

# Electronics Technologies

## electronics.chemeketa.edu

Career opportunities in the electronics field are diverse, exciting, and rewarding. Chemeketa's electronics department offers three programs of study to meet the present and future challenges of the electronics industry: Electronic Engineering Technician, Computer Electronics, and Industrial Electronics.

You may be interested in our Cooperative Work Experience program, which allows you to earn college credit for work you do related to your program. You will need department approval before you may enroll in ELT280A-H Cooperative Work Experience. For more information, look under Cooperative Work Experience in the catalog index or contact Roger White at 503.399.5068.

For additional information or tours of the electronics laboratory, visit [educationwithafuture.com](http://educationwithafuture.com).

### Program outcomes:

#### Students completing the Electronic Engineering AAS will:

- Use communication, interpersonal, and leadership skills to establish and maintain collaborative relationships with supervisors, co-workers, and customers.
- Identify and solve technology problems related to electronic circuits and devices, mechanical systems, and computer hardware or software.
- Perform test procedures and use equipment to diagnose, maintain, and/or repair electronic/computer-based circuits and systems.
- Read and interpret written materials, including manuals, technical bulletins, schematics, and procedures to maintain and repair equipment or systems.
- Use standard terminology and clarifying language to communicate orally and in writing with customers, suppliers, supervisors, and co-workers.
- Practice skills and attitudes—individually and as a member of a team—that reflect quality management procedures and professional standards in the workplace.
- Apply professional and environmental safety practices associated with the workplace.

#### In addition to the Electronic Engineering outcomes, students

##### completing the Computer Electronics AAS will:

- Identify and solve technology problems related to the manufacture, install, or maintenance of computers or computer-like equipment.

#### In addition to the Electronic Engineering outcomes, students

##### completing the Industrial Electronics AAS will:

- Identify and solve technology problems related to the development, manufacturing, installation, and servicing of computer integrated manufacturing systems, semiconductor and microelectronic manufacturing equipment, process control equipment, and robotic and other electromechanical systems.

#### Students completing the Advanced Technology Endorsement

##### Certificate will:

- Apply scientific processes and critical thinking skills to issues in the technology field.
- Use appropriate technology to solve advanced applied problems and to judge the reasonableness of their results.

#### Students completing the Microelectromechanical Systems (MEMS) Design Certificate will:

- Use computer-aided design systems to design the templates or masks that are used to manufacture microelectromechanical devices and circuits.
- Identify and solve technology problems related to electromechanical systems.
- Read and interpret written materials, including manuals, technical bulletins, schematics, and procedures.
- Use standard terminology and clarifying language to communicate orally and in writing with customers, suppliers, supervisors, and co-workers.

### Getting started

The first step to entering the following programs is to take part in an assessment process, which includes taking the college's free placement test and meeting with Counseling and Career Services staff. You may need to complete pre-program courses. Then, your advisor will help you develop an individualized program of study, which may include one or more of the following:

CA121	Keyboarding.....	3
CIS101	Introduction to Microcomputer Applications.....	3
MTH070	Elementary Algebra.....	4
RD090	College Textbook Reading.....	3
WR090	Fundamentals of Writing.....	4

If you have questions about the requirements, call Counseling and Career Services at 503.399.5120 or 503.399.5114. Failure to be assessed may delay your entry into program classes.

### Computer Electronics Associate of Applied Science

Graduates of the Computer Electronics program begin careers with companies that manufacture, install, debug, or maintain computers or computer-like equipment. This equipment includes, but is not limited to, mainframe computers, mini and microcomputers, automated office equipment and systems (word processors, point-of-purchase terminals, local area and wide area networks), computer peripherals, engineering work stations, automated factory products, and data communication networks.

The training includes both specific technical skills needed in the field and broader skills in communications and human relations, which are necessary for career success. You'll have hands-on practice working with computer hardware and software. Classes emphasize both component and system-level troubleshooting as well as installation and maintenance of equipment and networks.

As a graduate of this program, you may also choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you wish to transfer, declare your intent before the first term and work closely with electronics advisor Gene Moore (503.399.6506), and the institution to which you plan to transfer.

Students entering this program must have an Intel-compatible computer (Pentium III or better) and be computer literate (type approximately 20 wpm, and be familiar with the Windows operating system, a word processor, and a spreadsheet).

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,490; class fees, \$430; student services fee, \$52.50; universal fee, \$630; equipment and supplies, \$210; and Intel-compatible computer, \$900. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 105 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
<b>Term 1</b>		
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts I.....	4
MTH111	College Algebra+ (or higher).....	5
	or	
MTH081	Technical Mathematics I+.....	4
NET123	Computer Operating Systems.....	4
WR121	English Composition—Exposition+.....	3
<b>Term 2</b>		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	5
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry (or higher).....	5
	or	
MTH082	Technical Mathematics 2.....	4
<b>Term 3</b>		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Devices.....	3
ELT143	Pulse Circuit Fundamentals.....	3
ELT161	Linear IC Fundamentals.....	4
WR227	Technical Writing.....	3
<b>Term 4</b>		
ELT121	Programming Concepts I.....	4
	or	
CIS133J	Fundamentals of Java Programming I.....	4
ELT244	Electronic Circuit Analysis.....	4
ELT252	Digital Circuit Applications.....	3
FE205B	Résumés and Job Search Correspondence.....	1
PH201	General Physics.....	4
	or	
PH121	Applied Physics.....	4
SP111	Fundamentals of Public Speaking.....	3
<b>Term 5</b>		
CIS278	Data Communications.....	3
ELT253	Microprocessor Systems.....	5
ELT254	Computer Hardware.....	4
	or	
CIS145	Microcomputer Hardware.....	4
PH202	General Physics.....	4
	or	
PH122	Applied Physics.....	4
PSY104	Psychology in the Workplace+.....	3
<b>Term 6</b>		
ELT222	Programming Concepts 2.....	4
	or	
CIS140U	UNIX/LINUX.....	3
	or	
CIS140S	Solaris-UNIX Operating System.....	5
	or	
CIS179	Introduction to Client-Server Networks.....	4
ELT255	Advanced Data Communications.....	5
	or	
CIS279	Network Management.....	5
ELT256	Advanced Computer Architecture.....	4
ELT283	Logical Troubleshooting.....	5

+Meets related instruction requirement.

## Electronic Engineering Technician Associate of Applied Science

Upon graduation from the Electronic Engineering Technician program, you may begin a career assisting in the design, manufacturing, installation, and service of microelectronics and semiconductor manufacturing systems, telecommunication equipment and systems, electronic test instruments, medical measuring and monitoring equipment, computers, video systems, automation products, security and safety systems, process control systems, and flexible automation systems (robots). Training includes specific technical skills needed in the field and broader skills in communications, teamwork, and human relations, which are necessary for career success.

As a graduate of this program, you may choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you wish to transfer, declare your intent before the first term and work closely with the electronic engineering advisor (Gene Moore, 503.399.6506) and the institution to which you plan to transfer. Students entering this program must have an Intel-compatible computer (Pentium III or better), and be computer literate (type approximately 20 wpm, be familiar with the Windows operating system, a word processor, and a spreadsheet).

In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,520; class fees, \$430; student services fee, \$51; universal fee, \$612; Intel-compatible computer, \$900; equipment and supplies, \$210. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.

You may earn an Associate of Applied Science degree by successfully completing the required 102 credit hours with a grade of "C" or better in all courses.

Course	Title	Credit Hours
<b>Term 1</b>		
DRF101	Basic CAD for Electronics.....	2
ELT111	Electronics Orientation.....	1
ELT131	Electronic Concepts I.....	4
MTH111	College Algebra+ (or higher).....	5
	or	
MTH081	Technical Mathematics I+.....	4
WR121	English Composition—Exposition+.....	3
<b>Term 2</b>		
ELT132	Electronic Concepts 2.....	4
ELT141	Transistor Fundamentals.....	5
ELT151	Digital Fundamentals.....	4
MTH112	Trigonometry (or higher).....	5
	or	
MTH082	Technical Mathematics 2.....	4
<b>Term 3</b>		
ELT133	Electronic Concepts 3.....	4
ELT142	Semiconductor Devices.....	3
ELT143	Pulse Circuit Fundamentals.....	3
ELT161	Linear IC Fundamentals.....	4
WR227	Technical Writing.....	3
<b>Term 4</b>		
ELT121	Programming Concepts I.....	4
	or	
CIS133J	Fundamentals of Java Programming I.....	4
ELT244	Electronic Circuit Analysis.....	4
ELT252	Digital Circuit Applications.....	3
FE205B	Résumés and Job Search Correspondence.....	1
PH201	General Physics.....	4
	or	
PH121	Applied Physics.....	4
SP111	Fundamentals of Public Speaking.....	3

<b>Term 5</b>	
ELT253	Microprocessor Systems .....5
ELT262	Linear IC Applications.....3
ELT281	Antennas and Transmission Lines.....2
ELT282	Telecommunications .....3
PH202	General Physics.....4
	or
PH122	Applied Physics .....4
<b>Term 6</b>	
ELT283	Logical Troubleshooting.....5
ELT291	Advanced Industrial Electronics .....4
PSY104	Psychology in the Workplace+ .....3
	Electronics electives* .....6

+Meets related instruction requirement.

**\*Electronics electives (select 6 credits):**

CH121	College Chemistry.....5
CH201	Chemistry for Engineers.....4
CIS145	Microcomputer Hardware.....4
ELT222	Programming Concepts 2 .....4
ELT254	Computer Hardware .....4
ELT255	Advanced Data Communications.....5
ELT256	Advanced Computer Architecture .....4
ELT280C	Cooperative Work Experience*.....3
ELT293	Flexible Manufacturing Systems.....3
MT110	Microelectronics.....3
MT221	Fluid and Vacuum Systems.....4
MT223	High Vacuum Technology.....3
MT227A	Pneumatics and Hydraulics Fundamentals .....3
MTH241	Elementary Calculus .....4
MTH243	Probability and Statistics I .....4
MTH251	Differential Calculus (or higher).....5
PH203	General Physics.....4

## Industrial Electronics Associate of Applied Science

Students selecting the Industrial Electronics program may begin careers—upon graduation—assisting in the development, manufacturing, installation, and servicing of computer-integrated manufacturing systems, semiconductor, and microelectronic manufacturing equipment, process control equipment, and robotic, and other electromechanical systems. This program stresses mechanical, computer, and electronic theory, as well as the communication and human relation skills needed for career advancement.

As a graduate of this program, you may choose to transfer to a school such as Oregon Institute of Technology to complete the coursework required for a bachelor's degree. If you intend to transfer, declare your intent before the first term and work closely with the Industrial Electronics advisor (Gene Moore at 503.399.6506) and the institution to which you plan to transfer. Students entering this program must have an Intel-compatible computer (Pentium III or better), and be computer literate (type approximately 20 wpm and be familiar with the Windows operating system, a word processor and a spreadsheet).

*In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$2,300; class fees, \$430; student services fee, \$50.50; universal fee, \$606; Intel-compatible computer, \$900; equipment and supplies, \$210. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.*

You may earn an Associate of Applied Science degree by successfully completing the required 101 credit hours with a grade of "C" or better in all courses.

<b>Course</b>	<b>Title</b>	<b>Credit Hours</b>
<b>Term 1</b>		
DRF101	Basic CAD for Electronics.....2	
ELT111	Electronics Orientation.....1	
ELT131	Electronic Concepts 1 .....4	
MT110	Microelectronics.....3	
MTH111	College Algebra+ (or higher).....5	
	or	
MTH081	Technical Mathematics 1+.....4	
WR121	English Composition—Exposition+.....3	
<b>Term 2</b>		
ELT132	Electronic Concepts 2 .....4	
ELT141	Transistor Fundamentals.....5	
ELT151	Digital Fundamentals.....4	
MTH112	Trigonometry (or higher) .....5	
	or	
MTH082	Technical Mathematics 2 .....4	
<b>Term 3</b>		
ELT133	Electronic Concepts 3 .....4	
ELT142	Semiconductor Devices.....3	
ELT143	Pulse Circuit Fundamentals.....3	
ELT161	Linear IC Fundamentals .....4	
WR227	Technical Writing .....3	
<b>Term 4</b>		
ELT121	Programming Concepts 1 .....4	
	or	
CIS133J	Fundamentals of Java Programming I.....4	
ELT244	Electronic Circuit Analysis.....4	
ELT252	Digital Circuit Applications.....3	
FE205B	Résumés and Job Search Correspondence.....1	
PH201	General Physics.....4	
	or	
PH121	Applied Physics .....4	
SP111	Fundamentals of Public Speaking.....3	
<b>Term 5</b>		
ELT253	Microprocessor Systems .....5	
ELT262	Linear IC Applications.....3	
PH202	General Physics.....4	
	or	
PH082	Applied Physics .....4	
	Technical elective* .....3	
<b>Term 6</b>		
ELT291	Advanced Industrial Electronics .....4	
PSY104	Psychology in the Workplace+ .....3	
	Technical electives* .....9	

+Meets related instruction requirement.

**\*Technical electives (select 12 credits):**

CH121	College Chemistry.....5
CH201	Chemistry for Engineers.....4
CIS145	Microcomputer Hardware.....4
DRF251	Power Transmission Design.....3
ELT254	Computer Hardware .....4
ELT283	Logical Troubleshooting.....5
ELT293	Flexible Manufacturing Systems.....3
MT221	Fluid and Vacuum Systems.....4
MT223	High Vacuum Technology.....3
MT227A	Pneumatics and Hydraulics Fundamentals .....3
MTH243	Probability and Statistics I .....4

## Advanced Technology Endorsement Certificate of Completion

If you already have an associate degree in electronics or are a journeyman electronics technician, this certificate can help you get the skills you need to advance your career. This certificate can build on your past experience and help you get the skills needed by Oregon's

advanced technology employers. To be admitted into this program, you must be interviewed by the program chair, Charles Sekafetz (sekafetz@chemeketa.edu, 503.399.6254), and have your past education and experience evaluated. Your previous education and experience must include writing, science, math, and technical expertise similar to the AAS degrees in electronics offered by Chemeketa. If you are lacking equivalent experience in any one of these areas, a program of study will be developed for you during the interview.

*In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$1,500; class fees, \$650; student services fee, \$21.50; universal fee, \$258; Intel-compatible computer, \$900; equipment and supplies, \$275. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.*

You may earn a Certificate of Completion by successfully completing the required 43 credit hours with a grade of "C" or better in all courses.

### Term 1

CH201	Chemistry for Engineers.....	4
	or	
CH121	College Chemistry.....	5
MTH243	Probability and Statistics I.....	4
	or	
MTH241	Elementary Calculus.....	4
	or	
MTH251	Differential Calculus (or higher).....	4
	or	
MTH231	Discreet Mathematics.....	4
WR122	English Composition—Logic and Style.....	3
	Advanced Technology Endorsement elective*.....	6

### Term 2

CH202	Chemistry for Engineers.....	4
	or	
CH122	College Chemistry.....	5
PSY104	Psychology in the Workplace.....	3
SP219	Fundamentals of Small Group Communications.....	3
	Advanced Technology Endorsement elective*.....	3

### Term 3

	Advanced Technology Endorsement elective*.....	13
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### \*Advanced Technology Endorsement electives (select 22 credits):

CAM190	Programming CNC Lathes.....	4
CAM290A	CAD/CAM Integrations.....	8
CH123	College Chemistry.....	5
CIS145	Computer Hardware.....	4
CIS276A	Introduction to Oracle: SQL.....	4
CVL230	Applied Statics.....	3
DRF132	CAD 3.....	3
EGR211	Statics.....	4
ELT281	Antennas and Transmission Lines.....	2
ELT282	Telecommunications.....	3
ELT283	Logical Troubleshooting.....	5
ELT291	Advanced Industrial Electronics.....	4
ELT293	Flexible Manufacturing Systems.....	3
MT110	Microelectronics.....	3

MT201A	Introduction to MEMS.....	1
MT201B	MEMS Design 1.....	1
MT201C	MEMS Design 2.....	2
MT221	Fluid and Vacuum Systems.....	4
MT223	High Vacuum Technology.....	3
MT227A	Pneumatics.....	3
NET123	Computer Operating Systems.....	4
NET151	Network Essentials.....	5
NET152	Network Router Configurations.....	5
NET153	LANs and Internetwork Design.....	5
NET154	WAN Design.....	5
NET171	Fundamentals of Wireless LANs.....	5
PH203	General Physics.....	4
WLD073	Basic Gas Tungsten Arc Welding (TIG).....	4
	Cooperative Work Experience.....	12
	Maximum credits allowed.....	

## Microelectromechanical Systems (MEMS) Design Certificate of Completion

Graduates of the MEMS program are employed by firms who design and manufacture nanotechnology systems that are at the nucleus of advanced bio- and nano-technology equipment. MEMS designers use computer-aided-design systems to design the templates or masks that are used to manufacture nanotechnology systems. Graduates of this program may also be employed as electronic circuit designers and layout specialists.

The MEMS program includes courses in computer-aided design (CAD), MEMS Layout, electronics, and semiconductor manufacturing processes, as well as the communication and human relations skills needed for career advancement.

*In addition to tuition, estimated costs for students who complete the entire program listed below are books, \$700; class fees, \$510, student services fee, \$6.50; universal fee, \$78; Intel-compatible computer, \$900; equipment and supplies, \$260. Contact the Financial Aid Office at 503.399.5018 to find out if you qualify for help with these costs.*

You may earn a Certificate of Completion by successfully completing the following required 13 credit hours with a grade of "C" or better in all courses.

### Term 1

MT110	Microelectronics.....	3
MT201A	Introduction to MEMS.....	1

### Term 2

CVL230	Applied Statics.....	3
MT201B	MEMS Design 1.....	1

### Term 3

MT201C	MEMS Design 2.....	2
PSY104	Psychology in the Workplace.....	3



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Chemeketa Community College is an equal opportunity, affirmative action institution.