THE REGISTERED APPRENTICESHIP OCCUPATIONS AND STANDARDS CENTER OF EXCELLENCE (AOSC)

Electrical and Electronic Engineering Technician
National Occupational Framework

ONET Code: 17-3023.00

RAPIDS Code: 0155

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Introduction to Using This Document

Under the Registered Apprenticeship Technical Assistance Centers of Excellence award, the Urban Institute leads the Occupations and Standards work. One of the main objectives of Urban's project is to create high-quality, well-researched, consensus-based work process schedules that are nonproprietary and widely available. This document is a product of that work and contains three sections: the occupational overview, the work process schedule, and the related technical instruction.

The **occupational overview** is a general introduction, including alternative job titles, any prerequisites, and, if applicable, the total number of hours needed to complete a time-based or hybrid program.

The **work process schedule** outlines the major job functions, competencies, and/or hours an apprentice completes in a registered apprenticeship program. It outlines what apprentices are expected to learn on the job with the support of a mentor or journeyworker (a worker mastering the competencies of an occupation in a particular industry), including both core competencies and those deemed optional by experts in the field. The work process schedule is the foundational document guiding a program.

Urban works with numerous experts to ensure the content is thoroughly researched and vetted to reflect the expectations of industry, educators, labor unions, employers, and others involved in apprenticeship for this occupation. Sponsors and employers can use the work process schedule as their program standards with assurances it has been approved by experts in the field.

The **related technical instruction** presents considerations for the coursework that apprentices will undertake to supplement on-the-job learning. It is intended to serve as a reference to sponsors exploring their options for the accompanying classroom, virtual, or hybrid training.

How to Use the Work Process Schedule

Sponsors can adapt the work process schedule to accommodate their needs for competency- or time-based or hybrid programs. In a **competency-based** apprenticeship, sponsors assess apprentices' progress across core and optional competencies listed in the work process schedule. In a **time-based** apprenticeship, apprentices complete a predetermined number of hours across major job functions and the program overall. In a **hybrid** apprenticeship, sponsors monitor apprentices' hours spent on major job functions and assess their proficiency across competencies.

Each program type has a different method of assessment:

- **For a competency-based program**, apprentices engage in activities and make progress toward proficiency in the identified competencies. Sponsors overseeing apprentices' work assess their mastery of the outlined competencies using the following rating scale:

  4—Competent/proficient (able to perform all elements of the task successfully and independently)

  3—Satisfactory performance (able to perform elements of the task with minimal assistance)

  2—Completed the task with significant assistance

  1—Unsuccessfully attempted the task

  0—No exposure (note the reason—absence, skill isn't covered, etc.)

  The competencies may be completed in any order. Apprentices must perform at a level 4 or 3 in all competencies listed as "core" to complete the apprenticeship program successfully.

- **For a time-based program,** sponsors monitor apprentices' completion of hours in training across major job functions. The total number of hours recommended for this occupation is listed in the occupational overview and is based on guidance from the US Department of Labor. Generally, apprentices must have at least 2,000 hours overall for on-the-job learning, but occupations of greater complexity may require more hours. Sponsors will provide apprentices with supervised work experience and allocate the total number of hours across the major job functions to adequately train their apprentices.

- **The hybrid approach** blends both competency- and time-based strategies. Sponsors measure apprentices' skills acquisition through a combination of completing the minimum number of hours of on-the-job learning successfully demonstrating identified competencies. Sponsors will assess apprentices' proficiencies as described for competency-based programs with a rating scale of 0–4 for every core competency. Generally, apprentices have at least 2,000 hours overall for on-the-job learning, but occupations of greater complexity may require more hours. Sponsors will document apprentices' completion within a minimum and maximum range of hours assigned for each major job function.

Electrical and Electronic Engineering Technician Occupational Overview

Occupational Purpose and Context

Electrical and electronic engineering technicians apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, install, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.

Potential Job Titles

Electrical engineering technician, electrical technician, electronics engineering technician, electronics technician, engineering technician (engineering tech), instrument mechanic, instrumentation and controls technician, instrument repairer, instrument mechanic, instrumentation technician, calibration laboratory technician, IT lab technician, electrical instrument repairer, and instrument technician (utilities)

Apprenticeship Prerequisites

It is recommended that candidates have a high school diploma or equivalent and be strongly interested in math, science, mechanical systems, or electronics. Some employers may give hiring priority to apprentices with additional certifications in electrical or electronic engineering.

Recommended Length of Apprenticeship (Time/Hybrid Programs Only)

The recommended length of on-the-job learning in an electrical and electronic engineering technician apprenticeship is 4,000 to 6,000 hours.

Work Process Schedule

Electrical and Electronic Engineering Technicians

ONET Code: 17-3023.00

RAPIDS Code: 0155

Instructions for Use:

Competency-based programs: In the "performance level achieved" column of the work process schedule (see examples starting on the next page), assess apprentices' performances on each competency with the scale below. No monitoring of hours is required for this approach. See "Guidelines for Competency-Based, Hybrid and Time-Based Apprenticeship Training Approaches," US Department of Labor, Employment and Training Administration, Office of Apprenticeship, October 20, 2015, https://www.apprenticeship.gov/sites/default/files/bulletins/Cir2016-01.pdf.

4—Competent/proficient (able to perform all elements of the task successfully and independently)

3—Satisfactory performance (able to perform elements of the task with minimal assistance)

2—Completed the task with significant assistance

1—Unsuccessfully attempted the task

0—No exposure (note the reason—absence, skill isn't covered, etc.)

Time-based programs: In the "hours" row, specify the number of hours apprentices will fulfill for each job function. No assessment of competencies is required for this approach.

Hybrid programs: In the "performance level achieved" column, assess apprentices' performances on each competency using the 0–4 scale above. In the "hours" row, identify a range of hours apprentices should spend working on each major job function.

Job Function 1: Plans for design and assembly of electronic systems		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Reads blueprints, wiring diagrams, schematic drawings, or engineering instructions for assembling electronics units, applying knowledge of electronic theory and components	Core	
B. Identifies electrical components and their uses	Core	
C. Provides documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, equipment, or structures are to be assembled, installed, modified, maintained, or used	Core	
D. Develops blueprints, plans, drawings, and models	Optional	

Job Function 2: Assembly and installation		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Installs electrical systems and equipment	Core	
B. Determines which tools, equipment, or technologies to use for operations or projects	Core	
C. Operates machines, equipment, and computer systems as part of installation activities	Core	
D. Builds prototypes (e.g., for electrical systems) from plans or sketches	Core	
E. Assembles, tests, or maintains circuitry of electronic components according to engineering instructions, technical manuals, or knowledge of electronics, using hand tools or power tools	Core	

Job Function 3: Equipment maintenance and quality control		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Inspects equipment for malfunctions or defects	Core	
B. Monitors and reviews information from materials, events, or the environment to detect or assess problems	Core	
C. Uses information provided by other systems for preventive maintenance	Core	
D. Tests equipment to resolve design-related problems	Core	
E. Recommends repairs or changes to equipment	Core	
F. Modifies, maintains, or repairs electronics equipment or systems to ensure proper functioning using hand tools, power tools, and precision instruments (e.g., multimeters)	Core	
G. Resolves equipment malfunctions or defects, working with manufacturers, field representatives, or vendors as necessary to procure replacement parts	Core	
H. Performs inspections and audits to identify and rectify noncompliance issues	Core	
I. Ensures electrical and electronic systems meet standards, regulatory guidance, and safety guidelines	Core	
J. Adheres to quality control processes	Core	

Job Function 4: Project management		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Adheres to work plans, design costs, and project budgets and timelines	Core	
B. Compiles and maintains records of performed work activities	Core	
C. Develops specific goals and plans to prioritize, organize, and accomplish work	Core	

D. Analyzes information and evaluate results to choose the best solutions and solve problems	Core	
E. Complies with federal and state guidelines, laws, and regulations (e.g., OSHA 10)	Core	
F. Reviews electrical engineering and maintenance standards and identify potential revisions or amendments	Core	
G. Identifies problems or risks and creates mitigation plans as well as periodic risk review processes	Core	
H. Interprets and demonstrates understanding of project timelines, costs, and budgets	Core	
I. Adapts to changes in the work environment and project timelines in response to unforeseen events	Core	
J. Researches equipment or component needs, sources, competitive prices, delivery times, or ongoing operational costs	Optional	

Job Function 5: Communicates and engages with internal teams, clients, and stakeholders		
Hours **(time-based and hybrid programs only):**		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Communicates effectively with colleagues and peers through oral, written, and electronic formats	Core	
B. Encourages peers to work together to complete tasks and assignments	Core	
C. Develops and maintains constructive and cooperative working relationships	Core	
D. Communicates with people outside the organization, representing the organization to customers, the public, government, and other external sources	Core	
E. Provides technical support to internal teams and clients	Core	
F. Communicates project requirements, progress, and challenges with engineers and technicians	Core	
G. Uses positive and respectful verbal, nonverbal, and written communication with coworkers and external stakeholders	Core	
H. Maintains positive contact and collaborative relationships with other organizations, coworkers, and management	Core	

I. Demonstrates effective one-on-one communication skills with supervisor and coworkers to discuss workplace challenges, personal limitations, and questions	Core	
J. Provides guidance, feedback, and advice to management and other groups on technical, systems-, or process-related topics	Optional	

Job Function 6: Workplace safety		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Remains alert and aware of surroundings	Core	
B. Follows safety procedures and standard operating procedures	Core	
C. Maintains a clean and organized safe work area	Core	
D. Exhibits knowledge and use of hand tools and power tools	Core	
E. Identifies what type of protective gear to use, as appropriate	Core	
F. Utilizes personal protective equipment (safety shoes, glasses, gloves, hearing protection, hard hats, life jackets, arc flash shields)	Core	
G. Reviews work plans and activities to ensure compliance with electrical codes and standards	Core	
H. Identifies unsafe work procedures and reports them in accordance with company policy	Core	

Job Function 7: Data collection, research, and reporting		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Writes reports and records data on testing techniques, laboratory equipment, and specifications	Core	
B. Enters, transcribes, records, stores, or maintains information in written or electronic/magnetic form	Core	

C. Contributes to research and development projects aimed at improving existing systems or developing new technologies	Core	
D. Describes and shares the results of the research in a direct and succinct manner	Core	
E. Collects and compiles data on testing techniques, laboratory equipment, and specifications	Optional	
F. Assists scientists and engineers with electrical engineering research	Optional	

Job Function 8: Operates computer systems and software		
Hours (time-based and hybrid programs only):		
Competencies	**Core or optional**	**Performance level achieved (0–4)** (competency-based and hybrid programs only)
A. Uses computers and computer systems to program, write software, set up functions, enter data, and process information	Core	
B. Demonstrates use of electronic simulation software	Core	
C. Assesses and evaluates potential IT security threats and reports them to the company's IT department	Core	
D. Engages actively in training related to emerging technologies (e.g., artificial intelligence, programming)	Core	
E. Integrates test equipment with computers or microprocessors	Optional	
F. Produces electronics drawings or other graphics representing industrial control, instrumentation, sensors, or analog or digital telecommunications networks using computer-aided design (CAD) software	Optional	

Related Technical Instruction

Electrical and Electronic Engineering Technician

ONET Code: 17-3023.00

RAPIDS Code: 0155

Program approach type (time-based, competency-based, hybrid):

Instructions for Use:

Registered Apprenticeships must include at least 144 hours of Related Technical Instruction (RTI) per apprenticeship year. Courses offered by accredited colleges and universities may be assigned a credit hour determination rather than a contact hour determination. In general, an academic credit unit is the equivalent of 15 clock hours of instruction.

Development and Use of this RTI Outline: Employers and academic institutions may approach RTI in markedly different ways. Our goal was not to identify the single best way to provide RTI, or to identify a single provider whose content we deemed to be superior. Instead, our goal was to survey a number of education providers, including employers, institutions of higher education, high schools, private continuing education providers, labor organizations, professional associations, and, in some cases, municipalities that provide worker training, to identify topics or courses common among those providers that align with the job functions included in this WPS. Those common topics or courses are reflected in the RTI Outline provided below, which may be useful in developing your RTI program or communicating your needs to an educational partner.

Licensure or certification requirements: Most states do not require electrical and electronic engineering technicians to be licensed; however, many employers require or give hiring priority to electrical and electronic engineering technicians who are certified by the National Institute for Certification in Engineering Technologies (which offers certification programs in civil engineering technology and electrical and mechanical systems engineering technology), the International Society of Certified Electronics Technicians, the Electronics Technician Association International, and SpaceTEC (which offers certification for engineering technicians in the aerospace industry), depending on the engineering the technician will perform.
Degree requirements for licensure or certification, if applicable: None
Accreditation requirements of instructional provider for licensure or certification, if applicable: N/A
Anticipated changes in licensure or certification requirements, if known: N/A

Examples of various certification requirements: Employers and apprentices should review the content guidelines issued by the certification body from which they wish to receive a credential. Some of these organizations offer several levels of certification in various electronics specialty areas.

National Institute for Certification in Engineering Technologies: This certification requires individuals to meet experience requirements, receive personal recommendations, and pass an exam. However, there are no degree requirements for technician-level certification.

The **International Society of Certified Electronics Technicians** offers certifications at many levels and in many specialty areas, including:

- *Associate-Level Certified Electronics Technician*—An electronics technician or student may take the associate-level exam. The basic electronics portion of the full-credit Certified Electronics Technician (CET) exam must be passed with a score of 75 percent or better.
- *Journeyman Level Certified Electronics Technician*—The International Society of Certified Electronics Technicians (ISCET) offers specialized journeyman certification in consumer, communications, industrial, and radar electronics.

Examples of RTI providers for this occupation

Professional associations and labor organizations: Each certifying body for electrical and electronics engineering technician certifications offers coursework, test prep opportunities, and conferences that include educational opportunities.

Military: The US Military, including the United Services Military Apprenticeship Program, provides training opportunities for Electrical and Electronic Engineering at many levels and specialties to military personnel (see military occupational specialties below). We are unaware if these training opportunities are available to civilians.

States/municipalities: Many states offer educational opportunities related to state codes and requirements, though they do not generally offer instruction in foundational electronics topics.

Colleges and universities: Many community colleges offer applied associate of science (AAS) degree programs in engineering technology. Four-year colleges may accept some credits from AAS programs toward baccalaureate degrees in engineering or computer science; however, credits earned in applied courses may not be accepted for transfer credit or may not be applied to meet baccalaureate degree requirements.

No-cost online providers: Coursera and EdX offer courses in physics, electronics, and mathematics that may be helpful to engineering technology apprentices; however, these online providers do not offer full programs in engineering technology.

Continuing education or specialty education providers: The Institute of Electrical and Electronics Engineers offers continuing education opportunities in engineering, computing, and information technology.

Prerequisite knowledge, skills, or experience typically required by RTI providers for this occupation

Electrical and electronic engineering technicians are typically expected to have a strong knowledge of math and science, mechanical systems, and electronics.

Electrical and electronic engineering technicians who work for or as contractors or subcontractors to the US government, including the US Military Services, may be required to pass a background check and obtain a security clearance.

Technical Mathematics

Hours: 35–50

Sample learning objectives

- Convert fractions to decimals and decimals to fractions; add, subtract, multiply, and divide fractions and decimals and calculate proportions and ratios.
- Calculate rates of changes.
- Calculate percentages.
- Measure correctly, convert between measurement systems (such as English to metric) and calculate unknown measurements using algebra, geometry, or trigonometry.
- Use scientific notation and manipulate numbers expressed with exponents.
- Use algebraic techniques to solve for unknown variables, solve linear equations, follow the correct order of operations, use the distributive law, and solve systems of equations.
- Define the various types and components of triangles, determine interior and exterior triangle angles, use the Pythagorean Theorem to solve problems for right triangles, and determine the perimeter and area of triangles.
- Identify squares, rectangles, parallelograms, trapezoids, hexagons, octagons, pentagons, and quadrilaterals and calculate their perimeter and area.
- Calculate a circle's diameter, radius, circumference, and arc.
- Use the Laws of Sines and Cosines to determine angles.
- Define and use mean, median, mode, and standard deviation.
- Create and interpret graphs.

DC Circuits

Hours: 35–45

Sample learning objectives

- Identify the various components of DC circuits.
- Analyze series, parallel, and series-parallel circuits using the concepts of voltage, current, and resistance.
- Define and properly use Ohm's Law to evaluate circuits' energy and power requirements.
- Diagram circuits and use schematics to build electronic systems.
- Use oscilloscopes, function generators, and multimeters to analyze circuits.
- Apply superposition, Thevenin's, and Norton's theorems to circuits and use branch, loop, and node analysis to find unknown values.
- Apply the appropriate safety techniques to work on and troubleshoot circuits and components.
- Interpret color codes and other descriptors used in electronics.
- Use appropriate units of measure, significant figures, rounding techniques, and engineering notation.

AC Electronics

Hours: 35–50

Sample learning objectives

- Define and properly use terms, including alternating current, frequency, period, sine wave, capacitance, and inductance.
- Interpret electrical symbols.
- Explain the relationship between voltage, current, resistance, and power.
- Define and properly use Ohm's and Kirchoff's laws to solve problems.
- Explain the operation of an electromagnet.
- Use the concepts of capacitance and inductance to analyze circuits.
- Use phasors and complex numbers to solve problems relating to resonant circuits.
- Properly use filter configurations to regulate power delivery.
- Solve problems related to the use of transformers.
- Use appropriate safety protocols, including personal protective devices, to safely work with electrical systems.

Programming Design for Engineering Technology

Hours: 45

Sample learning objectives

- Describe the hardware components of a computer system and explain their function.
- Explain how computer circuitry harnesses electric flow.
- Describe how computer components are selected and combined to build computer systems.
- Identify and explain the application of abstract data types such as queues, stacks, lists, trees, and graphs.
- Explain the role of operating systems in managing and interacting with computer system components, including main and secondary memory.
- Use information system software to organize, manipulate, and secure data.
- Apply object-oriented methodology to computer problem-solving.
- Apply problem-solving skills to develop computer algorithms.
- Use computational problem-solving skills to write, review, and correct code.
- Test programs for defects and use debugging techniques to remedy defects.
- Write programs using data stored in text files.
- Use editors to compose programming code and compilers to produce executable software.

Engineering Graphics

Hours: 45

Sample learning objectives

- Select digital and mechanical drafting tools, procedures, and forms of graphical representation appropriate to specific needs and industry standards.
- Demonstrate basic drafting skills, including neatness, accuracy, composition, and line weight/type.
- Communicate basic engineering ideas using both physical and digital drawing skills.
- Interpret basic engineering drawings.
- Explain the use of orthographic projection, auxiliary views, conventions, dimensions, tolerances, pictorial drawings, threads, and fasteners.
- Create 2D computer drawings, set up working space (units, grids, etc.), and create and edit 2D geometries.
- Use industry-standard CAD software to model solid objects, proceeding from basic sketching techniques to creating solid features.
- Create dimensions using good dimensioning practice.

Introduction to Physics

Hours: 45–60

Sample learning objectives

- Use mathematical equations to determine a moving object's position, velocity, and acceleration.
- Explain Newton's three laws of motion.
- Describe the concept of gravity and its effect on motion.
- Differentiate between inertial and gravitational mass.
- Discern between centripetal and centrifugal forces.
- Clarify the difference between open and closed energy systems.
- Explain how mechanical energy is used to perform work.
- Describe the laws regarding the conservation of energy.
- Explain the momentum conservation principle.
- Describe the types of vectors used to determine motion in a plane.

Manufacturing Technology

(the content of this course will vary based on the industry in which the engineering technician is employed)

Hours: 45–60

Sample learning objectives

- Differentiate between different materials, such as ceramics, composites, metals, plastics, and wood.
- Discern the difference between manufacturing processes, such as forming, separating, fabricating, conditioning, and finishing.
- Discuss effective methods for maintaining quality control in the manufacturing process.
- Explain the importance of automated technologies in manufacturing.
- Discuss machining, casting, forming, and fabrication to produce materials, components, and products.
- Describe the role of sensors in manufacturing control systems.
- Discuss the importance of packing in manufacturing and distribution.

Soldering Basics
Hours: 35–50
Sample learning objectives ▪ Explain the principles of soldering and how it is used to make electrical connections. ▪ Select and prepare the proper electrical/electronic components and cables. ▪ Explain the different solder types used in electronics applications, including the advantages and disadvantages. ▪ Explain the composition and function of flux. ▪ Describe the proper procedure for preparing the base material for soldering. ▪ Perform quality control analysis of solder and make appropriate adjustments to correct apparent problems. ▪ Demonstrate proper usage of the hand and machine tooling used for circuit board and cable fabrication. ▪ Show foundational knowledge of applicable industry standards. ▪ Use proper safety procedures and protective gear.

Semiconductors
Hours: 35–50
Sample learning objectives ▪ Explain basic semiconductor theory. ▪ Describe the characteristics of diodes, bipolar and field-effect (FET) transistors, thyristors, and elementary circuits relating to these devices. ▪ Determine wave shapes in circuits with PN diodes, Zener diodes, and varactors. ▪ Demonstrate the ability to bias transistors to the correct level. ▪ Build diode and transistor circuits. ▪ Display the capability to use an oscilloscope properly.

Computing Essentials
Hours: 45
Sample learning objectives ▪ Support and secure access to data by properly using authentication, access control, and encryption. ▪ Use networking concepts and protocols to assemble and support wired and wireless networks. ▪ Install, maintain, and troubleshoot popular operating systems. ▪ Explain the basics of hardware, software, and networking to support IT infrastructures. ▪ Utilize decision trees to diagnose, resolve, and document common hardware and software problems across various devices. ▪ Explain the use of cloud systems to store and secure data. ▪ Use productivity software tools, such as Excel.

CAD/Computer-Aided Manufacturing (CAM) Drawings in Manufacturing
Hours: 35–50
Sample learning objectives ▪ Create two-dimensional (2D) parts views using AutoCAD interface and basic commands. ▪ Complete 2D orthographic drawings using geometric construction and editing tools inside AutoCAD. ▪ Properly use layers, dimensions, and notes to complete AutoCAD drawings. ▪ Plot appropriately scaled drawings. ▪ Apply parametric constraints on 2D drawings and edit them to demonstrate their functional use. ▪ Create templated drawings in AutoCAD to include section and auxiliary views. ▪ Explain the importance of proper CAD/CAM drawings to the Computer Numeric Control (CNC) machining process.

Relevant military experience

Marine Corps: Military Occupational Specialty (MOS) 2862 is assigned on completion of the Electronics Maintenance Technician Course, while MOS 2891 is assigned on promotion to Electronics Maintenance Chief.

Army–MOS 35 F: Special Electronic Devices Repairer

Army–MOS 256A: Communications Electronics Repair Technician

US Navy: Electronics Technician

Diversity, equity, and inclusion

Most engineering technicians are males (91 percent), and while the percentage of female engineering technicians was higher between 2010 and 2017 (83 percent to 85 percent), participation by women dropped significantly in 2018. The majority of engineering technicians are white (71 percent). In comparison, 6 percent are Black (a decline of 1 percent since 2010), 8 percent are Asian (relatively unchanged since 2010), and 10 percent are Hispanic (a slight increase since 2010). Although there has been little effort nationally to increase the number of women who work as engineering technicians, there have been considerable efforts to diversify the engineering profession, though those efforts have been unsuccessful.

For decades, the National Science Foundation has funded efforts to recruit more women and minorities to engineering and engineering technology careers. The Advanced Technological Education Program is dedicated to increasing participation by women and minorities in engineering technology), though the results were mixed in improving diversity. Efforts have focused on improving the math and science preparation of girls and members of underrepresented minorities in middle and high school. These efforts have resulted in a slight increase in the diversity of students pursuing engineering degrees; however, women and minorities are more likely to leave the field once they experience the culture of the engineering workforce during internships or early employment experiences (Silbey 2016).

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STATEMENT OF INDEPENDENCE

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