

# ELECTRONICS, ROBOTICS & DRONES TECHNOLOGY (AS)

## Program Overview Associate in Science Degree



The Associate in Science Degree in Electronics, Robotics and Drones Technology (ERD) provides education and training in some of the most robust, emerging fields of the 21st Century. The use of robots and drones will drive structural changes in our economy and everyday life in areas ranging from driverless cars and medical procedures to automated manufacturing processes and aerial product delivery. Beginning with electronic foundation core courses and culminating in drone, robotics and automation systems, the curriculum provides the knowledge required to succeed in these modern high-tech fields. Technical elective courses provide the opportunity for in-depth study in areas including drone engineering, renewable energy systems, computer networking, CAD and manufacturing quality.

Laboratory projects highlighted in ERD courses include active hands-on experiences with robotic control systems and drone applications, data acquisition/control/communication, digital electronics, microprocessor control, and programmable automation controllers (PACs). Lab projects have been developed to simulate actual job conditions. Drone-specific courses prepare students to sit for the Federal Aviation Administration's (FAA) Section 107 Commercial Small Unmanned Aircraft System (SUAS) exam for pilot certification.

Graduates of this program are qualified to seek entry-level employment in several emerging areas such as drone mission programming, research and development, new product design, product testing, field service, controls engineering, manufacturing of complex electronic assemblies and systems, installation, marketing, and customer service. Associate degree graduates can also continue in the NEIT Bachelor of Science in Electrical Engineering Technology program.

## Curriculum

Course	Title	Quarter Credit Hours
<b>Term I</b>		
ERD 110	Fundamentals of Electronics	5
ENG 118	Introduction to Engineering Technology and Lab	3

EN 100	Introduction to College Writing (COM Core) <sup>1</sup>	4
Choose one of the following (depending upon Math Placement):		4-5
MA 105	Basic College Math with Lab (MA/SCI Core) <sup>1</sup>	
MA 110	Introduction to College Math (MA/SCI Core) <sup>1</sup>	
MA 125	Technical Math I (MA/SCI Core) <sup>1</sup>	
<b>Quarter Credit Hours</b>		<b>16-17</b>
<b>Term II</b>		
ERD 111	Electronic Circuit Construction	4
ERD 115	Computer and Networking Fundamentals for Engineering	4
ERD 122	Introduction to Robotic Control Systems	4
Choose one of the following (depending upon T1 MA selection):		4
MA 125	Technical Math I (MA/SCI Core) <sup>1</sup>	
MA 210	Technical Math II (MA/SCI Core) <sup>1</sup>	
<b>Quarter Credit Hours</b>		<b>16</b>
<b>Term III</b>		
ERD 120	Digital Concepts	5
ERD 131	Advanced Circuits and Semiconductors	5
EN 200	Workplace Communications (COM Core) <sup>1</sup>	4
Choose one of the following:		4
MA 210	Technical Math II (MA/SCI Core) <sup>1</sup>	
Elective	100-200 Level Humanities (or Arts/Foreign Language) Core <sup>1</sup>	
<b>Quarter Credit Hours</b>		<b>18</b>
<b>Term IV</b>		
ERD 210	Introduction to Drone/UAV Technology	2
ERD 212	Microprocessor Control Systems	4
ERD 242	Electro-Mechanical Systems & Industrial Controls	4
ERD 246	Data Acquisition Systems	4
PHY 200	Physics I & Lab (MA/SCI Core) <sup>1</sup>	4
<b>Quarter Credit Hours</b>		<b>18</b>
<b>Term V</b>		
ERD 250	Data Communications and the Internet of Things (IoT)	4
ENG 259	Commercial Drone / UAV Certification	3
MCT 235	Industrial Robotic Automation	4
SS 274	Human Relations in the Workplace	4
Elective	100-200 Level Humanities (or Arts/Foreign Language) Core <sup>1</sup>	4
<b>Quarter Credit Hours</b>		<b>19</b>
<b>Term VI</b>		
ENG 210	Introduction to Programmable Automation Controllers & Lab	5
ENG 263	Commercial Utilization of Drones / UAVs	4
ENG 283	Capstone Project	4
Choose one of the following:		2-4
ENG 281	Engineering Internship	

Elective	Technical Elective
<b>Quarter Credit Hours</b>	
	<b>15-17</b>
<b>Total Quarter Credit Hours</b>	
	<b>102-105</b>

<sup>1</sup> Liberal Arts Core.

## Technical Electives (Term VI)

Course	Title	Quarter Credit Hours
ELY 217	AutoCAD Electrical	2
ENG 289	Drone/UAV Engineering	4
MCT 115	Computer-Aided Design I	4
MCT 239	Quality	4
SE 116	Programming Essentials Using Python	4

## Legend

C = Number of lecture hours per week

L = Number of laboratory hours per week

T = Total Quarter Credit Hours where each lecture hour per week is one credit, every 2-4 laboratory hours are one credit depending on the expected amount of pre- or post-lab work.

All associate degree students are required to take 32 credits of liberal arts and math/science courses as selected from the liberal arts core. See the course descriptions section of this catalog for a list of the core area courses. Students who place out of MA 105 Basic College Math with Lab/MA 110 Introduction to College Math must still take 32 credits of core courses.

Subject to change.

## Program Mission, Goals, and Outcomes

### Program Mission

The mission of the Electronics, Robotics and Drones Technology (ERDA) program is to prepare students for entry-level employment as a technician, designer, or operator in the fields of electronics, robotics, drones technology and automation. Students are engaged in educational experiences combining theory and practical application in the basic knowledge, skills, techniques, practices, and concepts employed in their profession. The program endeavors to develop the student's ability to think critically, to communicate effectively and to solve problems independently. An important objective is to instill in students the necessity for continued professional development.

### Program Goals

The following program goals have been established for the ERDA program:

1. Develop skills in logical thinking, problem solving, and troubleshooting.
2. Develop professionalism and quality workmanship.
3. Develop oral and written communication skills.
4. Develop ability to work productively with others.
5. Develop skill in analyzing electronic circuits.

6. Develop skill in applying math in problem solving, analysis, and design.
7. Develop skills in computer analysis and programming.

## Program Outcomes

Students will develop:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline;
2. an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results; and
5. an ability to function effectively as a member of a technical team.

## Student Skills Developed

### Objective:

The ERDA program at NEIT has the primary focus of developing practical electronic technician skills starting from basic component and circuit theory, instruments and software; to industrial electronics, industrial automation, UAVs (Unmanned Aerial Vehicles), robotics, and system applications. Objectives also include identifying the basic tools and test equipment used to construct, troubleshoot, and maintain standard electronic circuits and systems. Included is the study of the general operating principles of multiple electronic components and electrical devices such as capacitors, resistors, inductors, semiconductors, integrated circuits (ICs), generators, motors, and transformers. Software is learned by applying C programming to microprocessors for robots and drones and to analyze applied electronics principles to develop circuitry and systems used for controls, communication systems, and microprocessor devices.

### Skills:

1. **Circuit Theory:** Fundamentals of DC and AC circuit theory and electronic components.
2. **Instrumentation:** Introduction to use of the oscilloscope, meters, signal generator, and DC power supplies.
3. **Soldering & Cable Fabrication:** Techniques in soldering Through-hole and Surface Mount components on printed circuit boards as well as cable fabrication.
4. **Robotic Systems:** Design, build, program, debug and demonstrate a robotic system.
5. **Circuit Simulation:** Simulation of DC and AC circuits with MultiSim™.
6. **Digital Systems:** Fundamentals of digital electronics theory, circuit construction, test and simulation.
7. **Analog Electronics:** Fundamentals of power supplies, amplifiers and filters.
8. **Microcontroller Systems:** Fundamentals of microcontrollers and programming in C language utilizing a computer program (Keil uvision) as well as controlling systems.

9. **Programmable Automation Controllers (PACs):** Fundamentals of PACs and programming with Ladder Logic and system applications.
10. **Data Communications Systems:** Fundamentals of data communications using Ethernet, modern wireless technologies and others.
11. **Industrial Systems:** Fundamentals industrial control components, motors, motor controllers and industrial sensing technologies.
12. **Drones / UAVs:** Fundamentals of drone technology including safety, design and applications.
13. **Teamwork** through lab team assignments and projects.
14. **Troubleshooting** techniques in all courses.
15. **Computer literacy:**
  - **C Language coding** – of an 8051 microcontroller
  - **Arduino™** – for robotic systems
  - **LabVIEW™** – for data acquisition and analysis
  - **MultiSim™** – for computer simulation of digital and analog circuits
  - **RSLogix5000™** – for ladder logic programming of PACs
  - **Microsoft Office Suite** – Word, Excel, Power Point

16. Additional skills can be obtained from technical electives in Renewable Energy, CAD, Drone Engineering, Manufacturing Quality and Creative Prototyping.

## Q&A and Technical Standards Questions & Answers

### 1. When do my classes meet?

Day Classes: Technical classes normally meet for at least three hours a day for up to five days a week. Classes normally begin in the early morning (7:45 a.m.), late morning (usually 11:25 a.m.), or mid-afternoon. The time slot for your program may vary from term to term.

Evening Classes: technical classes meet on the average of three nights a week, although there may be times when they will meet four nights a week. Classes normally begin at 5:45 p.m.

IN ADDITION, to achieve your associate degree, you will take a total of approximately eight liberal arts courses, which will be scheduled around your technical schedule over the course of your entire program. Each liberal arts course meets approximately four hours per week. Liberal arts courses are offered days, evenings, and Saturdays.

At the beginning of each term you will receive a detailed schedule giving the exact time and location of all your classes. The College requires that all students be prepared to take classes and receive services at any of NEIT's locations where the appropriate classes and services are offered.

When a regularly scheduled class falls on a day which is an NEIT observed holiday (Columbus Day, Veterans Day, Martin Luther King, Jr. Day, and Memorial Day), an alternate class will be scheduled as a make up for that class. The make up class may fall on a Friday. It is the student's responsibility to take note of when and where classes are offered.

### 2. How large will my classes be?

The average size for a class is about 20 to 25 students; however, larger and smaller classes occur from time to time.

### 3. How much time will I spend in lab?

Almost half of your technical courses consist of laboratory work. In order for you to get the most out of your laboratory experiences, you will first receive a thorough explanation of the theory behind your lab work.

### 4. Where do my classes meet?

Students should be prepared to attend classes at any of NEIT's classroom facilities: either at the Post Road, Access Road, or East Greenwich campuses.

### 5. I have not earned my high school diploma or GED: can I enroll in an Associate Degree Program?

A candidate for admission to an associate degree program must have a high school diploma, have earned a recognized equivalency diploma (GED), or meet the federal home school requirements.

### 6. How long should it take me to complete my program?

To complete your degree requirements in the shortest possible time, you should take the courses outlined in the prescribed curriculum. For a typical six-term curriculum, a student may complete the requirements in as little as 18 months.

To complete all your degree requirements in the shortest time, you should take at least one liberal arts course each term.

Students may also elect to complete some of their liberal arts requirements during Intersession (except for EN courses), a five-week term scheduled between Spring and Summer Terms. Students will not be assessed any additional tuition for liberal arts courses taken during the Intersession but may be assessed applicable fees.

Students wishing to extend the number of terms needed to complete the required technical courses in their curriculum will be assessed additional tuition and fees.

### 7. Is NEIT accredited?

NEIT is accredited by the New England Commission of Higher Education (NECHE). Accreditation by NECHE is recognized by the federal government and entitles NEIT to participate in federal financial aid programs. Some academic departments have specialized professional accreditations in addition to accreditation by NECHE. For more information on accreditation, see NEIT's catalog.

### 8. Can I transfer the credits that I earn at NEIT to another college?

The transferability of a course is always up to the institution to which the student is transferring. Students interested in the transferability of their credits should contact the Office of Teaching and Learning for further information.

### 9. Can I transfer credits earned at another college to NEIT?

Transfer credit for appropriate courses taken at an accredited institution will be considered upon receipt of an official transcript for any program, biology, science, and mathematics courses in which the student has earned a "C" or above within the past three years and for English or humanities courses in which the student has earned a "C" or above within the last ten years. Official transcript from the other institution must be received before the end of the first week of the term for transfer credit to be granted for courses to be taken during that term. Students will receive a tuition reduction for the approved technical courses based on the program rate and will be applied against the final technical term of the curriculum's tuition amount. No tuition credit is provided for courses which are not a part of the technical curriculum.

### 10. What is the "Feinstein Enriching America" Program?

New England Institute of Technology is the proud recipient of a grant from the Feinstein Foundation. To satisfy the terms of the grant, the College has developed a one-credit community enrichment course which includes hands-on community enrichment projects. The course can be taken for a few hours per term, spread over several terms. Students who are already engaged in community enrichment on their own may be able to count that service towards course credit.

#### 11. How many credits do I need to acquire my Financial Aid?

In order to be eligible for the maximum financial aid award, you need to maintain at least 12 credits per academic term.

#### 12. What does my program cost?

The cost of your program will be as outlined in your enrollment agreement, along with your cost for books and other course materials. Students who decide to take more terms than the enrollment agreement describes to complete the technical courses in their curriculum will be subject to additional fees and possible additional tuition costs. Students who elect to take the technical portion of the degree requirements at a rate faster than the rate prescribed in the curriculum and the enrollment agreement will be assessed additional tuition.

Students who require prerequisite courses will incur additional tuition and fees above those outlined in their enrollment agreement.

If a student elects to take a course(s) outside of the prescribed curriculum, additional tuition and fees will be assessed.

Remember, students who withdraw and re-enter, one time only, pay the tuition rate that was in effect for them at the time of their last day of attendance for up to one year from their last day of attendance. Second re-entries and beyond pay the tuition rate in effect at the time they re-enter. The most economical way for you to complete your college degree is to begin your program now and continue your studies straight through for the six terms necessary to complete your degree requirements.

#### 13. What kind of employment assistance does NEIT offer?

The Career Services Office assists NEIT students and graduates in all aspects of the job search, including resume writing, interviewing skills, and developing a job search strategy. Upon completion of their programs, graduates may submit a resume to the Career Services Office to be circulated to employers for employment opportunities in their fields. Employers regularly contact us about our graduates. In addition, our Career Services Office contacts employers to develop job leads. A strong relationship with employers exists as a result of our training students to meet the needs of industry for over fifty years. No school can, and NEIT does not, guarantee to its graduates employment or a specific starting salary.

#### 14. Where will job opportunities exist?

Graduates have obtained employment in the local area. However, one of the most exciting aspects of this program is the ability to look nationally for employment opportunities.

#### 15. Is there any state or federal licensing required in my field?

No license is required for any of the careers which you will be preparing to enter.

#### 16. What kind of jobs will I be qualified to look for?

Generally, jobs will exist in research and design and manufacturing firms.

#### 17. Will I be able to continue toward a bachelor's degree?

Yes. Students who earn an associate degree in Electronics, Robotics and Drones Technology with the Bachelor's Degree concentration curriculum

can earn a baccalaureate degree in Electrical Engineering Technology with approximately 6 additional terms of study.

#### 18. Are there any special certifications available?

Yes. The International Society of Certified Electronics Technicians, (ISCET), 3608 Pershing Ave., Fort Worth, TX 76107 (800-946-0201 <http://www.iscet.org>) certification. As a convenience to our students, ISCET certification tests can be taken in our Academic Skills Center (ASC) for a fee which is paid directly to the ISCET with a credit card online on the afternoon before the test or on the day of the test. Please note that ISCET certification is voluntary and not a graduation requirement.

Graduates are eligible to sit for the Federal Aviation Administration (FAA) Section 107 Commercial Small Unmanned Aerial System (sUAS) exam for pilot certification (<http://www.faa.gov>). The FAA Section 107 sUAS exam is voluntary and not a graduation requirement. Note: A conviction for the violation of any Federal or State statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marijuana, or depressant or stimulant drugs or substances is grounds for denial of an application for a remote pilot certificate with a small UAS rating for a period of up to 1 year after the date of final conviction.

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## Technical Standards

These technical standards set forth by the Electronic Systems Engineering Technology Department, establish the essential qualities considered necessary for students admitted to these programs to achieve the knowledge, skills and competencies to enter these fields. The successful student must possess the following skills and abilities or be able to demonstrate that they can complete the requirements of the program with or without reasonable accommodation, using some other combination of skills and abilities.

### Cognitive Ability

- Ability to concentrate for long periods of time and retain information on intricate details of component theory and analysis/operation of electronics circuits.
- Ability to learn, remember and recall detailed information and to use it for problem solving.
- Ability to deal with materials and problems such as organizing or reorganizing information.
- Ability to use abstractions in specific concrete situations.
- Ability to break information into its component parts.
- Ability to understand spatial relationships.
- Ability to perform tasks by observing demonstrations.
- Ability to perform tasks by following written instructions.
- Ability to perform tasks following verbal instructions.

### Communications Skills

- Ability to communicate effectively with faculty and students.
- Ability to read English sufficiently to read college level text books, electronics manuals, directions, technical service bulletins, wiring diagrams and safety directions and anger signals.
- Ability to demonstrate and use the knowledge acquired during the classroom training process and in the lab setting.

## Adaptive Ability

- Ability to maintain emotional stability and the maturity necessary to interact with other members of the faculty and students in a responsible manner.

## Physical Ability

- Ability to move test equipment from point to point and to manipulate controls on electronic test equipment.
- Ability to perform learned skills, independently, with accuracy and completeness within reasonable time frames in accordance with procedures.

## Manual Ability

- Ability to wire, build, or protoboard electronic circuits using small components and hand tools.
- Ability to solder connections, and fabricate cables and test leads.
- Ability to manipulate, screwdrivers, and other tools.
- Sufficient motor function and sensory abilities to participate effectively in the classroom laboratory.
- Sufficient manual dexterity and motor coordination to coordinate hands, eyes and fingers in the operation of tools and other equipment.

## Sensory Ability

### Visual

- Acute enough to identify and differentiate component leads, values of codes written on components, as well as color coding on components and wire cables.
- Acute enough to make circuit connections, solder connections, find circuit test points.
- Acute enough to read dials, and position of control settings of electronics testing equipment and operational controls.
- Acute enough to read small numbers on precision measuring instruments.

- Raytheon
- SAIC
- Satcon Power Systems
- Teradyne, Boston
- Sensata (Texas Instruments)
- Wind River

## Typical Job Titles of ERDA Graduates

- Test Engineering Tech
- Technician
- Electronics Technician
- Technician/Field Service Tech
- Engineering tech/Electronic Systems Tech/Air Traffic Systems Specialist
- Electronics Engineer/Technician
- Systems Technician
- Test Technician/Technical Writer
- Design Engineer Tech/ Technician
- Bio-Med Technician
- Technical Specialist
- Electronics Engineer
- Engineering Technician
- Equipment Technician
- Technician
- Engineering Technician
- QA Technician

## Degree Progress Checklist Electronics, Robotics & Drones Technology - AS

### Degree Progress Checklists

- For students entering October 2024 or later
- For students entering October 2020 to September 2024

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*Sample List of Employers Who Have Hired Electronic Systems Engineering Technology AS graduates from New England Institute of Technology*

### Company Name

- American Power Conversion
- Amtrak
- Composite Modules
- EMC
- Federal Aviation Administration
- Federal Electronics
- General Dynamics
- Gillette
- GTECH
- Hanna Instruments
- Invensys Thermal Systems
- KVH Industries
- Linc-Health/Technology in Medicine
- Lockheed Martin
- McLaughlin Research