Robotics and Communications Systems Engineering Technology

(1.5 to 3 Years)

Two Advanced Technical Certificates, one Associate of Applied Science degree, and one Bachelor of Applied Science degree are available.

Objectives

Graduates of the Robotics and Communications Systems Engineering Technology program will:

1. Obtain gainful employment as professional, highly skilled, broad-based electronics technicians capable of working in a wide variety of electronics-related fields.
2. Continue to expand their knowledge and remain current in a continuously expanding industry.
3. Successfully integrate as productive team members in the electronics industry utilizing written, oral and electronic communications skills.
4. Develop, install, maintain, troubleshoot, and repair equipment and circuitry integrated in audio, video, communications, laser, robotics, industrial electronics with embedded systems, and pulse electronic systems.
5. Complete projects, produce project overviews with written and oral presentation components, and identify and address potential financial, ethical, and social concerns.

Required courses will be taught in sequential blocks of instruction. Successful completion of a course is required before the student can progress in the program. If the student fails any math, theory, or lab course, then that course must be repeated and a passing grade obtained before the student can advance in the program. The student must exit the program and make up their deficiency through Technical General Education or other appropriate methods. The student will then be allowed to repeat the course at the next available program opening.

Upon successful completion of RCET 0141, Applied Mathematics I, and RCET 0142, Applied Mathematics II, a student may enroll directly into an academic math course which requires MATH 1147 as a prerequisite.

Students must earn a C- or better in all RCET courses to progress in the program and graduate. An accumulative 2.0 GPA is required for graduation. For a Program Information Packet showing descriptions of each option, course descriptions, lists of course sequences, and the cost of books, tools, uniforms, fees, and other expenses, go online to https://www.isu.edu/robotics/.

Faculty

Coordinator and Clinical Instructor


Clinical Assistant Professor


Assistant Professor


Clinical Instructors


Instructor


Advanced Technical Certificate: Laser/Electro-Optics Technology

(1.5 Years)

Required Courses:

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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>RCET 0142</td>
<td>Applied Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>RCET 0153A</td>
<td>Basic Electricity and DC Circuit Theory</td>
<td>4</td>
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<tr>
<td>RCET 0153B</td>
<td>Basic Electricity and AC Circuit Theory</td>
<td>4</td>
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<tr>
<td>RCET 0154</td>
<td>Electronic Control Devices Theory</td>
<td>5</td>
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<tr>
<td>RCET 0155A</td>
<td>Basic Electricity and DC Circuit Lab</td>
<td>2</td>
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<tr>
<td>RCET 0155B</td>
<td>Basic Electricity and AC Circuit Lab</td>
<td>3</td>
</tr>
<tr>
<td>RCET 0156</td>
<td>Electronic Control Devices Lab</td>
<td>5</td>
</tr>
<tr>
<td>RCET 0251</td>
<td>Systems Analog and Digital Theory</td>
<td>7</td>
</tr>
<tr>
<td>RCET 0253</td>
<td>Systems Analog and Digital Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>RCET 0264</td>
<td>Introductory Calculus</td>
<td>4</td>
</tr>
<tr>
<td>RCET 0271</td>
<td>Introduction to Lab Simulation Software</td>
<td>2</td>
</tr>
<tr>
<td>RCET 0331</td>
<td>Laser Systems and Optics Theory</td>
<td>4</td>
</tr>
<tr>
<td>RCET 0332</td>
<td>Laser Systems and Optics Laboratory</td>
<td>4</td>
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<tr>
<td>TGE 0158</td>
<td>Employment Strategies</td>
<td>2</td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition 1</td>
<td>3</td>
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<tr>
<td>or ENGL 1101P</td>
<td>English Composition Plus</td>
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<tr>
<td>COMM 1101</td>
<td>Principles of Speech 1</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1101</td>
<td>Elements of Physics 1</td>
<td>4</td>
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<tr>
<td>&amp; 1101L</td>
<td>Elements of Physics Laboratory 1</td>
<td></td>
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</tbody>
</table>

Total Credits 65

1 Contributes to a General Education requirement.
Advanced Technical Certificate: Robotics and Communications Systems Engineering Technology

(3 Years)

Required Courses:

- RCET 0142 Applied Mathematics II 4
- RCET 0153A Basic Electricity and DC Circuit Theory 4
- RCET 0153B Basic Electricity and AC Circuit Theory 4
- RCET 0154 Electronic Control Devices Theory 5
- RCET 0155A Basic Electricity and DC Circuit Lab 2
- RCET 0155B Basic Electricity and AC Circuit Lab 3
- RCET 0156 Electronic Control Devices Lab 5
- RCET 0251 Systems Analog and Digital Theory 7
- RCET 0253 Systems Analog and Digital Laboratory 7
- RCET 0264 Introductory Calculus 4
- RCET 0265 Computer Fundamentals and Introduction to Programming 4
- RCET 0267 Radio Frequency Transmission Theory 7
- RCET 0268 Radio Frequency Transmission Lab 5
- RCET 0270 Electronic Drafting 2
- RCET 0271 Introduction to Lab Simulation Software 2
- RCET 0276 Advanced Pulse Laboratory 5
- TGE 0158 Employment Strategies 2
- RCET 0371 Advanced Math for Electronics 4
- RCET 1372 Calculus for Advanced Electronics 4
- RCET 0373 Advanced Digital Theory 5
- RCET 0374 Advanced Pulse Theory 5
- RCET 0375 Advanced Digital Laboratory 5
- RCET 0376 Advanced Pulse Laboratory 5
- ENGL 1101 English Composition 3
- or ENGL 1101P English Composition Plus 4
- COMM 1101 Principles of Speech 3
- PHYS 1101 & 1101L Elements of Physics and Elements of Physics Laboratory 4
- Total Credits 109

1 Contributes to a General Education requirement.

Associate of Applied Science Degree: Robotics and Communications Systems Engineering Technology

(3 Years)

Required Courses:

- RCET 0142 Applied Mathematics II 4
- RCET 0153A Basic Electricity and DC Circuit Theory 4
- RCET 0153B Basic Electricity and AC Circuit Theory 4
- RCET 0154 Electronic Control Devices Theory 5
- RCET 0155A Basic Electricity and DC Circuit Lab 2
- RCET 0155B Basic Electricity and AC Circuit Lab 3
- RCET 0156 Electronic Control Devices Lab 5
- RCET 0251 Systems Analog and Digital Theory 7
- RCET 0253 Systems Analog and Digital Laboratory 7
- RCET 0264 Introductory Calculus 4
- RCET 0265 Computer Fundamentals and Introduction to Programming 4
- RCET 0267 Radio Frequency Transmission Theory 7
- RCET 0268 Radio Frequency Transmission Lab 5
- RCET 0270 Electronic Drafting 2
- RCET 0271 Introduction to Lab Simulation Software 2
- RCET 0371 Advanced Math for Electronics 4
- RCET 1372 Calculus for Advanced Electronics (satisfies a General Education Requirement) 4
- RCET 0373 Advanced Digital Theory 5
- RCET 0374 Advanced Pulse Theory 5
- RCET 0375 Advanced Digital Laboratory 5
- RCET 0376 Advanced Pulse Laboratory 5
- TGE 0158 Employment Strategies 2
- COM 1101 Principles of Speech 3
- PHYS 1101 Elements of Physics and Elements of Physics Laboratory 4
- Total Credits 109

1 See General Education Requirements (minimum 15 credits) for A.A.S. Degree at the start of the College of Technology section of the catalog.
2 Contributes to a General Education requirement.

Courses

RCET 0141 Applied Mathematics I: 4 semester hours.
Basic math as it applies to Electrical Theory; includes algebraic and trigonometric topics as they relate to DC and AC (sine wave) circuit analysis. F, S

RCET 0142 Applied Mathematics II: 4 semester hours.
Continuation of math concepts taught in RCET 0153A and RCET 0153B. Selected algebraic and trigonometric topics as related to DC and AC (sine wave) circuit analysis with special emphasis on trigonometric solution and vector analysis. PREREQ: RCET 0153B. F, S

RCET 0153 Electronic Theory: 5 semester hours.
Fundamentals of DC and AC electronics: safety, soldering, electrical units, Ohm’s Law, series and parallel resistive circuits, voltage and current, meters, network theorems, magnetism, inductors, capacitors, AC-DC network analysis, and power supplies. COREQ: RCET 0141 and RCET 0155. F, S

RCET 0153A Basic Electricity and DC Circuit Theory: 4 semester hours.
The fundamental principles of basic electricity and DC circuit theory will be covered. Topics covered will include related technical math, safety procedures, components, and the principles of electrical circuit analysis including voltage, current, resistance, and related laws. COREQ: RCET 0153B. F, S

RCET 0153B Basic Electricity and AC Circuit Theory: 4 semester hours.
Introduction to the theoretical and mathematical principles applied to basic reactive (electrostatic and electromagnetic) components, and alternating current circuits. Includes algebraic and trigonometric analysis of passive high pass, low pass, resonant filter networks, and rectifying circuits. PRE-or-COREQ: RCET 0153A. COREQ: RCET 0155B. F, S
RCET 0154 Electronic Control Devices Theory: 5 semester hours.
Comprehensive study of semiconductors, power supplies, transistor amplifiers, and operational amplifiers. Digital fundamentals including logic gates, Boolean algebra, combination logic circuits, digital registers, counters, and timing circuits. PREREQ: RCET 0153B and RCET 0155B. COREQ: RCET 0156 and RCET 0142. F, S

RCET 0155 Electronic Lab: 5 semester hours.
Experiments involving subjects covered in RCET 0153. Students will construct, measure, and analyze circuits. COREQ: RCET 0153. F, S

RCET 0155A Basic Electricity and DC Circuit Lab: 2 semester hours.
Students will construct, analyze, predict and measure DC circuits while selecting and using appropriate test equipment. Project reports require design concepts, theoretical application, and demonstration of principles and practices learned in math, theory, and laboratory. Students will learn to adhere to safe work practices. COREQ: RCET 0155B. F, S

RCET 0155B Basic Electricity and AC Circuit Lab: 3 semester hours.
Emphasizes understanding of alternating current circuitry covered in RCET 0153B, by allowing students to design, construct, test, and troubleshoot using proper test equipment. PRE-or-COREQ: RCET 0155A. COREQ: RCET 0153B. F, S

RCET 0156 Electronic Control Devices Lab: 5 semester hours.
Experiments involving subjects covered in RCET 0154. Students will construct, measure, and analyze circuits. PREREQ: RCET 0153B and RCET 0155B. COREQ: RCET 0154. F, S

RCET 0199 Experimental Course: 1-6 semester hours.
This is an experimental course. The course title and number of credits are announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times with the same title and content.

RCET 0251 Systems Analog and Digital Theory: 7 semester hours.
Analog circuit analysis applied to amplifiers, power supplies, op-amps, and discrete switching circuits, with an emphasis on frequency limitations of discrete components and circuitry. Introduction to actuator, motor, and transducer control circuitry. COREQ: RCET 0253. F, S

RCET 0253 Systems Analog and Digital Laboratory: 5 semester hours.
Emphasizes understanding of analog and digital circuitry by allowing students to design, construct, test, and troubleshoot using proper test equipment. Experiments involve subjects covered in RCET 0251 and RCET 0271. PREREQ: RCET 0156. COREQ: RCET 0251. F, S

RCET 0264 Introductory Calculus: 4 semester hours.
Correlations of algebraic, trigonometric and geographic topics as well as logarithms and their applications. Algebraic calculus concepts involving differentiation and integration and their applications to electronic circuits and waveform analysis. Supports RCET 0251. PREREQ: RCET 0142 or equivalent. F, S

RCET 0265 Computer Fundamentals and Introduction to Programming: 4 semester hours.
Basic computer components and functions. Introduction to operating system file structures. Introduction to and use of element-driven programming languages and integrated development environments. F, S

RCET 0267 Radio Frequency Transmission Theory: 7 semester hours.
Theory, analysis, and design of devices operating in the radio frequency spectrum. Fundamentals involving the phenomena of radio waves from audio frequencies through light rays. PREREQ: RCET 0251, RCET 0253, and RCET 0264. COREQ: RCET 0268. F, S

RCET 0268 Radio Frequency Transmission Lab: 5 semester hours.
Maintenance, design, and adjustment of RF oscillators, amplifiers, AM, FM and single sideband, mobile and fixed station transmitters; transmission lines and antennas; microwave transmitters and measurement techniques. PREREQ: RCET 0251, RCET 0253, and RCET 0264. COREQ: RCET 0267. F, S

RCET 0270 Electronic Drafting: 2 semester hours.
Computer aided drafting with emphasis on schematic capture with component information systems and printed circuit board layout. F, S

RCET 0271 Introduction to Lab Simulation Software: 2 semester hours.
Introduction to lab simulation software environments used to build data acquisition and instrument control applications. F, S

RCET 0276 Advanced Pulse Theory: 5 semester hours.
A study of analog/digital circuits used in the video studio. Introduction and analysis of a television studio system, modules, and individual analog/digital circuits will be covered. Discussion, lectures, classroom and lab demonstrations are used to help the student gain knowledge and troubleshoot equipment in large system. COREQ: RCET 0376. F, S

RCET 0371 Advanced Math for Electronics: 4 semester hours.
The study of computer programming languages at the machine level, assembler level, and high level, a standard operating system, translation of numbers between number systems. F, S

RCET 0373 Advanced Digital Theory: 5 semester hours.
A study of microcomputer operation, programming, interfacing to digital and analog systems, and troubleshooting. Memory and storage systems. System microcontroller integration using a software development system. F, S

RCET 0374 Advanced Pulse Theory: 5 semester hours.
A study of analog/digital circuits used in the video studio. Introduction and analysis of a television studio system, modules, and individual analog/digital circuits will be covered. Discussion, lectures, classroom and lab demonstrations are used to help the student gain knowledge and troubleshoot equipment in large system. COREQ: RCET 0376. F, S

RCET 0375 Advanced Digital Laboratory: 5 semester hours.
Practical application of topics covered in RCET 0371 and RCET 0373 while building, programming, and troubleshooting microprocessor and microcontroller-based systems. F, S

RCET 0376 Advanced Pulse Laboratory: 5 semester hours.
Practical equipment and systems application of analog/digital circuits used in conjunction with Advanced Pulse Theory (RCET 0374). Operation of the lab is by an exploratory method with guides furnished by the instructor. Test results of these explorations will be maintained in written log form and will be presented in verbal form to other student technicians. One major student project is accomplished during the semester. The student must give an oral and written presentation on the project. COREQ: RCET 0374. F, S

RCET 0382 Introduction to Rapid Prototyping: 2 semester hours.
Introduction to the software, tools, and techniques used in modern rapid prototyping processes. Equivalent to UAS 0382. D
**RCET 0383 Advanced Laser Systems and Optics Theory: 5 semester hours.**  
Advanced theory and analysis of lasers and associated devices. Covers advanced laser topics, wave and geometric optics, electro-optics devices and components.  
PREREQ: RCET 0331 and RCET 0332. D

**RCET 0384 Advanced Laser Systems and Optics Laboratory: 3 semester hours.**  
Practical application of advanced theory and analysis in analyzing laser/optics systems. PREREQ: RCET 0331 and RCET 0332. D

**RCET 1372 Calculus for Advanced Electronics: 4 semester hours.**  
Algebraic, trigonometric, logarithmic and exponential functions, derivatives and integrals with electronic and other physical applications. Also included McClaurin's, Taylor's and Fourier's series and introduction to differential equations. Supports RCET 0374. Satisfies Objective 3 of the General Education Requirements. F, S