media, Technology **IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.**		
c: I select relevant information necessary for making decisions and solving problems	IMT1.c.6.h: I can interpret and select appropriate information to develop a resolution for a given situation.	
d: I apply data and information to communicate ideas and create new opportunities.	IMT1.d.8.h: I can manage and share stored data and information for a specific purpose.	
PRIORITY CONTENT STANDARDS & Learning Targets		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
Standard: ICT1: Students will analyze, select and use information and communication technologies.	**ICT1.c.9.h:** I can generate an authentic graphic Communication example.	*Students will demonstrate their learning from lectures, readings and demonstrations by completing various projects and activities to be*

Standard: MNF1: Students will be able to select and use manufacturing technologies.	**MNF1.a.9.h:** I can select and apply the appropriate units and scales for situations involving measurement.	*evaluated by a rubric.*
SUPPORTING STANDARDS AND LEARNING TARGETS		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
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Standard: ENG4: Students will develop abilities to apply the design process.	**ENG4.b.5.h:** I can develop and produce a product or system using a design process.	*Students will demonstrate their learning from lectures, readings and demonstrations by completing various projects and activities to be evaluated by a rubric.*
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Stage 3: Learning Activities

A brief summary of the key learning activities- How will students build knowledge & develop skills? How will learning be relevant, accessible, and engaging? How will the learning unforld in a natural flow?

GUIDING UNIT QUESTIONS *Using Costas Level of Thinking, what questions will hook and hold students so that they develop a deep understanding of the desired results? The guiding questions are more topic-specific to the particular unit. They guide the exploration of the essential questions and rigor of the standards. This may include questions that guide project based/ problem based learning*	STRATEGIES/ACTIVITIES *What learning strategies and experiences will authentically engage students so that they gain understanding the desired results? This includes strategies and activities that help learners acquire targeted knowledge and skills, make meaning of important ideas, and transfer their learning to new situations. Consider how the learning will be tailored and flexible to address the interests and learning styles of all students.*	RESOURCES/MATERIALS *This includes an applicable textbooks, software, industry recognized certification software/tools, subcriptions (such asPLTW), etc.*
How are graphics used to communicate ideas		Autodesk Fusion 360
What graphic standards are needed to aid in communication		Autodesk Inventor

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Standard: BB1: Students will analyze the core concepts of technology.	**BB1.b.6.h:** I can choose and perform the material processing operations of forming (e.g., bending, pressing, drawing, rolling), bonding (e.g., gluing, soldering, brazing, spot welding, gas welding, arc welding), fastening (e.g., screws, nuts & bolts, rivets, clips, pins, nails) and finishing (e.g., surface preparation, cleaning, treatment, coating).	*Students will demonstrate their learning from lectures, readings and demonstrations by drsigning and manufacturing various projects and activities to be evaluated by a rubric.*
Standard: ENG1: Students will analyze and demonstrate the attributes of design.	**ENG1.a.9.h:** I can examine how the design needs to continually be evaluated and the ideas of the design must be redefined and improved.	
Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	**ENG3.a.5.h:** I can explain technological problems must be researched before they can be solved.	
	ENG3.a.7.h: Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	
Standard: ICT1: Students will analyze, select and use information and communication technologies.	**ICT1.c.9.h:** I can generate an authentic graphic Communication example.	
Standard: MNF1: Students will be able to select and use manufacturing technologies.	**MNF1.a.9.h:** I can select and apply the appropriate units and scales for situations involving measurement.	
	MNF.1.b.6.h: I can design and publish documents using advanced publishing software and graphic programs to defend and promote results.	
SUPPORTING STANDARDS AND LEARNING TARGETS		**Performance Tasks Options/ Assessment Strategies by Standard** *Students may be given options to show their learning in varied ways.*
Standard: ENG2: Students will analyze and demonstrate engineering design.	**ENG2.a.7.h:** I can recognize that engineering design is influenced by personal characteristics, such as creativity, resourcefulness and the ability to visualize and think abstractly.	*Students will demonstrate their learning from lectures, readings and demonstrations by drsigning and manufacturing various projects and activities to be evaluated by a rubric.*
	ENG2.b.4.h: A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	
Standard: ENG4: Students will develop abilities to apply the design process.	**ENG4.a.5.h:** I can identify the design problem to solve and determine how to address it.	*Students will apply the design process to create and manufacture products using knowledge learned from class. The products and the process will be evaulated using a standard design rubric*
	ENG4.a.6.h: I can identify criteria and constraints and determine how these will affect the design process.	
	ENG4.b.4.h: I can refine a design by using prototypes and modeling to ensure quality, efficiency and productivity of the final product.	
	ENG4.b.5.h: I can develop and produce a product or system using a design process.	
Stage 3: Learning Activities *A brief summary of the key learning activities- How will students build knowledge & develop skills? How will learning be relevant, accessible, and engaging? How will the learning unforld in a natural flow?*		

GUIDING UNIT QUESTIONS *Using Costas Level of Thinking, what questions will hook and hold students so that they develop a deep understanding of the desired results? The guiding questions are more topic-specific to the particular unit. They guide the exploration of the essential questions and rigor of the standards. This may include questions that guide project based/ problem based learning*	STRATEGIES/ACTIVITIES *What learning strategies and experiences will authentically engage students so that they gain understanding the desired results? This includes strategies and activities that help learners acquire targeted knowledge and skills, make meaning of important ideas, and transfer their learning to new situations. Consider how the learning will be tailored and flexible to address the interests and learning styles of all students.*	RESOURCES/MATERIALS *This includes an applicable textbooks, software, industry recognized certification software/tools, subcriptions (such asPLTW), etc.*
How can 3D models be used to create or produce a product.		3D printers
		Laser cutters
		CNC router/mills