



Delaware Department of Education
 CTE & STEM Office
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DELAWARE CTE PROGRAM OF STUDY APPLICATION

LOCAL EDUCATION AGENCY INFORMATION		
Local Education Agency (LEA):		
School(s) where the Program of Study will be Located:		Program of Study Start Date:
LEA CTE Coordinator Name:	Phone:	E-Mail Address:
Career Cluster Title: Architecture & Construction	Career Pathway Title: Design/Pre-Construction	Program of Study Title: Architectural Engineering Technology
CTE Pathway Course Sequence:		
1. Foundations of Technology (FOT) 2. Processes of Architecture and Construction (PAC) 3. Architectural CAD Applications (ACA)		
CTE Program of Study Request:		
☒ State-model CTE Program of Study ☐ Local CTE Program of Study		
ASSURANCES & SIGNATURES		
CTE Program of Study approval and funding is contingent upon the following assurances: 1. The LEA will comply with Delaware Administrative Code, 14 Del.C. §525, Requirements for Career and Technical Education Programs and the Delaware State Plan for the Carl D. Perkins Career and Technical Education Act of 2006; 2. The LEA will submit CTE program data as required by the Delaware Department of Education; 3. All teachers are certified in the appropriate CTE area and participate in program specific professional learning; 4. The LEA will convene and engage a program advisory committee for the purposes of program development, implementation, and continuous improvement; 5. All students have equal access to the program of study as well as early career/early college options; 6. Career and Technical Student Organizations are integral components of the program of study; 7. The LEA will maintain safe facilities and equipment aligned with the program of study goals; and 8. A process for continuous improvement has been established, which includes a model of evaluation and program improvement.		
LEA CTE Coordinator Signature:		Date:
LEA Chief School Officer Signature:		Date:

PROGRAM ADVISORY COMMITTEE MEMBER INFORMATION

Complete the list of program advisory committee members. Program of study representatives should include, but are not limited to: CTE and academic teachers, CTE/curriculum district coordinators, school counselors, business and industry representatives, labor representatives, and post-secondary partners. Community stakeholders including parents and students can also be considered. *Attach additional information if applicable.*

Name: Title:

Affiliation:

Address:

Phone: E-Mail:

Area of Expertise:

Representing:

- ☐ Business/Industry
- ☐ Secondary Education
- ☐ Post-Secondary Education
- ☐ Community/Other

Name: Title:

Affiliation:

Address:

Phone: E-Mail:

Area of Expertise:

Representing:

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- ☐ Secondary Education
- ☐ Post-Secondary Education
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Name:	Title:
Affiliation:	
Address:	
Phone:	E-Mail:
Area of Expertise:	
Representing: ☐ Business/Industry ☐ Secondary Education ☐ Post-Secondary Education ☐ Community/Other	

LABOR MARKET DEMAND

Certify that a labor market needs analysis has been completed for the proposed CTE program of study. Attach the [Labor Market Information \(LMI\) Review](#) document.

Access the [Labor Market Information \(LMI\) Review](#) document.

- ☒ The LEA certifies that regional, state, and local labor market data have been reviewed to assure a demand exists for the POS occupations and that the number of POS completers will not significantly exceed this demand. Department of Labor data are available and/or documented. Supporting evidence of supply and demand is submitted with this proposal.
- ☐ No data exist for POS due to a unique labor market demand. Supporting evidence of demand is submitted with this proposal. Evidence may include, but is not limited to: real-time labor market information, documentation of national, regional, state, or local labor trends, or letters from employers or workforce agencies documenting projected employment specific to the career pathway.

ACADEMIC AND TECHNICAL SKILL STANDARDS

List the academic, technical, and workplace skills and knowledge used to develop the program of study.

Title and source of academic standards:

[Common Core State Standards \(CCSS\)](#)

The Common Core State Standards (CCSS) are national standards that set clear college- and career-ready expectations for kindergarten through 12th grade in English language arts/literacy and Mathematics. The standards help to ensure that students graduating from high school are prepared to take credit bearing introductory courses in two- or four-year college programs and enter the workforce. The standards were developed by the nation's governors and education commissioners, through their representative organizations, the National Governors Association Center for Best Practices (NGA) and the Council of Chief State School Officers (CCSSO). Teachers, parents, school administrators, and experts from across the country provided input into the development of the standards. The implementation of the Common Core, including how the standards are taught, the curriculum developed, and the materials used to support teachers as they help students reach the standards, is led entirely at the state and local levels. For more information on CCSS, please visit the link above.

[Next Generation Science Standards \(NGSS\)](#)

The Next Generation Science Standards (NGSS) are national standards for science that lay out the disciplinary core ideas, science and engineering practices, as well as crosscutting concepts that students should master in preparation for college and careers. The standards were developed through a state-led effort that was managed by Achieve. The development of the NGSS involved the National Research Council (NRC), the National Science Teachers Association (NSTA), and the American Association for the Advancement of Science (AAAS), and other critical partners such as K–12 teachers, state science and policy staff, higher education faculty, scientists, engineers, cognitive scientists, and business leaders. For more information on the NGSS, please visit the link above.

Engineering by Design identifies and develops the skills people and businesses need to thrive in a changing economy. Engineering by Design has created courses that prepare students for the future and incorporates aspects of the common Core State Standards for English language arts/literacy and Mathematics, the Next generation Science Standards and other national standards where appropriate. A standards and objectives alignment tool is available for all courses at:

<http://www.iteea.org/EbD/ebd.htm>.

Title and source of technical skill standards:

[International Technology & Engineering Educators Associate \(ITEEA\) – Standards for Technological Literacy:](#)

The Standards for Technological Literacy (STL) present a vision for what students should know and be able to do in order to be technologically literate. The standards describe the content for technology education programs in grades K-12 by setting forth a consistent expectation that ensures all students receive effective instruction about technology. The STL was created under the ITEEA Technology for All Americans Project and was developed with hundreds of educators and professionals. For more information on STL, please visit the link above.

Engineering byDesign (EbD) is a national Career & Technical Education instructional program that incorporates the International Technology & Engineering Educators Associate (ITEEA) Standards for Technological Literacy. A standards and objectives alignment tool is available for EbD network schools by contacting the Engineering byDesign STEM Center for Teaching and Learning at:

<http://www.iteea.org/EbD/ebd.htm>.

Title and source of workplace or other skill standards, as applicable:

[Common Career Technical Core \(CCTC\)](#)

The Common Career Technical Core (CCTC) are national standards for Career & Technical Education (CTE) that help to inform the establishment of state standards and/or programs of study. The CCTC were developed by educators, school administrators, representatives from business and industry, faculty from higher education, as well as workforce and labor markets economists. The CCTC includes a set of standards for each of the sixteen (16) Career Clusters and the corresponding Career Pathways that help to define what students should know and be able to do after completing instruction in a program of study. The CCTC standards for Architecture & Construction and the STEM Career Cluster are reflected inside the courses for the Architectural & Construction Management (ACM) program of study. The program has students apply the CCTC Architecture & Construction and STEM standards. For more information on the CCTC, please visit the link above.

[Career Ready Practices \(CRP\)](#)

The Career Ready Practices (CRP) are a component of the CCTC framework and includes twelve (12) statements that address the knowledge, skills, and dispositions that are important to becoming career ready. The CRP describes the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education and should be taught and reinforced in all career exploration and preparation programs with

increasingly higher levels of complexity and expectation as a student advances through a career pathway. The CRP statements are embedded throughout the Architectural & Construction Management (ACM) program of study to ensure students display the appropriate soft skills and workplace requirements necessary to be successful in a career. For more information on the CRP, please visit the link above.

EARLY CAREER AND EARLY COLLEGE OPPORTUNITIES

Identify CTE program of study early career opportunities, industry-recognized certifications and licenses, options for early college credit, two- and four-year degree and certification program alignment, and the technical skill attainment measures for the program of study. *Attach articulation/dual enrollment agreement(s).*

Describe early career opportunities (i.e. work-based learning experiences and industry-mentored projects):

The Architectural Engineering Technology (AET) program is a three (3) credit program of study delivered in partnership with Delaware Technical Community College (DTCC) that engages students in open-ended problem solving where students will use industry-standard technology and software, and apply math, science, architectural and construction standards to hands-on projects. Students will work both individually and in teams to explore a broad range architecture and construction topics including the strength of structures and materials, product data management (PDM) and building information modeling (BIM). Students will develop skills in problem solving, research and design while learning strategies for design process documentation, collaboration, and presentation. The CTE program consists of three courses: Foundations of Technology (FOT), Processes of Architecture and Construction (PAC), and the capstone course of Architectural CAD Applications (ACA). Work-based learning experiences and industry-mentored projects will be investigated by the Local Education Agency (LEA) Program Advisory Committee to further identify opportunities to engage the community.

Delaware students that have completed the Architectural Engineering Technology (AET) program of study in: Foundations of Technology (FOT); Processes of Architecture and Construction (PAC); Architectural CAD Applications (ACA) and who have additionally maintained a high school GPA of 3.0 or higher will receive preferential plus factor consideration for through the office of admissions for the undergraduate Construction Engineering and Management Program at the University of Delaware (UD) in the College of Engineering.

List industry-recognized certifications and/or licenses, as appropriate (include the partner organization and credential):

[Engineering byDesign \(EbD\)](#) provides industry-based pre- and post-assessments known as course level assessments for participating network schools. EbD will report valid and reliable scores on overall student performance for the Foundations Of Technology (FOT) course. The assessment gives students an objective evaluation of their achievement and stakeholders the opportunity to obtain and use data to make informed decisions.

[AutoCAD Certified User](#) is a task-based assessment from Autodesk that leads to industry the recognized credential that validates mastery of user based technical skills and that are reflective of both real-world academic and industry requirements.

[Revit Architecture Certified User](#) is a task-based assessment from Autodesk that leads to industry the recognized credential that validates mastery of user based technical skills and that are reflective of both real-world academic and industry requirements.

[International Code Council \(ICC\) Certification](#) is an assessment based certificate that is divided into four disciplines: building; electrical; mechanical HVAC; and plumbing. Each discipline has a correlating certification to measure the understanding of construction codes and regulations as used in the planning, design and construction of residential; commercial; federal; and military projects.

Describe early college credit options (i.e. advanced placement, dual enrollment, transcribed and/or articulated credit, credit by exam, pre-apprenticeship, other) and options for two- and four-year degree and/or certification program alignment (attach articulation/dual enrollment agreement). The partner organization and hours of credit earned should be included, as applicable:

Students who successfully complete the Architectural Engineering Technology (AET) program of study will receive 6 articulated and 3 dual enrollment credits at Delaware Technical Community College (DTCC) that may be applied to the following programs of study offered by DTCC:

Architectural Engineering Technology: 9 articulated credits

- AET123 – Architectural Drafting/Design 1 (4 articulated credits)
- EDD171 – Introduction to CAD using AutoCAD (3 articulated credits)
- AET164 – Architectural CAD Applications (3 dual enrollment credits)

Construction Management Technology: 3 articulated credits

- AET164 – Architectural CAD Applications (3 credits)

Civil Engineering Technology: 3 articulated credits

- EDD171 – Introduction to CAD using AutoCAD (3 credits)

Computer Aided Drafting Design Technology: 3 articulated credits

- EDD171 – Introduction to CAD using AutoCAD (3 credits)

Energy: Building Automation Systems Option: 3 articulated credits

- AET164 – Architectural CAD Applications (3 credits)

Energy Management: 3 articulated credits

- AET164 – Architectural CAD Applications (3 credits)

Environmental Engineering Technology: 3 articulated credits

- EDD171 – Introduction to CAD using AutoCAD (3 credits)

Surveying & Geomatics Engineering Technology: 3 articulated credits

- EDD171 – Introduction to CAD using AutoCAD (3 credits)

Construction Engineering & Management; University of Delaware (UD): College of Engineering

- Delaware students that have completed the Architectural Engineering Technology (AET) program of study in: Foundations of Technology (FOT); Processes of Architecture and Construction (PAC); Architectural CAD Applications (ACA) and who have additionally maintained a high school GPA of 3.0 or higher will receive preferential plus factor consideration for through the office of admissions for the undergraduate Construction Engineering and Management Program at the University of Delaware (UD) in the College of Engineering.

List technical skill attainment measures for the program of study (i.e. industry recognized certification or license, advanced placement, dual enrollment, transcribed and/or articulated credit, dual enrollment, credit by exam):

- ☒ Certification/credentialing exam (specify):
AutoDesk AutoCAD User Certification*
AutoDesk Revit User Certification*
- ☒ Advanced Standing (specify):
Delaware Technical Community College articulated credit:
AET123 – Architectural Drafting/Design 1 (4 credits)
EDD171 – Introduction to CAD using AutoCAD (3 credits)
Delaware Technical Community College dual enrollment:
AET164 – Architectural CAD Applications (3 credits)

* To become a Certiport assessment site, please visit <http://www.certiport.com>. To review list of established Ceritport assessment sites, please visit <http://www.certiport.com>.

POS OVERVIEW, COURSE DESCRIPTIONS, END-OF-COURSE, AND PROGRAM ASSESSMENTS

Provide a CTE program of study overview that broadly describes the program and student expectations. Identify end-of-program assessment(s) and opportunities for students to participate in early college and early career experiences. List each course title in the CTE program of study. Provide an overview of each course and define what students should know and be able to demonstrate upon completion of each level. Identify appropriate end-of-course assessment(s).

CTE Program of Study Overview:

The Architectural Engineering Technology (AET) program of study is a three (3) course Career & Technical Education (CTE) instructional program of study that engages students in the world of construction and architecture through coursework focusing on site selection, drafting, architectural, and engineering planning, budgeting, cost estimating, production, permits, contracting, work timetables, and project management. Students utilize strategies to solve open-ended problems while they learn how to apply technical skills, knowledge, documentation techniques, and processes using modern, industry-leading technology and software. Work-based learning experiences and industry-mentored

projects will introduce students to a wide array of careers such as architects, civil engineers, construction management, cost estimators, and drafters. The AET program of study will lead to students earning AutoCAD and Revit certification, dual enrollment for up to 10 credits from Delaware Technical Community College (DTCC), and advanced skills in product data management (PDM) and building information modeling (BIM).

- **Foundations of Technology (FOT)** prepares students with the ability to innovate, improvise, and invent solutions to engineering problems. Students explore how technological innovations result when ideas, knowledge, and skills are shared within a technological cluster and amongst other fields of study. In this course, students develop foundational skills in engineering design and documentation as a formal process to transform ideas into products or systems.
- **Processes of Architecture and Construction (PAC)** is an articulated course (AET123 – Architectural Drafting/Design 1 and EDD171 – Introduction to CAD using AutoCAD) that prepares students with the skills and experience in the skills and techniques of drafting, freehand orthographic and pictorial sketching, geometric construction, multi-view projections, sectional views, auxiliary views, line types, lettering, dimensioning, notation, and use of drafting equipment that will lead to students applying AutoCAD tools and features to create designs, manipulate and modify elements, assemble project data, and create printed output.
- **Architectural CAD Applications (ACA)** is a capstone dual enrollment course (AET164 – Architectural CAD Applications) that introduces three-dimensional (3D) parametric architectural computer-aided design (CAD) software to develop building models used to produce drawing documents, including site plans, floor plans, elevations, sections, and schedules. Topics include creation of 3D pictorial representations of interiors and exteriors, including materials, lighting, rendering, and animation. Students will transform concepts into architectural products with fully developed design documentation to meet requirements. Students will practice the design process by creating, synthesizing, iterating, and presenting solutions.

End-of-Program Assessment(s):

- ☒ Certification/credentialing exam (specify):
AutoDesk AutoCAD User Certification
Autodesk Revit User Certification
- ☐ Licensing exam (specify):
- ☒ Nationally recognized exam (specify): Engineering by Design (EbD)– Foundations of Technology (FOT)
- ☒ Other (specify): DTCC Portfolio requirement, which serves as evidence for the purpose of evaluating technical learning progress, and academic achievement.

Course title:

Foundations of Technology (FOT)

Course description (include prerequisites):

Foundations of Technology (FOT) prepares students with the ability to innovate, improvise, and invent solutions to engineering problems. Students explore how technological innovations result when ideas, knowledge, and skills are shared within a technological cluster and amongst other fields of study. In this course, students develop foundational skills in engineering design and documentation as a formal process to transform ideas into products or systems.

Pre-requisite or concurrent enrollment requirement: Algebra I

Course knowledge and skills (what students will know and be able to do):

By the end of this course, students will:

1. Analyze technological innovations and inventions to: create mathematical representations that illustrate the rapidly increasing rate of technological development and diffusion; develop an invention or innovation as a result of goal-oriented research and design; debate an example of a technology in which the development was driven by the profit motive; and discuss how technology transfer occurs and how it can be applied toward existing innovations for a different function.
2. Research and discuss the patenting process in order to: interpret how the patenting process is used to protect technological ideas and develop examples of an evolutionary technology that has resulted from a series of refinements to a basic invention.
3. Apply advertising, economic analysis, and production considerations to: determine how advertising, the strength of the economy, the goals of the company, and market analysis contribute to influence design criteria and constraints; develop success versus failure rubrics for products; and determine impacts of technologies other than those intended by the design.
4. Illustrate the research and development process to: construct problem-solving approaches; prepare proposals for devices and systems to meet the needs of the marketplace; and present research and development criteria in the development of a new invention or innovations that meets a market need.
5. Analyze precision and accuracy of measurement to: construct and modify components of a product based upon design constraints; discuss systems that are embedded within larger technological, social, and environmental systems; debate how technological progress is advanced through the application of science and mathematics; and apply scientific and mathematic analysis techniques to evaluate a product.

6. Analyze the application of a technology to: determine trade-offs between positive and negative impacts and predict positive and negative effects of a technology on the environment.
7. Apply the steps of the engineering design process to: define a problem to be solved that includes brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing, and communicating results and draw conclusions about a situation being modeled based on data.
8. Analyze and create three-dimensional objects in order to: define objects and spaces from different perspectives; demonstrate how to test a design in order to redefine and improve the design; and select design requirements to redefine and improve a product within the design criteria.
9. Determine principles used in a current design to: analyze data on the effectiveness of the design principles used; propose a redesign using the design process; apply mathematical modeling aids to simulate how a proposed system might behave; and apply scientific laws, engineering principles, properties of materials, and construction techniques to design engineered solutions to problems.
10. Use symbolic algebra to: represent and explain mathematical relationships; apply geometric ideas to solve problems; apply mathematics to visualize engineering design solutions; draw and construct representations of two- and three-dimensional geometric objects using a variety of tools; collect data and information and use computers and calculators to organize, process, and present the information; and make decisions about units and scales that are appropriate for problem situations involving measurement.
11. Communicate technological solutions through: observations, processes, and results of the design process through a final solution; the use of appropriate verbal, graphic, quantitative, virtual, and written means to communicate a solution; and presentations to a target audience using appropriate oral and written techniques.

End-of-Course Assessment(s):

- ☐ Teacher designed assessment
- ☐ LEA designed assessment
- ☐ Certification/credentialing exam (specify):
- ☐ Licensing exam (specify):
- ☒ Nationally recognized exam (specify):
Engineering byDesign (EbD) Course Level Assessment – Foundations of Technology (FOT)
- ☐ Other (specify):

Course title:

Processes of Architecture and Construction (PAC)

Course description (include prerequisites):

Processes of Architecture and Construction (PAC) is a set of articulated courses (AET123 – Architectural Drafting/Design 1 and EDD171 – Introduction to CAD using AutoCAD) that prepares students with the skills and experience in the skills and techniques of drafting, freehand orthographic and pictorial sketching, geometric construction, multi-view projections, sectional views, auxiliary views, line types, lettering, dimensioning, notation, and use of drafting equipment that will lead to students applying AutoCAD tools and features to create designs, manipulate and modify elements, assemble project data, and create printed output.

Prerequisite: Foundations of Technology

Course knowledge and skills (what students will know and be able to do):**By the end of this course, students will be able to:**

1. Use a paraliner or T-square to create horizontal lines; employ combinations of triangles, protractors, and adjustable triangles to create vertical and angle lines; identify and produce lines types and line weights that are representative of the line quality used in industry; use drafting compasses and circle templates to create circles and arcs; identify drafting media sizes and types; Interpret architectural and engineering scale units. Use architectural and engineering scale rulers and units; identify and produce architectural and engineering style dimensions and annotation.
2. Apply sketching techniques to: identify various types of sketches, and identify the objects depicted; sketch both two- and three-dimensional objects; delineate parallel, perpendicular, and evenly spaced lines; draft circles and arcs; sketch objects to scale using grid media; and delineate the primary views of an orthographic drawing in proper orientation and alignment.
3. Draw geometric constructions by: drafting a line, and bisect the line into equal length parts; drawing a line, and construct a second line that is parallel to the first line. Divide a line into multiple equal parts; draw intersecting lines and bisect the interior angles; erect a perpendicular line from another line; erect a perpendicular line from a point in space to a line; inscribe a square in a circle; construct a circle through three points; draft an arc tangent to a horizontal and vertical line; draw an ogee curve tangent to two parallel lines.
4. Compose single and multi-views to: draft lines, arcs, and circles of specific sizes; draw lines at specific angles; construct irregular curves; compose the three standard views of an object, including all of the proper conventions, placement, and alignment; transfer the height, width, and depth between views; identify and project surfaces appearing in each view; name and draw visible, hidden, and center lines in each view; and draw and project normal, inclined, and oblique surfaces in all views.

5. Delineate auxiliary view to: create an auxiliary view from an orthographic projection; draw folding lines or reference-plane lines between any two adjacent views; construct depth, height, and width auxiliary views; and construct partial auxiliary views.
6. Draw plan views to: indicate walls, doors, windows, and other architectural features; draw hidden lines, and use various line weights for clarity; and arrange and organize dimensions and annotation.
7. Draw elevation views to: indicate walls, doors, windows, and other architectural features; use various line weights for clarity; and arrange and organize dimensions and annotation.
8. Draw sectional views to: indicate walls, doors, windows, and other architectural features; draw hidden lines and utilize various line weights for clarity; and arrange and organize dimensions and annotation.
9. Delineate axonometric views to: construct axonometric views from information provided; indicate walls, doors, windows, and other architectural features; draw hidden lines, and use various line weights for clarity; and arrange and organize dimensions and annotation.
10. Create an architectural model in CAD to: apply materials to the model for visual realism; add lighting and shading to a model; and print realistic CAD architectural model.
11. Identify various types of sketches, and identify the objects depicted to: sketch both two- and three-dimensional objects; delineate parallel, perpendicular, and evenly spaced lines; draft circles and arcs; sketch objects to scale using grid media; and delineate the primary views of an orthographic drawing in proper orientation and alignment.
12. Draw geometric constructions to: draft a line, and bisect the line into equal length parts; draw a line, and construct a second line that is parallel to the first line; divide a line into multiple equal parts; draw intersecting lines and bisect the interior angles; erect a perpendicular line from another line; erect a perpendicular line from a point in space to a line; inscribe a square in a circle; construct a circle through three points; draft an arc tangent to a horizontal and vertical line; and draw an ogee curve tangent to two parallel lines.
13. Compose single and multi-views to: draft lines, arcs, and circles of specific sizes; draw lines at specific angles; construct irregular curves; compose the three standard views of an object, including all of the proper conventions, placement, and alignment; transfer the height, width, and depth between views; identify and project surfaces appearing in each view; name and draw visible, hidden, and center lines in each view; and draw and project normal, inclined, and oblique surfaces in all views.
14. Delineate auxiliary views to: create an auxiliary view from an orthographic projection; draw folding lines or reference-plane lines between any two adjacent views; construct depth, height, and width

auxiliary views; and construct partial auxiliary views.

15. Draw plan views to: indicate walls, doors, windows, and other architectural features; draw hidden lines, and use various line weights for clarity; and arrange and organize dimensions and annotation.
16. Draw elevation views to: indicate walls, doors, windows, and other architectural features; use various line weights for clarity; and arrange and organize dimensions and annotation.
17. Draw sectional views to: indicate walls, doors, windows, and other architectural features; draw hidden lines and utilize various line weights for clarity; and arrange and organize dimensions and annotation.
18. Delineate axonometric views to: construct axonometric views from information provided; indicate walls, doors, windows, and other architectural features; draw hidden lines, and use various line weights for clarity; and arrange and organize dimensions and annotation.
19. Create an architectural model in CAD that: uses various materials to model for visual realism; adds lighting and shading to the model; and prints detailed construction documents to both replicate as a physical model in CAD.

End-of-Course Assessment(s):

- ☐ Teacher designed assessment
- ☐ LEA designed assessment
- ☒ Certification/credentialing exam (specify): Autodesk AutoCAD User Certification
- ☐ Licensing exam (specify):
- ☐ Nationally recognized exam (specify):
- ☒ Other (specify):
 - DTCC End of Course assessment for AET123 – Architectural Drafting/Design 1
 - DTCC End of Course assessment for EDD171 – Introduction to CAD using AutoCAD
 - DTCC Portfolio requirement which serves as evidence for the purpose of evaluating technical learning progress, and academic achievement

Course title (select one and delete all other language):

Architectural CAD Applications (ACA)

Course description (include prerequisites):

Architectural CAD Applications (ACA) is a capstone dual enrollment course (AET164 – Architectural CAD Applications) that introduces three-dimensional (3D) parametric architectural computer-aided design (CAD) software to develop building models used to produce drawing documents, including site plans, floor plans, elevations, sections, and schedules. Topics include creation of 3D pictorial representations of interiors and exteriors, including materials, lighting, rendering, and animation. Students will transform concepts into architectural products with fully developed design documentation to meet requirements. Students will practice the design process by creating, synthesizing, iterating, and presenting solutions.

Prerequisite: Processes of Architecture and Construction (PAC)

Course knowledge and skills (what students will know and be able to do):

By the end of this course, students will:

1. Construct parametric building models with appropriate values and settings to: compare parametric modeling products in use today in the local, regional, and global architectural engineering and construction (AEC) industry; define parametric building modeling and building information technology terminology; explain bi-directional associativity among components, views, and annotation, and discuss its importance to contemporary architectural drafting and design; prepare files with correct settings for both residential and commercial buildings; operate the software tools found on the ribbon, toolbars, menus, dialog boxes, and other locations; adjust and modify default settings as needed to customize both the software environment and model as needed; use standard file-naming conventions; and create backups of all files to various storage media and locations.
2. Create parametric building models using software tools to select and define site work, foundations, walls, ceilings, roofs, windows, doors, stairs, architectural components, and structural members to: produce site topography and surface infrastructure; prepare horizontal building grid and vertical elevations; select and define foundation types and place in model; choose and modify wall types and place in model; use and revise ceiling types, openings, bulkheads, and place in model; employ and adjust roof types and place in model; identify and customize window and door types and place in model; select and adjust stairs, ramps, and railings and place in model; use and adapt architectural components and place in model; and select and define structural members and place in model.
3. Use and modify drawing profiles, templates, object types, and other parametric software tools to: change component locations, dimensions, colors, and other characteristics; modify object categories to create custom objects; prepare multiple design element alternatives contained within

a model; and demonstrate collision checking among objects.

4. Prepare architectural views and drawings from the model such as site, foundation, plans, elevations, sections, details, legends, and schedules to: arrange sheets for various paper sizes and drawing scales; use and modify software-supplied title blocks; prepare new title blocks; produce standard architectural views such as site, foundation, plans, elevations, sections, details, legends, and schedules; manipulate scales, object visibility, cutting planes, line types, and other software variables to achieve required appearance for both views and sheets.
5. Use standard documentation conventions for the annotation and dimensioning of architectural drawings to: use software-supplied annotation and dimensions; modify formatting of software-supplied annotation and dimensions; employ dimensions both for object parameters and non-parametric labeling; use cut lines and elevation markers to create section and elevation views; employ tags for details such as doors, windows, and rooms, and develop corresponding schedules; use keynotes to label elements and materials using the Master Format organizational structure; and apply two-dimensional (2D) line work and detail to section views.
6. Produce presentation quality renderings and animations of the model in isometric and perspective interior and exterior views to: prepare isometric and perspective interior and exterior views using both three-dimensional (3D) navigation techniques and virtual cameras; edit material attributes such as pattern size, brightness, intensity, gloss, transparency, reflection, and other characteristics; apply and edit different types of lighting: ambient, directional, natural, and artificial; modify shade and shadows, both default and those based on location, season, and time of day; employ plants, people, vehicles, and other non-architectural objects for heightened realism; demonstrate non-photorealistic renderings, depth of field, atmospheric, or other advanced rendering techniques; and prepare both walk through and fly-around animations.
7. Use printers, plotters, and file export functions to make transmittable, readable, and hard copies of drawings, model views, and renderings to: convert line drawings, rendered images, and animations to compact file formats that are easily transmittable and readable by commonly available viewing software on a variety of devices and platforms; and use printers and plotters to produce line drawings, rendered images, and animations.

End-of-Course Assessment(s):

- ☐ Teacher designed assessment
- ☐ LEA designed assessment
- ☒ Certification/credentialing exam (specify):
 - Autodesk Revit User Certification
 - International Code Council (ICC) Certification (building, electrical, mechanical HVAC, plumbing)
- ☐ Licensing exam (specify):
- ☐ Nationally recognized exam (specify):
- ☒ Other (specify):
 - DTCC End of Course assessments for AET164 – Architectural CAD Applications

DTCC Portfolio requirement which serves as evidence for the purpose of evaluating technical learning progress, and academic achievement

PROGRAM OF STUDY CURRICULUM

Identify the method of technical and academic curriculum development (adopted, adapted, or developed in accordance with guidance from the program advisory committee).

POS technical and academic curriculum will be:

- ☒ Adopted (specify source): State-model program of study
- ☐ Adapted (specify source):
- ☐ Developed locally (describe):
- ☐ Other (specify):

TEACHER CERTIFICATION

Provide valid teacher certification(s), candidate experience, pre-requisite and requisite licensure or certification requirement(s) for POS teachers.

POS teacher requirements include:

- ☒ Teacher certification(s) (list): Technology Education; or Skilled and Technical Sciences (STS) Design/Preconstruction
- ☒ Candidate experience (describe): Candidate may have experience as a drafter, architect, designer, or engineer producing drawings of an architectural or mechanical nature, on paper and electronically. Must have experience with drafting conventions and dimensioning practices in mechanical and architectural areas. Must also demonstrate proficiency in the use of various computer hardware and software systems. For more information, please see the Bureau of Labor Statistics: Drafters.
- ☐ Pre-requisite professional licensure or certification requirement(s) (list):
- ☐ Requisite professional licensure or certification requirement(s) (list):
- ☐ Other (describe):

VALUE-ADDED OPPORTUNITIES

List extended early career and college credit opportunities available during the student's senior year. Document transition services, cooperative learning experiences, additional dual enrollment, or other.

Opportunities for extended and accelerated learning include:

- ☐ Cooperative education (describe):
- ☐ Structured internship (describe):
- ☐ Dual enrollment (list):
- ☐ Advanced Placement (list):
- ☐ Transition services (describe):
- ☐ Other (describe):

CAREER AND TECHNICAL STUDENT ORGANIZATIONS

Indicate the Career and Technical Student Organization (CTSO) affiliation by checking the appropriate box.

- ☒ Technology Student Association (TSA)

PROGRAM OF STUDY MATRIX

Complete the program of study matrix to demonstrate the alignment of academic and technical courses, culminating early career and/or early college experiences. Identify appropriate certification and licensure options, opportunities for obtaining early college credit (courses with articulated or dual enrollment credit agreements should be appropriately designated within the matrix), the post-secondary program sequence, and potential career options. *Attach the Program of Study Matrix.*

Access the [Program of Study Matrix](#).

DEPARTMENT OF EDUCATION PROGRAM OF STUDY APPROVAL		
The following section will be completed by staff from the Delaware Department of Education, CTE & STEM Office and reported to the LEA as part of the CTE program of study approval process.		
Date Delaware CTE Program of Study Application Received:		
Local Education Agency (LEA): School(s):		Program of Study Start Date:
LEA CTE Coordinator Name:		Phone: E-Mail Address:
Career Cluster & Code: Architecture/Construction / 2	Career Pathway & Code: Design/Pre-construction / 2.01	Program of Study Title & Code: Architectural Engineering Technology / 2.01605
CTE Program of Study Course Titles, Course Codes, and Funding Levels: 1. Foundations of Technology (FOT) / 2.01605011 / 2 2. Processes of Architecture and Construction (PAC) / 2.01605022 / 3 3. Architectural CAD Applications (ACA) / 2.01605033 / 3		
CTE Concentrator/Completer Course Titles: Concentrator Course: <u>Processes of Architecture and Construction (PAC)</u> Completer Course: <u>Architectural CAD Applications (ACA)</u>		
CTE Program of Study Request: ☒ State-model CTE Program of Study ☐ Local CTE Program of Study		
CTE Program of Study Attachments: ☒ Labor Market Information (LMI) Review; ☒ Articulation/Dual Enrollment Agreement(s); and ☒ Program of Study Matrix.		
DDOE CTE & STEM Director Signature:		Date:
DDOE Chief Academic Officer Signature:		Date: