



Automotive/Advanced Manufacturing Architecture & Engineering Design

Program Information

Every new structure or machine starts out as the idea of a designer or an engineer. It is only through the knowledge and ability of highly skilled and trained drafters/designers that these ideas are put on paper and actually come to life. Drafting is a specialized skill that involves the process of converting an idea from a designer's mind to precise shop drawings and specifications from which a product or project can be constructed. This field requires individuals with imagination, insight, the ability to visualize in 3-D, some technical knowledge of mechanical and architectural drawings, along with an aptitude of applying mathematics and the physical sciences in completing assigned projects.

Trenholm State Community College uses the world's most popular Computer Aided Design (CAD) software; AutoDesk's AutoCAD, to teach basic architectural and engineering design graphic principles, standards, and conventions. The courses are comprised of theory classes with associated practical laboratory assignments incorporating "on the job" drafting techniques and training in Automated Manufacturing; such as 3-D printing. In addition, the student will be trained in Technical Sketching, 3-D modeling (BIM) software programs such as Inventor, Revit Architecture, SolidWorks, Google Pro Sketch-Up and Catia.

Occupational Choices

Employment of architects is projected to grow 4 percent from 2016 to 2026, slower than the average for all occupations. With a high number of students graduating with degrees in architecture, strong competition for internships and jobs is expected.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2019 Survey

Average Full-Time Wage

The median annual wage for architects was \$79,380 in May 2018. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$48,020, and the highest 10 percent earned more than \$138,120.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2019 Survey

Awards Available

Associate of Applied Science
Automotive/Advanced Manufacturing
Architecture & Engineering Design

Certificate
Automotive/Advanced Manufacturing
Architecture & Engineering Design

Short Term Certificate
Automotive/Advanced Manufacturing
Architecture & Engineering Design
Engineering Design Concentration
Architecture Design Concentration

Program Contact

Richard Herring
Program Coordinator/Instructor
334-420-4368
Location: Library Tower - 2nd Floor

As part of ongoing planning and evaluation, the College regularly evaluates student learning outcomes for each program.

Estimated Program Length & Cost *

| <u>Award</u> | <u>Length</u> | <u>Credit Hours</u> | <u>Tuition Fees</u> | <u>Books</u> | <u>Tools</u> | <u>Supplies</u> |
|--------------------------|---------------|---------------------|---------------------|--------------|--------------|-----------------|
| Associate Degree | 6 Terms | 67 | \$10,653 | \$660 | \$50 | \$0 |
| Certificate | 5 Terms | 58 | \$9,222 | \$390 | \$50 | \$0 |
| Short Term Certificate 1 | 3 Terms | 21 | \$3,339 | \$260 | \$50 | \$0 |
| Short Term Certificate 2 | 3 Terms | 18 | \$2,862 | \$260 | \$50 | \$0 |

* Tax not included. Prices are subject to change without prior notice; cost of books may vary considerably among suppliers. Cost of general education books is in addition to the total listed above. The length of the program is based on full-time status of 12-15 credit hours per term. Enrollment in transitional level general education courses will alter the length of the program.

Associate of Applied Science Automotive/Advanced Manufacturing Architecture & Engineering Design

General Education Requirements (15 hours)

Area I - Written Composition (3 hours)

| | | |
|---------|--------------------------|---|
| ENG-101 | English Composition I | 3 |
| ENG-102 | English Composition II | 3 |
| ENG-130 | Technical Report Writing | 3 |

Area II - Humanities & Fine Arts (3 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

Note: If SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

Arts:

| | | |
|---------|--------------------|---|
| ART-100 | Art Appreciation | 3 |
| MUS-101 | Music Appreciation | 3 |

Humanities:

| | | |
|---------|---------------------------------|---|
| PHL-106 | Intro to Philosophy | 3 |
| PHL-206 | Ethics & Society | 3 |
| REL-100 | History of World Religions | 3 |
| REL-151 | Survey of Old Testament | 3 |
| REL-152 | Survey of New Testament | 3 |
| SPA-101 | Intro Spanish I | 3 |
| SPA-102 | Intro Spanish II | 3 |
| SPH-106 | Fundamentals of Oral Comm | 3 |
| SPH-107 | Fundamentals of Public Speaking | 3 |

Literature:

| | | |
|---------|------------------------|---|
| ENG-251 | American Literature I | 3 |
| ENG-252 | American Literature II | 3 |
| ENG-261 | English Literature I | 3 |
| ENG-262 | English Literature II | 3 |
| ENG-271 | World Literature I | 3 |
| ENG-272 | World Literature II | 3 |

Area III - Natural Science & Mathematics (6 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

| | | |
|---------|--------------------------------|---|
| MTH-100 | Intermediate Algebra | 3 |
| MTH-103 | Intro to Technical Mathematics | 3 |
| MTH-104 | Plane Trigonometry | 3 |
| MTH-110 | Finite Mathematics | 3 |
| MTH-112 | Precalculus Algebra | 3 |
| MTH-116 | Mathematical Applications | 3 |

Natural Sciences:

| | | |
|---------|----------------------------|---|
| BIO-101 | Introduction to Biology I | 4 |
| BIO-102 | Introduction to Biology II | 4 |
| BIO-103 | Principles of Biology I | 4 |
| BIO-104 | Principles of Biology II | 4 |
| PHS-111 | Physical Science I | 4 |
| PHS-112 | Physical Science II | 4 |
| PHY-120 | Introduction to Physics | 4 |

Area IV - History, Social & Behavioral Sciences (3 hours):

(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

Note: Must complete 3 semester hours.

History:

| | | |
|---------|--------------------------|---|
| HIS-101 | Western Civilization I | 3 |
| HIS-102 | Western Civilization II | 3 |
| HIS-121 | World History I | 3 |
| HIS-122 | World History II | 3 |
| HIS-201 | United States History I | 3 |
| HIS-202 | United States History II | 3 |

Social and Behavioral Sciences:

| | | |
|---------|-----------------------------------|---|
| PSY-200 | General Psychology | 3 |
| PSY-210 | Human Growth and Development | 3 |
| SOC-200 | Introduction to Sociology | 3 |
| POL-200 | Introduction to Political Science | 3 |
| POL-211 | American National Government | 3 |

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

| | | |
|---------|----------------------------|---|
| ORI-101 | Orientation to College | 1 |
| CIS-146 | Microcomputer Applications | 3 |

| | | |
|---------|-----------------------------------|---|
| ADM-101 | Precision Measurement | 3 |
| ADM-108 | Intro to 3D Modeling | 3 |
| ADM-109 | Freehand Sketching | 2 |
| ADM-110 | Blue Print Reading | 3 |
| ADM-114 | Design Innovation | 3 |
| ADM-116 | Introduction to CATIA | 3 |
| ADM-208 | Intermediate 3D Modeling | 3 |
| ADM-255 | Applications to Design (Capstone) | 3 |
| DDT-124 | Basic Technical Drawing | 3 |
| DDT-125 | Surface Development | 3 |
| DDT-128 | Intermediate Technical Drawing | 3 |
| DDT-131 | Machine Drafting Basics | 3 |
| DDT-132 | Architectural Drafting | 3 |
| DDT-222 | Advanced Architectural Drafting | 3 |
| DDT-225 | Structural Steel Drafting | 3 |
| DDT-234 | 3D Graphics and Animation | 3 |
| DDT-286 | Co-op | 1 |

Area V Credit Hours: 52

Total Credit Hours: 67

Certificate Automotive/Advanced Manufacturing Architecture & Engineering Design

General Education Requirements (9 hours)

Area I - Written Composition (3 hours)

| | | |
|---------|--------------------------|---|
| ENG-101 | English Composition I | 3 |
| ENG-102 | English Composition II | 3 |
| ENG-130 | Technical Report Writing | 3 |

Area II - Humanities & Fine Arts (0 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

Note: If SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

Arts:

| | | |
|---------|--------------------|---|
| ART-100 | Art Appreciation | 3 |
| MUS-101 | Music Appreciation | 3 |

Humanities:

| | | |
|---------|---------------------------------|---|
| PHL-106 | Intro to Philosophy | 3 |
| PHL-206 | Ethics & Society | 3 |
| REL-100 | History of World Religions | 3 |
| REL-151 | Survey of Old Testament | 3 |
| REL-152 | Survey of New Testament | 3 |
| SPA-101 | Intro Spanish I | 3 |
| SPA-102 | Intro Spanish II | 3 |
| SPH-106 | Fundamentals of Oral Comm | 3 |
| SPH-107 | Fundamentals of Public Speaking | 3 |

Literature:

| | | |
|---------|------------------------|---|
| ENG-251 | American Literature I | 3 |
| ENG-252 | American Literature II | 3 |
| ENG-261 | English Literature I | 3 |
| ENG-262 | English Literature II | 3 |
| ENG-271 | World Literature I | 3 |
| ENG-272 | World Literature II | 3 |

Area III - Natural Science & Mathematics (6 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

| | | |
|---------|--------------------------------|---|
| MTH-100 | Intermediate Algebra | 3 |
| MTH-103 | Intro to Technical Mathematics | 3 |
| MTH-104 | Plane Trigonometry | 3 |
| MTH-110 | Finite Mathematics | 3 |
| MTH-112 | Precalculus Algebra | 3 |
| MTH-116 | Mathematical Applications | 3 |

Natural Sciences:

| | | |
|---------|----------------------------|---|
| BIO-101 | Introduction to Biology I | 4 |
| BIO-102 | Introduction to Biology II | 4 |
| BIO-103 | Principles of Biology I | 4 |
| BIO-104 | Principles of Biology II | 4 |
| PHS-111 | Physical Science I | 4 |
| PHS-112 | Physical Science II | 4 |
| PHY-120 | Introduction to Physics | 4 |

Area IV - History, Social & Behavioral Sciences (0 hours):

(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

History:

| | | |
|---------|--------------------------|---|
| HIS-101 | Western Civilization I | 3 |
| HIS-102 | Western Civilization II | 3 |
| HIS-121 | World History I | 3 |
| HIS-122 | World History II | 3 |
| HIS-201 | United States History I | 3 |
| HIS-202 | United States History II | 3 |

Social and Behavioral Sciences:

| | | |
|---------|-----------------------------------|---|
| PSY-200 | General Psychology | 3 |
| PSY-210 | Human Growth and Development | 3 |
| SOC-200 | Introduction to Sociology | 3 |
| POL-200 | Introduction to Political Science | 3 |
| POL-211 | American National Government | 3 |

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

| | | |
|---------|-----------------------------------|---|
| ORI-101 | Orientation to College | 1 |
| CIS-146 | Microcomputer Applications | 3 |
| ADM-101 | Precision Measurement | 3 |
| ADM-108 | Intro.to 3D Modeling | 3 |
| ADM-109 | Freehand Sketching | 2 |
| ADM-110 | Blue Print Reading | 3 |
| ADM-114 | Design Innovation | 3 |
| ADM-116 | Introduction to CATIA | 3 |
| ADM-208 | Intermediate 3D Modeling | 3 |
| ADM-255 | Applications to Design (Capstone) | 3 |
| DDT-124 | Basic Technical Drawing | 3 |
| DDT-125 | Surface Development | 3 |
| DDT-128 | Intermediate Technical Drawing | 3 |
| DDT-131 | Machine Drafting Basics | 3 |
| DDT-132 | Architectural Drafting | 3 |
| DDT-225 | Structural Steel Drafting | 3 |
| DDT-234 | 3D Graphics and Animation | 3 |
| DDT-286 | Co-op | 1 |

Area V Credit Hours: 49

Total Credit Hours: 58

Short Term Certificate
Automotive/Advanced Manufacturing
Architecture & Engineering Design
Engineering Design Concentration

Area V: Pre-Professional/College Requirements:
 (Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

| | | |
|---------|-----------------------------------|---|
| ORI-101 | Orientation to College | 1 |
| ADM-108 | Intro.to 3D Modeling | 3 |
| ADM-109 | Freehand Sketching | 2 |
| ADM-114 | Design Innovation | 3 |
| ADM-208 | Intermediate 3D Modeling | 3 |
| ADM-255 | Applications to Design (Capstone) | 3 |
| DDT-124 | Basic Technical Drawing | 3 |
| DDT-225 | Structural Steel Drafting | 3 |

Total Credit Hours: 21

Short Term Certificate
Automotive/Advanced Manufacturing
Architecture & Engineering Design
Architecture Design Concentration

Area V: Pre-Professional/College Requirements:
 (Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

| | | |
|---------|-----------------------------------|---|
| ORI-101 | Orientation to College | 1 |
| ADM-109 | Freehand Sketching | 2 |
| ADM-114 | Design Innovation | 3 |
| ADM-255 | Applications to Design (Capstone) | 3 |
| DDT-132 | Architectural Drafting | 3 |
| DDT-222 | Advanced Architectural Drafting | 3 |
| DDT-225 | Structural Steel Drafting | 3 |

Total Credit Hours: 18

Course Descriptions Advanced Manufacturing Architecture & Engineering Design

| Course # | Course Title | Credit Hours |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| ADM-101 | PRECISION MEASUREMENT PREREQUISITE: None This course covers the use of precision measurement instruments utilized in inspection. In addition, basic print reading techniques reverse engineering, and related industry standards required in advanced manufacturing disciplines are covered. Upon completion, students should be able to demonstrate correct use of precision measuring instruments, interpret basic prints and apply basic reverse engineering techniques. Note: This is a suitable substitute for MTT-127. | 3 |
| ADM-108 | INTRO TO 3D MODELING PREREQUISITE: None This course introduces basic 3Dimensional (3D) modeling functions and techniques and the parametric concept. "Hands-on" class structure utilizes various 3D software applications. Topics include terminology, hardware, basic 3D modeling involving sketching and 3D feature creations, feature application and operating system functions. Students will be able to generate basic 3D parts and associated working drawings in soft and hard copy format. | 3 |
| ADM-109 | FREEHAND SKETCHING PREREQUISITE: None This is an introductory course, which allows students to learn the terminology and procedures related to drawing. Students will learn and demonstrate the foundations of basic sketching techniques and design principles, focusing on two and three-dimensional representations. | 2 |
| ADM-110 | BLUE PRINT READING PREREQUISITE: None This course is designed to provide students with a comprehensive understanding of blueprint reading. Topics include identifying types of lines and symbols used in mechanical drawings; recognition and interpretation of various types of views, tolerance, and dimensions. | 3 |
| ADM-114 | DESIGN INNOVATION PREREQUISITE: None This course introduces students to concepts that enable them to think like a designer when approaching architectural, engineering and additive manufacturing tasks. Emphasis will be placed on design and problem-solving skills when working independently, or with a team. This course focuses on giving students exposure to creativity, problem solving skills, and the design processes in which a design- centered approached will be employed to develop innovated solutions. This course includes components to develop basic skills to express innovated solutions to design problems with the application of projects, drawings, as well as oral and written communication skills. Students will be introduced to related computer based tools used by architect, engineers, and design manufacturers. (e.g., spreadsheet, word processing, presentation software, and Internet). | 3 |
| ADM-116 | INTRODUCTION TO CATIA PREREQUISITE: None Introduction to parametric, three-dimensional modeling using CATIA (v5 or 6). Focus on how to navigate within this software, how to create three-dimensional solid models using industry best practices, and then how to create and manipulate assemblies made from these parts. Learn the process of designing models with CATIA from conceptual sketching, through to solid modeling, assembly design, and drawing production. Upon completion of this course you will have acquired the skills to confidently work with CATIA. Gain an understanding of the parametric design philosophy of CATIA in this extensive hands-on course. It is expected that all new users of CATIA will require this course. | 3 |
| ADM-208 | INTERMEDIATE 3D MODELING PREREQUISITE: None In this course students will receive instruction on intermediate 3D modeling concepts, such as sheet metal modeling, intermediate assemblies, 3D sketching and weldments. Students will explore an introduction to prototyping and design concepts in a 3D environment. 3D software will be utilized to produce properly detailed construction drawings, using multi-views, section views, and auxiliary views. Proper, industry standard dimensioning with basic tolerances will be discussed and applied to parts. Emphasis will be placed on the theory as well as the mechanics of concepts using 3D and 2D applications. Upon completion, student will produce 3D models in a CAD environment, simple prototype models and working drawings based on proper industry standards. Note: This course is a suitable substitute for DDT-124 | 3 |

| Course # | Course Title | Credit Hours |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| ADM-255 | APPLICATIONS TO DESIGN (CAPSTONE) | 3 |
| | PREREQUISITE: None | |
| | This is a project- or research-oriented course that emphasizes synthesis through collaborative learning. Students integrate and apply previous knowledge, skills, and experiences they learned in their major and other academic courses to complete individual & team-based projects. AM student will be required to serve as interns in the AM Lab. Architectural and Engineer students will serve as interns doing live work, campus project or in an office. The course emphasizes communication skills, critical thinking, problem solving, computer literacy, and teaming skills. NOTE: This course is usually taken during the last 2 semesters of the program of study. | |
| DDT-111 | FUNDAMENTALS OF DRAFTING & DESIGN TECH | 3 |
| | PREREQUISITE: None | |
| | This course serves as an introduction to the field of drafting and design and provides a foundation for the entire curriculum. Topics include safety, lettering, tools and equipment, geometric constructions, and orthographic sketching, and drawings. This is a CORE course. | |
| DDT-124 | BASIC TECHNICAL DRAWING | 3 |
| | PREREQUISITE: None | |
| | This course covers sections, auxiliary views, and basic space geometry. Emphasis will be placed on the theory as well as the mechanics of applying sections, basic dimensioning, auxiliary views, and basic space geometry. This is a CORE course. | |
| DDT-125 | SURFACE DEVELOPMENT | 3 |
| | PREREQUISITE: None | |
| | This course covers surface intersections and developments. Emphasis is placed on the basic types of intersections using simple geometric forms. Upon completion, students should be able to draw common types of surface intersection and handle them simply as applications of the concepts learned in this class. | |
| DDT-128 | INTERMEDIATE TECHNICAL DRAWING | 3 |
| | PREREQUISITE: None | |
| | This course is designed to develop a strong foundation in common drafting and design practices and procedures. Topics include dimensioning concepts and pictorial drawings. This is a CORE course. | |
| DDT-131 | MACHINE DRAFTING BASICS | 3 |
| | PREREQUISITE: None | |
| | This course in machine drafting and design provides instruction in the largest specialty area of drafting in the United States, in terms of scope and job opportunities. Emphasis will be placed on the applications of multi-view drawings, including drawing organization and content, title blocks and parts lists, assembly drawings, detail drawings, dimensioning and application of engineering controls in producing industrial-type working drawings. Upon completion, students should be able to organize, layout, and produce industrial-type working drawings, including the application of title blocks, parts lists, assemblies, details, dimensions, and engineering controls. | |
| DDT-132 | ARCHITECTURAL DRAFTING | 3 |
| | PREREQUISITE: None | |
| | This course in architectural design and drafting introduces basic terminology, concepts and principles of architectural design and drawing. Topics include design considerations, lettering, terminology, site plans, and construction drawings. Upon completion, students should be able to draw, dimension, and specify basic residential architectural construction drawings. | |
| DDT-222 | ADVANCED ARCHITECTURAL DRAFTING | 3 |
| | PREREQUISITE: None | |
| | This third course in architectural design and drafting continues with advanced architectural plans, including a slant toward light commercial construction. Topics include climate control plans, application of building codes, building materials and finish specifications, cost estimating, and bid specifications. Upon completion, students should be able to apply current techniques in producing advanced-level architectural plans, including residential and light commercial applications. | |
| DDT-225 | STRUCTURAL STEEL DRAFTING | 3 |
| | PREREQUISITE: None. | |
| | This course covers the theory and practical applications necessary to understand the basic design and terminology of structural steel components used in light commercial buildings. Emphasis is placed on structural steel drafting techniques, bolted and welded connections, framing plans, sections, fabrication and connection details, and bills of material. Upon completion, students should be able to produce engineering and shop drawings incorporating standard shapes, sizes, and details using the A.I.S.C. Manual and incorporating safety practices. | |

| Course # | Course Title | Credit Hours |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------|
| DDT-234 | 3D GRAPHICS AND ANIMATION | 3 |
| PREREQUISITE: None. | | |
| This course is design to challenge the imagination of the student in a 3-dimensional problem solving environment. The student will be given a basic introduction to the concepts of 3D design and animation, then apply those concepts to a design project. Upon completion, students should be able to create and animate objects in a 3-dimensional environment. | | |
| DDT-286 | CO-OP | 1 |
| PREREQUISITE: None. | | |
| These courses constitute a series wherein the student works on a part-time basis in a job directly related to drafting. In these courses the employer evaluates the student's productivity and the student submits a descriptive report of his work experiences. Upon completion, the student will demonstrate skills learned in an employment setting. | | |