

# ENERGY TECHNOLOGY (ENRT)

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## **ENRT 101. Introduction to Energy Technology**

Credits: 3

An introduction to various sectors of energy industry. Students will learn about a variety of energy facilities including fossil fuel power plants, petroleum refineries, ethanol and biodiesel facilities, gasification plants, wind farms, geothermal and hydro power production facilities, natural gas processing facilities, petroleum production, water and wastewater treatment and others. The role of the technician in these facilities will be a focus, as will be the expectations and culture of the industry.

## **ENRT 103. Applied Math**

Credits: 3

Typically Offered: FASPSU

This course will teach basic math skills and apply them to energy industry situations. Students will learn the metric system, basic volume and area calculations as well as algebra and trigonometry and how they apply to industry specific situations.

## **ENRT 104. Electrical Fundamentals**

Credits: 3

This course covers basic direct current theories and applies those to the electrical system and related equipment. Students will also study basic DC circuit calculations. This course will also cover basic alternating current theories and apply those theories to electrical systems and related equipment. Students will study various methods of producing a voltage. Students will also study essential generator and motor design, construction and operating principles.

## **ENRT 105. Safety, Health and Environment**

Credits: 3

This course covers the personal protective equipment and proper safe work practices and procedures commonly used in the energy industry. Students will also gain a working knowledge of standard safety, health and environmental practices and regulations set by various government entities.

## **ENRT 106. DC Fundamentals**

Credits: 2

Typically Offered: FASPSU

This course covers basic direct current theory and application. Students will study methods of producing direct current voltage, including batteries, and magnetic fields. Students will learn to calculate voltage, current, resistance, and power in series, parallel, and combination DC circuits. The construction and operation of rotating DC machines including DC generators and DC motors will also be covered.

## **ENRT 107. Mechanical Fundamentals**

Credits: 3

Typically Offered: FALL

This course introduces mechanical concepts commonly found in a plant setting. Topics covered include hand tools, power tools, piping, valves, steam traps and strainers. In addition, pumps, compressors, drivers, fans and rotating equipment are covered. Hydraulics, bearings, seals and lubrication are a focus in this course, as well as heat exchanger designs. Plant terminology and operator expectations are covered.

## **ENRT 108. AC Fundamentals**

Credits: 3

Typically Offered: FASPSU

This course covers basic alternating current theories and applies those theories to electrical systems and related equipment. Students will also study basic generator and motor design, construction and operation principles.

## **ENRT 110. Plant Equipment and Systems**

Credits: 4

Typically Offered: FALLSPR

This course provides an introduction to equipment used in the power, process and renewable industries. Valves, piping, pumps, compressors, generators, turbines, motors, lubrication systems, heat exchangers, furnaces, boilers, cooling towers, separators, reactors, and distillation columns are covered. The utilization of this equipment within systems will be covered.

## **ENRT 112. Print Reading**

Credits: 3

This course covers schematics, prints, and piping and instrument diagrams used in various industries. Students will learn how to read and interpret block and single-line diagrams, which will prepare them for the logic and electrical schematics included in this course.

## **ENRT 116. Instrumentation and Control**

Credits: 4

This course provides a comprehensive study of instrumentation components, control theory, control systems and typical controllers associated with the operation of energy facilities.

**ENRT 117. Technical Communication**

Credits: 3

Typically Offered: FASPSU

In this course, students will learn the proper writing techniques used within the industry through practical industrial writing scenarios such as safety incident, work order request, equipment log and compliance report. In addition, students will study the appropriate interpersonal skills needed to communicate effectively with coworkers and customers including resolving on the job conflicts and establishing positive working relationships. Students will also learn what is considered acceptable behavior in the workplace and how to recognize unacceptable behaviors.

**ENRT 118. Heat Transfer, Fluid Flow & Thermodynamics**

Credits: 3

Students enrolled in this course will study heat transfer, fluid flow and the conservation of energy. Specific equipment design considerations based on thermodynamic principles will be covered.

**ENRT 120. Water Purification and Treatment**

Credits: 3

This course covers industrial water treatment processes. Students will study boiler water treatment, raw water treatment and the design and operation of ion exchangers. The course also covers cooling water treatment equipment and waste water treatment equipment and systems.

**ENRT 122. Industrial Composition and Communication**

Credits: 4

Typically Offered: FASPSU

In this course, students will learn the proper writing techniques used within the industry through practical industrial writing scenarios such as filling out work request orders, equipment logs and electrical switching orders. In addition, students will study the appropriate interpersonal skills needed to communicate effectively with co-workers and customers including resolving on-the-job conflicts and establishing positive working relationships. Students will also learn what is considered acceptable behavior in the workplace and how to recognize unacceptable behaviors.

**ENRT 205. Steam Generation**

Credits: 3

In this course the various types of boilers, systems, components and auxiliary systems associated with steam generators are covered. Different designs of boilers will be covered including low/high pressure, fire tube/water tube, negative/positive draft, drum type and others. Boiler operation, combustion, safety and emission control equipment will be covered along with efficiency measures.

**ENRT 215. Operations, Troubleshooting & Communications**

Credits: 3

Students will gain the knowledge necessary to comprehend overall plant operations and respond to abnormal operating conditions. Students also will participate in root cause analysis exercises while troubleshooting different operating scenarios. This course provides instruction in the different types of troubleshooting techniques, procedures, and methods used to solve process problems. Students will use existing knowledge of equipment, systems and instrumentation to understand the operation of an entire unit in a facility. Students study concepts related to commissioning, normal startup, normal operations, normal shutdown, turnarounds, and abnormal situations, as well as the process technicians individual and team role in performing tasks associated with these concepts within an operating unit.

**ENRT 220. Practical Applications**

Credits: 2

Students will participate in hands-on lab activities, internships or industry job shadowing to gain entry-level job competencies.

**ENRT 221. Applied Electronics**

Credits: 3

Typically Offered: FASPSU

This course focuses on the electronic components and devices that are critical in the operation of energy, manufacturing and other industrial facilities. Students will understand the function of a variety of devices and how to troubleshoot them.

**ENRT 224. Automation and Control**

Credits: 3

Typically Offered: FASPSU

This course includes an in depth study of discrete motor control devices and the assembly and programming of PLC discrete input and output modules. The application of these devices in energy and industrial environments is included. Understanding of real world control systems and student constructed systems is part of this course. Some of the equipment covered is switches, relays, contactors, motor starters, control transformers, discrete input devices, electronic input devices, and PLCs (Programmable Logic Controllers).

**ENRT 230. Power System SCADA**

Credits: 3

Typically Offered: FASPSU

This course introduces the theories, design and application of Supervisory Control and Data Acquisition (SCADA) systems. Topics include equipment, system configuration, data communication systems, and SCADA security.

**ENRT 240. Industrial SCADA**

Credits: 3

Typically Offered: FASPSU

An introduction to the design, assembly, programming and operation of Supervisory Control and Data Acquisition (SCADA) systems, including Human Interface (HMI) systems. Wiring and networking of programmable controllers to SCADA software and an HMI device is one part of this course. SCADA system application, operation and troubleshooting in manufacturing and energy sectors is included.