Electronics Engineering Technology

Certificate

Associate of Applied Science Degree

Program code: AAS.ELECTRONENGTECH, CC.ELECTRONENGTECH

Program course work focuses on a traditional electronics foundation, including a basic electronics series, digital logic series, a troubleshooting series, a physics series and a semiconductor linear circuit series. The degree focuses on electronics and engineering design principles and electronics systems and is taught in a team environment whenever possible.

Specific skill areas for the Electronics Engineering Technology degree include test equipment use, computer use, problem-solving, teamwork, understanding math and electronics fundamentals and writing and oral communication.

rELATED iNSTRUCTION OUTCOMES

Computation (1 course- MTH 95 Algebra III)

1. Use appropriate mathematics to solve problems

Communication (1 course- WR-101 Communication Skills: Occupational Writing)

1. Read actively, think critically, and write purposefully and capably for professional audiences

Human Relations (1 course- See page 82 for course list)

1. Engage in ethical communication processes that accomplish goals

Physical Education/Health/Safety/First Aid (3 credits- courses with HE, HPE, or PE prefix) NOT REQUIRED FOR CERTIFICATE

1) Use effective life skills to improve and maintain mental and physical wellbeing.

PROGRAM OUTCOMES

Electronics Engineering Technology AAS Degree

Upon successful completion of this program, students should be able to:

• ~~collaborate safely and professionally in an electronic technology-focused workplace;~~

~~• use and comprehend standard electronics terminology in communication;~~

~~• identify and isolate technology problems;~~

~~• identify electronic components including resistors, capacitors, inductors, diodes, transistors, amplifiers and digital logic gates;~~

~~• read specifications, symbols, schematics, ladder diagrams and assembly drawings;~~

~~• recognize common circuit arrangement like bridges, Darlington pairs, differential pairs;~~

~~• comprehend AC, DC, amps, volts, ohms, impedance, watts, frequency, apparent and reactive power;~~

~~• operate and interpret oscilloscopes, multimeters, signal generators, power supplies;~~

~~• assemble, disassemble, adjust and verify electronic equipment performance;~~

~~• use test procedures and test equipment to service and maintain equipment.~~

* Demonstrate safe work habits around electricity and manufacturing equipment,
* Apply verbal and graphical means to communicate effectively about electronics,
* Design, analyze and troubleshoot complex AC & DC circuits found in industrial, military and consumer electronics applications.
* Use test equipment such as oscilloscopes, digital multimeters, signal generators and power supplies to test and maintain components and equipment,
* Apply the concepts of digital electronics, computing and programming to implement automation in an industrial context.

Program Outcomes

Electronics Engineering Technology Certificate Degree

Upon successful completion of this program, students should be able to:

• ~~safely and professionally collaborate in an electronic technology-focused workplace;~~

~~• use and comprehend standard electronics terminology in communication;~~

~~• identify electronic components including resistors, capacitors, diodes, transistors, amplifiers, and digital logic gates;~~

~~• read specifications, symbols and schematics;~~

~~• recognize common circuit arrangements like bridges, Darlington pairs, differential pairs;~~

~~• comprehend AC, DC, amps, volts, ohms, impedance, watts, frequency, apparent and reactive power;~~

~~• operate and interpret oscilloscopes, multimeters, signal generators, power supplies;~~

~~• assemble and disassemble electronic equipment.~~

* Demonstrate safe work habits around electricity and manufacturing equipment,
* Apply verbal and graphical means to communicate effectively about electronics,
* Design, analyze and troubleshoot common AC & DC circuits found in industrial, military and consumer electronics applications,
* Use test equipment such as oscilloscopes, digital multimeters, signal generators and power supplies to test and maintain components and equipment,
* Apply the concepts of digital electronics, to build elementary circuits.

CAREERS

Career opportunities may include engineering technician, manufacturing equipment technician, field services technician and operators and processors with large and small employers in high-tech industries.

For information contact the Manufacturing Department, 503-594-3318.

ELECTRONICS engineering TECHNOLOGY CERTIFICATE

First Term Credits

EET-112 Electronic Test Equipment & Soldering 3

EET-137 Electrical Fundamentals I 4

MFG-109 Computer Literacy for Technicians 3

MTH-095 Algebra III 4

SM-150 Semiconductor Processing I 2

WR-101\* Communication Skills: Occupational Writing 3

Second Term

EET-139 Principles of Troubleshooting I 2

EET-141 Electrical Fundamentals II 4

EET-157 Digital Logic I 3

MTH-111 College Algebra 5

— — Human Relations requirement (see page 82) 3

Third Term

EET-127 Semiconductor Circuits I 4

EET-142 Electrical Fundamentals III 4

EET-257 Digital Logic II 4

MTH-112 Trigonometry/Pre-Calculus 5

SM-280 Electronics & Microelectronics/CWE 2

Credits required for certificate 55

ELECTRONICS engineering TECHNOLOGY
Associate of Applied Science Degree: 1st YEAR

Complete certificate program.

ELECTRONICS engineering TECHNOLOGY
Associate of Applied Science Degree: 2nd YEAR

Fourth Term Credits

EET-215 Electromechanical Systems I 2

EET-227 Semiconductor Circuits II 3

EET-239 Principles of Troubleshooting II 2

MFG-107 Industrial Safety & First Aid 3

PH-201\*\* General Physics 5

Fifth Term

EET-250 Linear Circuits 3

EET-252 Control Systems 3

EET-254 Introduction to Microcontrollers 4

MFG-209 Programming & Automation for Manufacturing 3

PH-202\*\* General Physics 5

Sixth Term

EET-230 Laser and Fiber Optics 3

MFG-133 Programmable Logic Controllers 3

PH-203\*\* General Physics 5

SM-280 Electronics & Microelectronics/CWE 2

— — Electronics Engineering Technology

 program electives 3

Credits required for degree 104

electronics engineering Technology
program electives:

Any course with a CDT, EET, MFG, MET, RET, SM, or WLD prefix not already in the Electronics Engineering Technology program.

\*Substitute college transfer courses for these courses if you plan to continue your education at a higher education institution. It is recommended that you consult with a faculty advisor or a staff member in Student Services for the transfer requirements of the specific advanced program or school.

\*\*The General Physics with Calculus series PH-211/212/213 may be substituted.

Electronics Engineering Technology

(Oregon Tech transfer courses)

The CCC Manufacturing Technology Department, in partnership with Oregon Tech, offers a number of transferable classes into Oregon Tech’s Electronics Engineering Technology degree program.

For information contact the Manufacturing Department, 503-594-3318.

Geographic Information Systems (GIS) Technology

Certificate

Program code: CC.GISTECHNOLOGY

The Geographic Information Systems (GIS) Technology Certificate offers instruction in the fields of geography, data analysis, cartography, computer-aided drafting (CAD), global positioning systems (GPS), database theory and mathematics. The program also includes instruction in research skills, technical mathematics, computer programming, human relations skills and other field competencies.

rELATED iNSTRUCTION OUTCOMES

Computation (1 course- MTH 50 Technical math I )

1. Use appropriate mathematics to solve problems

Communication (1 course- WR-121 English Composition)

1. Read actively, think critically, and write purposefully and capably for professional audiences

Human Relations (1 course- See page 82 for course list)

1. Engage in ethical communication processes that accomplish goals

PROGRAM OUTCOMES

Upon successful completion of this program, students should be able to:

• ~~interpret accurately technical drawings to determine product manufacturing specifications;~~

~~• understand clearly GIS concepts and techniques;~~

~~• understand and capably use many aspects of the ArcGIS software;~~

~~• create high quality digital maps;~~

~~• design, plan and execute GIS projects;~~

~~• create and design advanced Geodatabases for use in GIS;~~

~~• use capably geoprocessing tools to analyze data in a GIS environment;~~

~~• write scripts using the Python programming language;~~

~~• use advanced editing techniques to capture GIS data;~~

~~• analyze and interpret remote sensing data, including LIDAR;~~

~~• use a mapping grade Global Positioning System (GPS) to collect data for a~~

~~GIS project;~~

~~• transform data form different formats to a GIS;~~

~~• create websites using HTML;~~

~~• create CAD data and transform it to a GIS.~~

* Apply geographic knowledge and GIS software techniques to create high quality digital maps,
* Create and design advanced geodatabases from original and proprietary sources for use in GIS projects,
* Apply programming and geoprocessing tools to automate the capture, analysis and reporting of GIS data,
* Analyze and interpret GIS data from remote sources including LIDAR and GPS signals,
* Capture and transform data to GIS format from a variety of vector and raster sources.

CAREERS

Career opportunities may include: GIS technician, GIS analyst, mapping technician and survey and remote sensing technician.

For information contact the Manufacturing Department, 503-594-3318.

GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNOLOGY CERTIFICATE

FIRST TERM CREDITS

GEO-100 Introduction to Physical Geography

 or GEO-110 Cultural & Human Geography 4

GIS-201 Introduction to Geographic Information System 3

GIS-236 Visual Basic Programming for GIS 1

MFG-109 Computer Literacy for Technicians 3

MTH-050 Technical Mathematics I 3

WR-121 English Composition 4

SECOND TERM

CDT-103 Computer-Aided Drafting I 3

GIS-237 Advanced Visual Basic Programming for GIS 1

GIS-281 ArcGIS I 3

GIS-286 Remote Sensing 3

MTH-080 Technical Mathematics II 3

— — Technical elective 3

THIRD TERM

CDT-224 Professional Web Design 1

GIS-232 Data Collection & Application 3

GIS-280 GIS/CWE 4

GIS-282 ArcGIS II 3

— — Human Relations requirement (see page 82) 3

Credits required for certificate 48

TECHNICAL ELECTIVES

Any course with a GIS or CDT prefix.

Microelectronics Systems Technology

Certificate

Associate of Applied Science Degree

Program codes: AAS.MICROSYSTECH, CC.MICROSYSTECH

This program prepares students for entry into the microelectronics and semiconductor industries. Course work focuses on wafer manufacturing, integrated circuit fabrication, component manufacturing, microelectronic assembly and equipment maintenance. Specific skill areas include: silicon materials fabrication, silicon manufacturing, semiconductor processing, microcontamination and particle control, troubleshooting of equipment and systems, microlithography, ion implantation, etch and chemical vapor deposition.

rELATED iNSTRUCTION OUTCOMES

Computation (1 course- MTH 50 Technical math I)

1. Use appropriate mathematics to solve problems

Communication (1 course- WR 101 Communication Skills: Occupational Writing)

1. Read actively, think critically, and write purposefully and capably for professional audiences

Human Relations (1 course- See page 82 for course list)

1. Engage in ethical communication processes that accomplish goals

Physical Education/Health/Safety/First Aid (3 credits- MFG 107- Industrial Safety and First Aid) NOT REQUIRED FOR CERTIFICATE

1) Use effective life skills to improve and maintain mental and physical wellbeing.

PROGRAM OUTCOMES

Microelectronics Systems Technology AAS Degree

Upon successful completion of this program, students should be able to:

• ~~safely and professionally collaborate in an electronic technology-focused workplace;~~

~~• use and comprehend standard electronics terminology in communication;~~

~~• identify and isolate technology problems;~~

~~• identify electronic components including resistors, capacitors, inductors, diodes, transistors, amplifiers and digital logic gates;~~

~~• read specifications, symbols, schematics, ladder diagrams and assembly drawings;~~

~~• comprehend AC, DC, amps, volts, ohms, impedance, watts, frequency, apparent and reactive power;~~

~~• operate and interpret oscilloscopes, multimeters, signal generators, power supplies;~~

~~• assemble, disassemble, adjust and verify electronic equipment performance;~~

~~• use test procedures and test equipment to service and maintain equipment;~~

~~• demonstrate a comprehensive knowledge of the semiconductor manufacturing process including materials, processes, vacuum systems and quality control;~~

~~• apply technical knowledge of sensors and actuators to automated manufacturing and motion control;~~

~~• comprehend the theoretical elements of fluid power systems and apply this knowledge to design, installation and repair of industrial equipment;~~

~~• program and install PLCs to control manufacturing processes.~~

* Demonstrate safe work habits around electricity and manufacturing equipment,
* Apply verbal and graphical means to communicate effectively about electronics,
* Design, analyze and troubleshoot common AC & DC circuits found in industrial, military and consumer electronics applications,
* Use test equipment such as oscilloscopes, digital multimeters, signal generators and power supplies to test and maintain components and equipment,
* Use test equipment such as oscilloscopes, digital multimeters, signal generators and power supplies to test and maintain components and equipment,
* Apply knowledge of control systems and industrial technologies to select, program, operate and maintain automated manufacturing systems.

Program Outcomes

Microelectronics Systems Technology Certificate Degree

Upon successful completion of this program, students should be able to:

• ~~safely and professionally collaborate in an electronic technology focused workplace;~~

~~• use and comprehend standard electronics terminology in communication;~~

~~• identify electronic compounds including resistors, capacitors, diodes, transistors, amplifiers, and digital logic gates;~~

~~• read specifications, symbols, schematics;~~

~~• comprehend AC, DC, amps, volts, ohms, impedance, watts, frequency, apparent and reactive power;~~

~~• operate and interpret oscilloscopes, multimeters, signal generators, power supplies;~~

~~• use test procedures to diagnose electronic equipment;~~

~~• demonstrate a basic knowledge of the semiconductor manufacturing process.~~

* Demonstrate safe work habits around electricity and manufacturing equipment,
* Apply verbal and graphical means to communicate effectively about electronics,
* Design, analyze and troubleshoot common AC & DC circuits found in industrial, military and consumer electronics applications,
* Use test equipment such as oscilloscopes, digital multimeters, signal generators and power supplies to test and maintain components and equipment,
* Demonstrate basic knowledge of the semiconductor manufacturing and materials,
* Apply knowledge of industrial technologies to select, operate and maintain automated manufacturing systems.

CAREERS

Career opportunities may include fabrication technician, equipment technician and product test technician.

For information contact the Manufacturing Department, 503-594-3318.

MICROELECTRONICS SYSTEMS TECHNOLOGY CERTIFICATE

First Term Credits

EET-112 Electronic Test Equipment & Soldering 3

EET-137 Electrical Fundamentals I 4

MFG-107 Industrial Safety & First Aid 3

MFG-109 Computer Literacy for Technicians 3

MTH-050\* Technical Mathematics I 3

SM-150 Semiconductor Processing I 2

WR-101\* Communication Skills: Occupational Writing 3

Second Term

EET-139 Principles of Troubleshooting I 2

EET-141 Electrical Fundamentals II 4

EET-157 Digital Logic I 3

ESH-100 Environmental Regulations 2

MTH-080\* Technical Mathematics II 3

SM-160 Semiconductor Processing II 2

Third Term

EET-127 Semiconductor Circuits I 4

EET-142 Electrical Fundamentals III 4

SM-170 Semiconductor Processing III 2

SM-280 Electronics & Microelectronics/CWE 2

— — Microelectronics Systems Technology program
 electives 3

— — Human Relations requirement (see page 82) 3

Credits required for certificate 55

Microelectronics Systems Technology
Associate of applied Science Degree: 1st Year

Complete certificate program.

Microelectronics Systems Technology
Associate of applied science Degree: 2nd Year

Fourth Term Credits

CH-104 Introductory Chemistry 5

EET-215 Electromechanical Systems I 2

EET-239 Principles of Troubleshooting II 2

MFG-104 Print Reading 2

— — Microelectronics Systems Technology program

 electives 3

Fifth Term

EET-250 Linear Circuits 3

MFG-140 Principles of Fluid Power 3

MFG-209 Programming and Automation for Manufacturing 3

SM-136 Photolithography 2

SM-280 Electronics & Microelectronics/CWE 2

MFG-123 Instrumentation & Controls 3

Sixth Term

EET-230 Laser and Fiber Optics 3

MFG-133 Programmable Logic Controllers 3

SM-229 Vacuum Technology 2

— — Microelectronics Systems Technology program
 electives 6

Credits required for degree 99

Microelectronics Systems Technology
program electives:

Any course with a CDT, EET, RET, SM, MFG, or WLD prefix not already in the Microelectronics Systems Technology program.

\*Substitute college transfer courses for these courses if you plan to continue your education at a higher education institution. It is recommended that you consult with a faculty advisor or a staff member in Student Services for the transfer requirements of the specific advanced program or school.

Electronics ENGINEERING TECHNOLOGY

(Oregon Tech transfer courses)

The Manufacturing Technology Department, in cooperation with Oregon Tech, offers a number of transferable microelectronics classes into Oregon Tech’s Electronics Engineering Technology degree program. For information contact the Manufacturing Department, 503-594-3318.