Trenholm State COMMUNITY COLLEGE
The College for Real Careers

Automotive Manufacturing Technology (AUT)

Program Information

Automotive Manufacturing Technology is a rapidly growing career in one of Alabama's highest-growth industries, automotive manufacturing. With high demand for skilled workers in this industry, Trenholm State offers highly informative programs to prepare students to become Multi-Craft Technicians. This technology program will give students knowledge in the following areas using the most up-to-date modern equipment: Metrology, Coordinate Measuring Machine, Welding, Electrical, Programmable Logic Controllers, Machine Tool, Troubleshooting assembly lines, and Robotics Maintenance.

The Maintenance Multi-Craft technician is responsible for setup, installation, troubleshooting, repair, and testing of complex mechanical /electrical equipment, including automatic machines and process controls, motor control centers and related controls, computer control systems, some with man/machine interfaces, as well as basic plant electrical equipment. This includes preventive maintenance activities related to production and building equipment, machinery and components.

At Trenholm State, the Automotive Manufacturing Technology program is designed to equip a student with the skills and technical knowledge needed to be a success in this interesting and growing field. The students are assigned to specific lab projects which must be completed while studying the theory directly related to the projects.

Occupational Choices

Automotive Manufacturing Technology graduates should find exceptional job opportunities in this field. As the economy grows, the demand for skilled and qualified Multi-Craft employees will increase. Demand for technicians will grow as the number of vehicles in operation increases, reflecting continued growth in the number of multi-car families. Growth in demand will be offset somewhat by slowing population growth and the continuing increase in the quality and durability of automobiles, which will require less frequent service. Additional job openings will be due to the need to replace a growing number of retiring technicians, who tend to be the most experienced workers.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2017 Edition, 2015 Survey

Average Full-Time Wage

The average full-time annual wage for a Multi-Craft Technician is $26,580 - $69,550. Employment in the manufacturing field is expected to increase 6 to 10 percent through the year 2018.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2017 Edition, 2015 Survey

Awards Available

Associate in Applied Science Degree
Automotive Manufacturing Technology

Certificate
Automotive Manufacturing Technology

Short Term Certificate
Automotive Manufacturing Technology

Program Contact

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Location: Patterson Campus - Bldg. Q

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

Estimated Program Length & Cost *

Award	Length	Credit Hours	Tuition Fees	Books	Tools	Supplies
Associate Degree 1	6 Terms	75	$10,875	$1000	$500	$0
Certificate	5 Terms	60	$9,860	$850	$500	$0
Short Term Certificate	3 Terms	29	$4,205	$600	$500	$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 in Applied Science Degree Automotive Manufacturing Technology

Required Technical Courses (53 credit hours)

Course	Title	Hrs
AUT-100	Introduction to Automotive Concepts	3
AUT-102	Manufacturing Fundamentals	3
AUT-103	Occupational Health and Safety	2
AUT-104	Blueprint Reading for Manufacturing	3
AUT-110	DC Fundamentals	3
AUT-111	AC Fundamentals	3
AUT-114	Intro to Prog Logic Controllers	3
AUT-116	Introduction to Robotics	3
AUT-130	Fund of Ind Hydraulics & Pneumatics	3
AUT-150	Introduction to Machine Shop 1	3
AUT-151	Introduction to Machine Shop 1 Lab	3
AUT-155	Metrology	3
AUT-178	Gas Tungsten Arc Welding	3
AUT-180	Gas Tungsten Arc Welding Lab	3
AUT-217	Elements of Industrial Control II	3
AUT-218	Elements of Industrial Control II Lab	2
AUT-234	Industrial Motor Controls I	3
AUT-235	Industrial Motor Controls II	3
AUT-291	Automotive Cooperative Education or AUT-193 Special Topics	1

Required General Education (22 credit hours)

Course	Title	Hrs
CIS-146	Microcomputer Applications	3
ENG-101	English Composition I	3
ENG-102	English Composition II	3
MTH-103	Intro to Technical Mathematics or MTH-110 Finite Math	3
MTH-104	Plane Trigonometry or MTH-112 Pre-Calculus Algebra	3
MUS-101	Music Appreciation OR ART-100 Art Appreciation	3
ORI-101	Orientation to College	1
PSY-200	General Psychology	3

Total Hours: 75 Credit Hours; 1,600 Contact Hours

Certificate Automotive Manufacturing Technology

Required Technical Courses (47 credit hours)

Course	Title	Hrs
AUT-100	Introduction to Automotive Concepts	3
AUT-102	Manufacturing Fundamentals	3
AUT-103	Occupational Health and Safety	2
AUT-104	Blueprint Reading for Manufacturing	3
AUT-110	DC Fundamentals	3
AUT-111	AC Fundamentals	3
AUT-114	Programmable Logic Controllers	3
AUT-116	Introduction to Robotics	3
AUT-130	Fund of Ind Hydraulics & Pneumatics	3
AUT-155	Metrology	3
AUT-178	Gas Tungsten Arc Welding	3
AUT-180	Gas Tungsten Arc Welding Lab	3
AUT-217	Elements of Industrial Control II	3
AUT-218	Elements of Industrial Control II Lab	2
AUT-234	Industrial Motor Controls I	3
AUT-235	Industrial Motor Controls II	3
AUT-291	Automotive Cooperative Education or AUT-193 Special Topics	1

Required General Education (13 credit hours)

CIS-146	Microcomputer Applications	3
ENG-101	English Composition I	3
MTH-103	Intro to Technical Mathematics or MTH-110 Finite Math	3
MUS-101	Music Appreciation OR ART-100 Art Appreciation	3
ORI-101	Orientation to College	1

Total Hours: 60 Credit Hours; 1,296 Contact Hours

Short Term Certificate Automotive Manufacturing Technology

Required Technical Courses (28 credit hours)

Course	Title	Hrs
AUT-100	Intro to Automotive Concepts	3
AUT-103	Occupational Health and Safety	2
AUT-104	Blueprint Reading for Manufacturing	3
AUT-106	Quality Ctrl & Inspection Techniques	3
AUT-114	Programmable Logic Controllers	3
AUT-116	Introduction to Robotics	3
AUT-130	Fund of Ind Hydraulic and Pneumatics	3
AUT-150	Introduction to Machine Shop 1	3
AUT-151	Introduction to Machine Shop 1 Lab	3
AUT-292	Automotive Cooperative Education or AUT-194 Special Topics	2

Required General Education (1 credit hours)

Course	Title	Hrs
ORI-101	Orientation to College	1

Total Hours: 29 Credit Hours; 720 Contact Hours

Course Descriptions for Automotive Manufacturing Technology (AUT)

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours

AUT-100 INTRODUCTION TO AUTOMOTIVE CONCEPTS **3** **0** **3**
PREREQUISITE: None
An introduction to automotive manufacturing concepts is the focus of this course. This course reviews the history of automotive manufacturing and discusses the automotive manufacturing processes for various automotive assembly and sub-assembly plants. It outlines the historical development of automotive manufacturing in Alabama. Finally, the electro-mechanical systems and body components of a typical vehicle will be examined. This is a CORE course.

AUT-102 MANUFACTURING FUNDAMENTALS **3** **0** **3**
PREREQUISITE: None
This course will introduce students to manufacturing fundamentals. It introduces various tools and techniques typically used in Lean manufacturing. It also will provide Occupational Safety and Health Administration (OSHA) certification instruction. OSHA standards will include electrical, Lock Out/ Tag Out, hazardous communications, personal protective equipment, machine guarding, and walking and working surfaces. This is a CORE course.

AUT-103 OCCUPATIONAL HEALTH AND SAFETY **1** **2** **2**
PREREQUISITE: None
This course will cover safety rules and procedures concerning personal safety in the workplace. The course provides both Classroom and performance based hands on training to inform personnel on OSHA rules and techniques to ensure safety.

AUT-104 BLUEPRINT READING IN MANUFACTURING **3** **0** **3**
PREREQUISITE: None
This course provides the students with terms and definitions, theory of orthographic projection, and other information required to interpret drawings used in the manufacturing and industrial trade areas. Topics include multi-view projection, pictorial drawings, dimensions and notes, lines and symbols, tolerances, industrial applications, scales and quality requirements. Upon completion, students should be able to interpret blueprint drawings used in the manufacturing and industrial trades. This course may be tailored to meet specific local industry needs. This is a CORE course. This course is also taught as INT-261.

AUT-106 QUALITY CONTROL & INSPECTION TECHNIQUES **3** **0** **3**
PREREQUISITE: None
This course provides the student with a basic understanding of quality assurance including the history of the quality movement in the United States; national and international standards for quality management systems; the impact of quality on an organization's performance; group problem solving; and statistical methods such as statistical process control (SPC); process capability studies, quality tools, idea generating tools, and corrective and preventive actions.

AUT-110 DC FUNDAMENTALS **1** **4** **3**
PREREQUISITE: None
This course provides a study of atomic theory, direct current (DC), properties of conductors and insulators, direct current characteristics of series, parallel, and series parallel circuits. Inductors and capacitors are introduced and their effects on DC circuits are examined. Students are prepared to analyze complex DC circuits, solve for unknown circuits variables and to use basic electronic test equipment. This course also provides hands-on laboratory exercises to analyze, construct, test, and troubleshoot direct current circuits. Emphasis is placed on the use of scientific calculators and the operation of common test equipment used to analyze and troubleshoot DC and to prove the theories taught during classroom instruction. This is a CORE course. This course is also taught as INT-221, ILT-160, and ELT-108. Suitable substitutes for this course are ELT-111, ILT-106, and INT-120.

AUT-111 AC FUNDAMENTALS **1** **4** **3**
PREREQUISITE: AUT-110
This course provides a study of the theory of alternating current (AC). Students are prepared to analyze complex AC circuit configurations with resistors, capacitors, and inductors in series and parallel combinations. Upon completion, students should be able to describe AC circuits and explain the specific AC theory functions such as RLC, impedance, phase relationships, and power factor. This course also provides hands-on laboratory exercises to analyze alternating current using a variety of circuit configurations with resistors, capacitors, and inductors in series and parallel combinations. Emphasis is placed on the operation of common test equipment used to analyze and troubleshoot AC circuits to prove the theories taught. This course is also taught as INT-223, ILT-161, and ELT-109. Suitable substitutes for this course are ELT-112, ILT-107, and INT-122.

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours

AUT-114 INTRO TO PROGRAMMABLE LOGIC CONTROLLERS **2** **2** **3**
PREREQUISITE: AUT-234
This course provides an introduction to programmable logic controllers. Emphasis is placed on, but not limited to, the following: PLC hardware and software, numbering systems, installation, and programming. Upon completion, students must demonstrate their ability by developing, loading, debugging, and optimizing PLC programs. This is a CORE course. This course is taught as INT-251, ILT-194, AND ELT-231.

AUT-116 INTRODUCTION TO ROBOTICS **2** **2** **3**
PREREQUISITE: None
This course provides instruction in concepts and theories for the operation of robotic servo motors and power systems used with industrial robotic equipment. Emphasis is on the application of the computer to control power systems to perform work. Student competencies include understanding of the functions of hydraulic, pneumatic, and electrical power system components, ability to read and interpret circuitry for proper troubleshooting and ability to perform preventative maintenance. This is a CORE course. This course is also taught as INT-253 and ILT-218.

AUT-130 FUND OF INDUSTRIAL HYDRAULICS & PNEUMATICS **2** **2** **3**
PREREQUISITE: None
This course provides an introduction to hydraulics/pneumatics. Topics include hydraulic pumps, pneumatic compressors work and system components such as valves, filters, regulators, actuators, accumulators, and lubricators. The lab enables students to test, troubleshoot and repair hydraulic pumps, pneumatic compressors work and system components such as valves, filters, regulators, actuators, accumulators, and lubricators. Upon completion, students will be able to apply principles of hydraulic/pneumatics. This course is also taught as ILT-169.

AUT-150 INTRODUCTION TO MACHINE SHOP I **2** **2** **3**
PREREQUISITE: AUT-104 or AUT-166
COREQUISITE: AUT-151
This course introduces machining operations as they relate to the metalworking industry. Topics include machine shop safety, measuring tools, lathes, saws, milling machines, bench grinders, and layout instruments. Upon completion, students will be able to perform the basic operations of measuring, layout, drilling, sawing, turning, and milling. This course is also taught as MTT-147.

AUT-151 INTRODUCTION TO MACHINE SHOP I LAB **0** **6** **3**
PREREQUISITE: None
COREQUISITE: AUT-150
This course provides practical application of the concepts and principles of machining operations learned in AUT 150. Topics include machine shop safety, measuring tools, lathes, saws, milling machines, bench grinders, and layout instruments. Upon completion, students will be able to perform the basic operations of measuring, layout, drilling, sawing, turning, and milling. This course is also taught as MTT-148. (AUT-152 is a suitable substitute for AUT-150 and AUT-151.)

AUT-152 MACHINING TECHNOLOGY I **2** **8** **6**
PREREQUISITE: None
This course introduces machining operations as they relate to the metalworking industry. Topics include machine shop safety, measuring tools, lathes, saws, milling machines, grinding machines, and layout instruments. Upon completion, students will be able to perform the basic operations of measuring, layout, grinding, drilling, sawing, turning, and milling.

AUT-154 METALLURGY **2** **2** **3**
PREREQUISITE: None
This course covers the production, properties, testing, classification, microstructure, and heat treating effects of ferrous and non-ferrous metals. Topics include the iron-carbon phase diagram, ITT diagram, ANSI code, quenching, senescing, and other processes concerning metallurgical transformations. Upon completion, students should be able to understand the iron-carbon phase diagram, ITT diagram, microstructure images, and other phenomena concerning the behavior of metals. This course is also taught as MTT-152.

AUT-155 METROLOGY **2** **2** **3**
PREREQUISITE: None
This course covers the use of precision measuring instruments. Emphasis is placed on the inspection of machine parts and use of a wide variety of measuring instruments. Upon completion students should be able to demonstrate correct use of measuring instruments. This course is aligned with NIMS certification standards. This course is also taught as MTT-127.

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours

AUT-159 BASIC FORMABILITY **2** **2** **3**
PREREQUISITE: AUT-150 and AUT-151
This course is designed to introduce the basic manufacturing processes used to form various materials into those needed for manufacturing. Topics include safety, commonly used materials, the structure of materials, various manufacturing processes, the casting and molding process, forming, separating, conditioning, assembling, and finishing. Upon completion students should be well aware of the basic concept of formability, and the processes used to convert raw materials into manufactured products.

AUT-166 BLUEPRINT READING FOR MACHINISTS **3** **0** **3**
PREREQUISITE: None
This course covers the basic principles of print reading and sketching. Topics include multi-view drawings; interpretation of conventional lines; and dimensions, notes, and thread notations. Upon completion, students should be able to interpret basic drawings, visualize parts, and make pictorial sketches. This course is aligned with NIMS certification standards. This course is also taught as MTT-121.

AUT-178 GAS TUNGSTEN ARC WELDING **3** **0** **3**
PREREQUISITE: None
COREQUISITE: AUT-180
This course provides student with knowledge needed to perform gas tungsten arc welds using ferrous and/or non-ferrous metals, according to applicable welding codes. Topics include safe operating practices, equipment identification and set-up, correct selection of tungsten type, polarity, shielding gas and filler metals. Upon completion, a student should be able to identify safe operating practices, equipment identification and setup, correct selection of tungsten type, polarity, shielding gas, filler metals, and various welds on ferrous and/or non-ferrous metals, using the gas tungsten arc welding process according to applicable welding codes. This course is also taught as WDT-228.

AUT-180 GAS TUNGSTEN ARC WELDING LAB **0** **6** **3**
PREREQUISITE: None
COREQUISET: AUT-178
This course provides student with skills needed to perform gas tungsten arc welds using ferrous and/or non-ferrous metals, according to applicable welding codes. Topics include safe operating practices, equipment identification and set-up, correct selection of tungsten type, polarity, shielding gas and filler metals. Upon completion, a student should be able to identify safe operating practices, equipment identification and setup, correct selection of tungsten type, polarity, shielding gas, filler metals, and various welds on ferrous and/or non-ferrous metals, using the gas tungsten arc welding process according to applicable welding codes. This course is also taught as WDT-268.

AUT-193 SPECIAL TOPICS **0** **1** **1**
PREREQUISITE: None
This course is designed to allow students an opportunity to study directly-related topics of particular interest which require the application of technical knowledge and technical skills. Emphasis is placed on the application of skills and knowledge with practical experiences. Upon completion, students should be able to solve job related problems using technical skills and knowledge.

AUT-194 SPECIAL TOPICS **0** **1** **1**
PREREQUISITE: None
This course is designed to allow students an opportunity to study directly-related topics of particular interest which require the application of technical knowledge and technical skills. Emphasis is placed on the application of skills and knowledge with practical experiences. Upon completion, students should be able to solve job related problems using technical skills and knowledge.

AUT-217 ELEMENTS OF INDUSTRIAL CONTROL II **3** **0** **3**
PREREQUISITE: AUT-114
COREQUISITES: AUT-218
This course includes the advanced principals of PLC's including hardware, programming, variable speed drives, and troubleshooting. Emphasis is placed on developing advanced working programs, and troubleshooting hardware and software communication problems. Upon completion, students should be able to demonstrate their ability in developing programs and troubleshooting the system. This course is also taught as ILT-222.

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours

AUT-218 ADV. PROGRAMMABLE LOGIC CNTRLRS LAB **0** **4** **2**
PREREQUISITE: None
COREQUISITE: AUT-217
This course includes the advanced principals of PLC's including hardware, programming, variable speed drives, and troubleshooting. Emphasis is placed on developing advanced working programs, and troubleshooting hardware and software communication problems. Upon completion, students should be able to demonstrate their ability in developing programs and troubleshooting the system. This course is also taught as ILT-223.

AUT-234 INDUSTRIAL MOTOR CONTROLS I **1** **4** **3**
PREREQUISITE: None
This course focuses on information regarding industrial motor controls and basic information regarding process logic controllers. Upon completion, students will be able to remove, replace, and wire different types of control devices for operating industrial motors. This course is also taught as INT-212, ELT-209, ILT-209.

AUT-235 INDUSTRIAL MOTOR CONTROLS II **2** **2** **3**
PREREQUISITE: AUT-234
This course covers complex ladder diagrams of motor control circuits and the uses of different motor starting techniques. Topics include wye-delta starting, part start winding, resistor starting and electronic starting devices. Upon completion, the students should be able to understand and interpret the more complex motor control diagrams and understand the different starting techniques of electrical motors. This course is also taught as ELT-212, INT-213.

AUT-274 MACHINE MAINTENANCE AND REPAIR **1** **4** **3**
PREREQUISITE: None
This course covers preventive maintenance as well as repair of machine tools. Emphasis is placed on safety, disassembly and assembly of lathes, grinders, saws, and milling machines. Upon completion, students should be able to perform machine maintenance and repair of machine tools.

AUT-291 AUTOMOTIVE COOPERATIVE EDUCATION **0** **5** **1**
PREREQUISITE: Completion of 50% of course requirements
This course is designed to give students practical, on-the-job experiences in all phases of automotive manufacturing under the supervision of a qualified professional. Grades are based on the successful completion of the work experience as judged by the students' work, supervisor, and faculty coordinator.

AUT-292 AUTOMOTIVE COOPERATIVE EDUCATION **0** **10** **2**
PREREQUISITE: Completion of 50% of course requirements
This course is designed to give students practical, on-the-job experiences in all phases of automotive manufacturing under the supervision of a qualified professional. Grades are based on the successful completion of the work experience as judged by the students' work, supervisor, and faculty coordinator.

AUT-293 AUTOMOTIVE COOPERATIVE EDUCATION **0** **15** **3**
PREREQUISITE: Completion of 50% of course requirements
This course is designed to give students practical, on-the-job experiences in all phases of automotive manufacturing under the supervision of a qualified professional. Grades are based on the successful completion of the work experience as judged by the students' work, supervisor, and faculty coordinator.