

# ELECTRICAL TECHNOLOGY WITH RENEWABLE ENERGY SYSTEMS (AS)

## Program Overview Associate in Science Degree

The Electrical Technology program trains students for entry-level careers in the electrical industry. Construction electrician, maintenance electrician, solar electric installer, automation technician, power system technician, field service engineering technician, electrical research technician, electrical distribution sales, electro-mechanical technician, electrical technical support, and entry-level controls engineer are some of the diverse careers open to graduates.

The curriculum integrates electrical theory and practical application to give students not only the manual skills to wire and install electrical systems and apparatus but also the mathematical and practical knowledge to support, explain and troubleshoot each application. Computer programs are integrated into the coursework to allow for practice of circuit calculations, to create working models that simulate real circuit conditions and to support classroom lectures and demonstrations. Of current interest, topics explored include renewable energy sources and energy conservation practices. Of equal importance is the thorough study of the safety rules, protocols, and procedures laid out in the National, Massachusetts and Rhode Island Electrical Codes as well as the OSHA standards for the construction and general industries. All current codes and standards as mandated by individual state legislature are followed. Through continuous connections being shown between the electrical codes and class/lab work, students become proficient and more willing to research electrical industry standards to support their work.

Laboratory projects provide hands-on experience to develop wiring techniques and to simulate actual job conditions in residential, commercial and industrial environments. The projects range from elementary breadboard experiments to advanced control circuits utilizing programmable automation controllers. Students install lighting, power, network, and control devices used in residential, commercial and industrial environments.

Upon completion of the Associate in Science Degree in Electrical Technology, graduates are qualified to seek employment in entry-level careers in the electrical industry. With a background in the science of electricity, mastery of fundamental mathematical principles, and the knowledge of safety rules and procedures laid out in the National Electrical Code, new graduates are qualified to work as an apprentice electrician or technician skilled in the basic foundation upon which an employer can build. Associate degree graduates can also continue in the NEIT Bachelor of Science in Electrical Engineering Technology, Construction Management or Business Management programs.

For those interested in careers in the sustainable renewable energy fields such as solar photovoltaic arrays, wind generation (turbine), tidal generation and fuel cell technologies, an additional term specifically addresses these careers as well as the unique techniques and standards students must learn to become competent not only as electricians or technicians but as "green" electricians or technicians. Upon successful completion, ELY students may earn an additional Associate in Science

degree in Electrical Technology with a concentration in Renewable Energy. Additionally, as the "Green Term" is certified by the North American Board of Certified Energy Practitioners (NABCEP), students, upon passage of the program, would be eligible to sit for the NABCEP Associate certification.

The "Green Term" is available not only for current Electrical Technology students, but also for Electrical Technology graduates as well as for non-NEIT students provided certain requirements are met (i.e., electrical licensing, electrical contractor, and electrical engineer).

## Curriculum

| Course                       | Title  | Quarter Credit Hours |
|------------------------------|--|----------------------|
| <b>Term I</b>                |  |                      |
| ELY 112                      | Electrical Foundations I & Lab                                 | 6                    |
| ELY 116                      | Introduction to Residential Wiring/NEC I                       | 3                    |
| ELY 117                      | Basic Wiring Techniques Lab                                    | 1                    |
| OSH 010                      | OSHA Construction Safety & Health                              | 2                    |
| Choose one of the following: |  | 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>        |                      |
| <b>Quarter Credit Hours</b>  |  | <b>16-17</b>         |
| <b>Term II</b>               |  |                      |
| ELY 122                      | Electrical Foundations II & Lab                                | 7                    |
| ELY 126                      | Residential Wiring/NEC II                                      | 1                    |
| ELY 127                      | Residential Wiring Lab II                                      | 2                    |
| MA 125                       | Technical Math I (MA/SCI Core) <sup>1</sup>                    | 4                    |
| EN 100                       | Introduction to College Writing (COM Core) <sup>1</sup>        | 4                    |
| <b>Quarter Credit Hours</b>  |  | <b>18</b>            |
| <b>Term III</b>              |  |                      |
| ELY 132                      | Transformers & Lab   | 3                    |
| ELY 138                      | Advanced Wiring/NEC III  | 4                    |
| ELY 139                      | Advanced Wiring III Lab  | 2                    |
| ELY 218                      | Building Construction & Environmental Systems for Electricians | 4                    |
| MA 210                       | Technical Math II (MA/SCI Core) <sup>1</sup>                   | 4                    |
| <b>Quarter Credit Hours</b>  |  | <b>17</b>            |
| <b>Term IV</b>               |  |                      |
| ELY 212                      | Motor Theory   | 4                    |
| ELY 213                      | Motor Controls & Lab   | 5                    |
| ELY 217                      | AutoCAD Electrical   | 2                    |
| PHY 200                      | Physics I & Lab (MA/SCI Core) <sup>1</sup>                     | 4                    |
| EN 200                       | Workplace Communications (COM Core) <sup>1</sup>               | 4                    |
| <b>Quarter Credit Hours</b>  |  | <b>19</b>            |
| <b>Term V</b>                |  |                      |
| ELY 224                      | Industrial Controls  | 5                    |
| ELY 225                      | Industrial Controls Lab  | 2                    |
| ENG 210                      | Introduction to Programmable Automation Controllers & Lab      | 5                    |
| Elective                     | 100-200 Level Humanities Core <sup>1</sup>                     | 4                    |

|   |  |                |
|---|--|----------------|
| Optional Course   |  | 0-3            |
| ABT 223   | Structures I (CMT/BS) (Only for students who wish to go into the CMT/BS Program) |                |
| <b>Quarter Credit Hours</b>                             |  | <b>16-19</b>   |
| <b>Term VI</b>  |  |                |
| ELY 244   | Electronic Motor Drive Systems   | 6              |
| ELY 245   | Advanced Industrial Controls Lab   | 3              |
| Choose one of the following:                            |  | 4              |
| SS 274  | Human Relations in the Workplace   |                |
| SS 236  | Small Business and the Law   |                |
| Choose one of the following:                            |  | 3-4            |
| ELY 250   | Low Voltage Systems and Fiber Optics (ELY/ELRE or MGT/BS)                        |                |
| ABT 223   | Structures I (CMT/BS)  |                |
| ERD 212   | Microprocessor Control Systems (ELT/BS) <sup>2</sup>                             |                |
| <b>Quarter Credit Hours</b>                             |  | <b>16-17</b>   |
| <b>Term VII</b>   |  |                |
| <b>Additional Term for Renewable Energy<sup>3</sup></b> |  |                |
| ELY 283   | Photovoltaic Systems & Lab   | 6              |
| ELY 290   | Wind Turbine Technology and Other Renewable Energy Sources                       | 4              |
| SCI 110   | Environmental Science (MA/SCI Core) <sup>1</sup>                                 | 4              |
| <b>Quarter Credit Hours</b>                             |  | <b>14</b>      |
| <b>Total Quarter Credit Hours</b>                       |  | <b>116-121</b> |

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

<sup>2</sup> ERD 212 Microprocessor Control Systems must be taken to enter the Electrical Engineering Technology bachelor's degree program.

<sup>3</sup> Students in Electrical Technology who wish to take Electrical Technology with Renewable Energy (ELRE) must hold their OSHA card prior to entering the seventh (ELRE) term of the program.

Total Quarter Credit Hours for ELRE or MGT/BS = 116-117

Total Quarter Credit Hours for CMT/BS = 119-120

Total Quarter Credit Hours for ELT = 117-118

## 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 Electrical Technology Program (ELY) is to provide a specialized associate degree program to prepare students for entry-

level technical careers in diverse electrical, electro-mechanical, technical support, and electrical controls fields. ELY students will develop skills in problem-solving, critical thinking, and appropriate use of construction tools through practical experience in the wiring and troubleshooting of a wide variety of electrical projects. Students will study and learn a background of electrical science, mastery of fundamental mathematical principles, and the knowledge of safety rules and procedures laid out in the National Electrical Code, enabling them to perform the duties of an apprentice electrician or entry-level technician. Graduates will attain a basic foundation of knowledge and skills that an employer can build upon with continuing education.

### Program Goals

1. The ELY program will provide appropriate learning opportunities for students to acquire the theoretical knowledge, applicable skills and attitude necessary to function as an entry-level electrical technician or electrical apprentice.
2. ELY students who are entering a State-run electrical apprenticeship program:
  - a. Will acquire the necessary skills for transfer into a State program and
  - b. May meet, contingent on applicable law and regulation, some of the requirements (which vary from state to state) necessary to qualify for state electrical journey electrician licensing exams. Continuing education is a component of most electrical apprentice programs.
3. The ELY program will instill in the student a sense of commitment to the electrical industry's core values and ethics.

### Program Outcomes

Graduates of this program will be able to:

1. Identify, define, and analyze fundamental principles of electrical circuitry and processes.
2. Identify, define, and analyze electrical industry materials, tools and equipment
3. Research, interpret, and apply electrical industry standards for installation criteria and safety considerations.
4. Function independently and/or interdependently as a team member to accomplish the following: install, maintain and troubleshoot residential, commercial, and industrial projects.
5. Demonstrate effective oral and written communications using correct technical terminology with supervisors, co-workers, clients, and suppliers.
6. Perform tasks and duties in a "safe and workmanlike manner" with regards to legal obligations applicable to the electrical industry.
7. Demonstrate attitudes, values, and behaviors congruent with electrical industry standards and ethics.
8. Identify, define, and analyze fundamental principles of renewable energy systems, such as photovoltaic and wind generating systems.
9. Apply renewable energy system concepts to prepare for the NABCEP entry-level certification exam.

## 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 university 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 the 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. 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. An 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-entrees 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 of a job search strategy. Upon completion of their program, 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?

Jobs at the technician level currently require no license in the state of Rhode Island. Graduates who wish to work as electricians can expect to meet some type of licensing requirements in whichever state they work. Because of the complex nature of licensing requirements and because these requirements change periodically, we cannot list all the requirements for the various types of licenses in the various states. NEIT IS NOT RESPONSIBLE FOR ANY CHANGES IN LICENSING REQUIREMENTS THAT ANY STATE LEGISLATURE, INCLUDING RI's, MAY IMPLEMENT AT ANY TIME. Each student should take personal responsibility for determining the licensing requirements in the specific trade and state in which he or she plans to work. Your instructor or department chair can give you help as needed.

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

You will be qualified to look for a job at the technician level, working under an engineer or as an electrical apprentice in a residential, commercial or industrial setting.

### 17. Can I get a bachelor's degree in my field?

Graduates of the Electrical Technology with Renewable Energy Systems program can earn a baccalaureate degree with approximately 6 more terms of study in one of three programs: Electrical Engineering Technology, Construction Management or Business Management.

### 18. Will I be required to wear special clothing?

Yes. In accordance with OSHA Standard 29CFR 1926.28(a), each student is required to wear appropriate attire for the workplace when in Lab or Open Lab. Electrical Technology students are required to wear button down or pull-over shirts for all classes (no sleeveless shirts or shirts containing objectionable printing of any type, as determined by the class instructor). Proper work pants include jeans or cotton-blend work pants, (no sweatpants, nylon pants, shorts, tattered, too tight or oversized pants). Proper footwear includes no-slip work shoes, boots, or sneakers – no open-toe shoes, slip-on shoes, dress shoes, or shoes with large heels will be allowed. For safety, no dangling jewelry (bracelets, necklaces, or earrings) is allowed. No rings other than wedding bands will be allowed. Safety glasses must be worn in all Lab classes. For more details, refer to the Electrical Technology Department's Dress Code Policy.

### 19. Where can I purchase an optional uniform shirt and what kind do I need?

Though specific uniform shirts are optional, students may purchase NEIT Electrical Technology uniform shirts online at Alexander's Uniforms <http://aucorporateapparel.com/>. At the site's homepage, click "New England Institute of Technology" from either the icon or the left tab, then select your department from the list. All items are priced to include a discount. If you have any questions, contact Wendy Mquette via email at [wmquette@alexandersuniforms.com](mailto:wmquette@alexandersuniforms.com) or at 401-654-6500.

The required uniforms include:

| Required Uniform                              | Size/Pricing   |
|---|--|
| Hunter Sanmar PC54 Shirt w/ Screen Printing   | S-5X (Contact Alexander's Uniforms for current pricing.) |
| Hunter Sanmar PC54LS Shirt w/ Screen Printing | S-5X (Contact Alexander's Uniforms for current pricing.) |

You may also purchase your uniform items at Alexander's Uniforms at one of their three locations (recommended if you are unsure of the size): 1) Rhode Island: Marshall's Plaza, 1 Lambert Lind Highway, Warwick RI 02886, 860-889-7744, 401-654-6500; 2) Connecticut: 77 Salem Turnpike, Norwich, CT 06360, 781-762-1449; 3) Massachusetts: 500 Providence Highway, Norwood MA 02062. A Student ID is needed to ensure you receive your discount at checkout.

### 20. Are there any special state or federal requirements or certifications required for Renewable Energy Systems?

The states of RI, MA, and CT all require an electrical license to install PhotoVoltaic and other renewable energy systems. Please contact your local state licensing board for additional information.

### 21. Is there any specialized certification available for Renewable Energy Systems?

Yes. NEIT is provider of the NABCEP Entry Level exam. The North American Board of Certified Energy Practitioners (NABCEP) is a volunteer board of renewable energy stakeholder representatives that includes representatives of the solar industry, NABCEP certificants, renewable energy organizations, state policy makers, educational institutions, and the trades. Each member of the board was chosen because of his or her experience and involvement in the solar energy industry. NABCEP's mission—to support, and work with, the renewable energy and energy efficiency industries, professionals, and stakeholders—is intended to develop and implement quality credentialing and certification programs for practitioners.

NABCEP is committed to providing a certification program of quality and integrity for the professionals and consumer/public it is designed to serve. Professionals who choose to become certified demonstrate their competence in the field and their commitment to upholding high standards of ethical and professional practice.

The NABCEP Entry Level Certificate Program is designed for those individuals wanting to get into the solar field; it is a way for them to show they have achieved basic knowledge comprehension and application of key terms and concepts of photovoltaic (solar electric) system operations.

The certificate demonstrates that the student has passed an industry-designed exam based on learning objectives developed by subject matter experts.

## Technical Standards

These technical standards set forth by the Electrical Technology Department, establish the essential qualities considered necessary for students admitted to the program. 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 visualize and portray ideas graphically.
- Good reasoning and critical thinking skills.
- 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.
- Possession of basic math skills through addition, subtraction, multiplication and division of whole numbers and fractions using both the U.S. and Metric systems of measurement.
- Ability to perform tasks by observing demonstrations.
- Ability to perform tasks following verbal instructions.

### Communications Skills

- 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

- An ability to work in a standing, walking, climbing, squatting, kneeling, or lying position for extended periods of time while maintaining high levels of concentration.
- Ability to lift objects weighing up to 35 pounds.
- Sufficient upper body strength to carry 20 pounds.
- Sufficient strength and agility to grasp and maintain tension for long periods of time.
- Ability to perform learned skills, independently, with accuracy and completeness within reasonable time frames in accordance with procedures.

### Manual Ability

- Ability to manipulate side cutters, diagonal cutters, needle-nose pliers, 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, wire and other equipment.
- Good manual dexterity.

### Sensory Ability

- Adequate vision for distinguishing colors, interpretation of gauges, oscilloscopes, and diagnostic equipment (adaptive equipment acceptable).
- Adequate vision for reading blueprints and other printed instruction, working with tools and equipment, and for maneuvering on job sites, scaffolding, and areas in various stages of completion (adaptive equipment acceptable).
- Visual ability, if necessary, with correction, to see tools, instruments and wires
- Acute enough to read small print.
- Acute enough to read small numbers on instrument

## Degree Progress Checklist

### Electrical Technology with Renewable Energy Systems - AS

#### Degree Progress Checklists

- For students entering October 2024 or later
- For students entering October 2023 to September 2024
- For students entering October 2022 to September 2023
- For students entering October 2021 to September 2022
- For students entering October 2020 to September 2021