



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

Overall employment of automotive body and glass repairers is projected to grow 8 percent from 2016 to 2026, about as fast as the average for all occupations. Job opportunities are projected to be good for automotive body and glass repairers. The need to replace experienced automotive body and glass repairers who change occupations, retire, or stop working for other reasons will also provide many job opportunities. The best opportunities in automotive body repair will be available to those with industry certification and training in automotive body repair and refinishing, and in collision repair.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2018 Survey

Average Full-Time Wage

The median annual wage for automotive body and related repairers was \$41,970 in May 2017. 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 \$25,470, and the highest 10 percent earned more than \$70,670.

Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2018 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	\$10,385	\$660	\$50	\$0
Certificate	5 Terms	54	\$8,370	\$390	\$50	\$0
Short Term Certificate 1	3 Terms	25	\$3,875	\$260	\$50	\$0
Short Term Certificate 2	3 Terms	22	\$3,410	\$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 (16 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-200	Ethics in the Workplace	3
PHL-206	Ethics & Society	3
PHL-210	Ethics and the Health Sciences	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 (6-7 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
BIO-201	Human Anatomy & Physiology I	4

BIO-202	Human Anatomy & Physiology 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-107	Introduction to CAD for CIM	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

Area V Credit Hours: 51

Total Credit Hours: 67

Certificate Automotive/Advanced Manufacturing Architecture & Engineering Design

General Education Requirements (6 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 (03 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 Philosphy	3
PHL-200	Ethics in the Workplace	3
PHL-206	Ethics & Society	3
PHL-210	Ethics and the Health Sciences	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 (3 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
BIO-201	Human Anatomy & Physioilogy I	4

BIO-202	Human Anatomy & Physiology 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-107	Introduction to CAD for CIM	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

Area V Credit Hours: 48

Total Credit Hours: 54

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-107	Introduction to CAD for CIM	3
ADM-108	Intro.to 3D Modeling	3
ADM-114	Design Innovation	3
ADM-208	Intermediate 3D Modeling	3
ADM-255	Applications to Design (Capstone)	3
DDT-111	Fundamentals of Drafting and Design	3
DDT-124	Basic Technical Drawing	3
DDT-225	Structural Steel Drafting	3

Total Credit Hours: 25

Short Term Certificate
Automotive/Advanced Manufacturing
Architecture & Engineering Design
Archicture 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-107	Introduction to CAD for CIM	3
ADM-114	Design Innovation	3
ADM-255	Applications to Design (Capstone)	3
DDT-111	Fundamentals of Drafting and Design	3
DDT-132	Architectural Drafting	3
DDT-222	Advanced Architectural Drafting	3
DDT-225	Structural Steel Drafting	3

Total Credit Hours: 22

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-107	INTRODUCTION TO CAD FOR CIM PREREQUISITE: None This course provides an introduction of Computer-Aided Drafting (CAD) techniques and terminology. Concepts to include CAD software, and skills necessary to perform the basic computer aided drafting functions. Related lab projects are developed from CAD to reinforce knowledge of various shop drawing concepts, software commands, and file management that will be used in the Computer Integrated Manufacturing (CIM). The course will provide an overview of CIM which will include the study of manufacturing planning, integration, and implementation of automation. This course explores manufacturing history, individual processes, systems, and careers. In addition to technical concepts, the course incorporates finance, ethics, and engineering design.	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 approach 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

Course #	Course Title	Credit Hours
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
ADM-255	APPLICATIONS TO DESIGN (CAPSTONE) 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.	3
DDT-111	FUNDAMENTALS OF DRAFTING & DESIGN TECH 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.	3
DDT-124	BASIC TECHNICAL DRAWING 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.	3
DDT-125	SURFACE DEVELOPMENT 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.	3
DDT-128	INTERMEDIATE TECHNICAL DRAWING 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.	3
DDT-131	MACHINE DRAFTING BASICS 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.	3
DDT-132	ARCHITECTURAL DRAFTING 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.	3

Course #	Course Title	Credit Hours
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.	