

## Practicum in Energy

PEIMS Code: N1303910

Abbreviation: PRACENRG

Grade Level(s): 11-12

Award of Credit: 2.0

### State Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to [TAC §74.13](#) for guidance on endorsements.

### Course Description:

The *Practicum in Energy* course gives students the opportunity to apply what they have learned in the classroom in a real-world setting designed to prepare students for occupations in the Oil and Gas, Refinery, and Renewable Natural Resources industries. In this course, students will learn how to communicate in the field and work safely in a variety of situations and environments common in the Energy occupations. Students will also learn about the energy balance, the distribution of power, the technology used in the field, and the regulations and environmental impact of the industry. Practicum experiences occur in a paid or unpaid arrangement and a variety of locations appropriate to the nature and level of the student's need for work-based learning experience. Students implement personal and interpersonal skills to strengthen individual performance in the workplace and in society and to make a successful transition to the workforce or postsecondary education.

### Essential Knowledge and Skills:

- (a) General Requirements. This course is recommended for students in grades 11 or 12. Recommended prerequisites: At least one of the following courses *Oil and Gas Production II/Lab, Occupational Safety and Environmental Technology I, Oil and Gas Production III, Occupational Safety and Environmental Technology II, Career Preparation, Oil and Gas Production IV, Introduction to Process Technology, Introduction to Instrumentation and Electrical, Petrochemical Safety, Health, and Environment, Advanced Instrument and Electrical, AC/DC Electronics, Introduction to Renewable Energy, Energy and Natural Resources Technology/Lab, Environmental Sustainability (PLTW), Solid State Electronics, Scientific Research and Design or Digital Electronics*. Students shall be awarded two credits for successful completion of this course.

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### (b) Introduction.

- (1) Career and technical education instruction provide content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
- (2) The Practicum of Energy course is in the Energy and Science, Technology, Engineering and Mathematics career cluster and serves as a work-based learning course for the oil and gas exploration and production, refining and chemical processes and/or renewable energy.
- (3) The Practicum in Energy course gives students the opportunity to apply what they have learned in the classroom in a real-world setting designed to prepare students for occupation in the oil and gas, refinery and renewable natural resources industries. In this course, students will learn how to communicate in the field and work safely in a variety of situations and environments common in the energy occupations. Students will also learn about the energy balance, the distribution of power, the technology used in the field and the regulations and environmental impact of the industry.
- (4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations, meetings with local chamber of commerce, and with industry specific to the oil and gas exploration and production, refining and chemical production and renewable energy.
- (5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

### (c) Knowledge and Skills.

- (1) The student demonstrates professional standards/employability skills required by the energy industry. The student is expected to:
  - (A) participate in a paid or unpaid, laboratory or work-based application of previously studied knowledge and skills related to energy;
  - (B) communicate effectively with others using oral and written skills;
  - (C) demonstrate collaboration skills through teamwork;
  - (D) demonstrate professionalism by conducting oneself in a manner appropriate for the profession and workplace;
  - (E) demonstrate a positive, productive work ethic by performing assigned tasks as directed;
  - (F) comply with all applicable rules, laws, and regulations;
  - (G) demonstrate time-management skills by prioritizing tasks, following schedules, and tending to goal-relevant activities in a way that uses time wisely and optimizes efficiency and results; and
  - (H) demonstrate the ability to write and understand Specific, Measurable, Attainable, Relevant and Timely (SMART) goals.
- (2) The student demonstrates leadership and teamwork skills to accomplish goals and objectives. The student is expected to:

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- (A) analyze leadership characteristics in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation;
  - (B) demonstrate teamwork skills through working cooperatively with others to achieve tasks;
  - (C) demonstrate teamwork processes that promote team-building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution;
  - (D) demonstrate responsibility for shared group and individual work tasks;
  - (E) establish and maintain effective working relationships in order to accomplish objectives and tasks;
  - (F) demonstrate effective working relationships using interpersonal skills in order to accomplish objectives and tasks;
  - (G) negotiate and work cooperatively with others using positive interpersonal skills; and
  - (H) demonstrate respect for individuals, including those from different cultures, genders, and backgrounds, and value for diversity.
- (3) The student demonstrates safety practices in all areas, in which they are exposed. The student is expected to:
- (A) demonstrate the use of personal protective equipment (PPE);
  - (B) comply with general safety procedures as delineated by the company and industry;
  - (C) demonstrate specific safety practices for each assigned task;
  - (D) identify critical hazards and safety processes using job safety analysis (JSA) worksheet to;
  - (E) describe procedures for reporting safety near misses or event;
  - (F) define emergency response roles and required actions;
  - (G) review and demonstrate Occupational Safety and Health Administration (OSHA) standards for the industry; and
  - (H) describe and demonstrate each phase of the Health Safety and Environment Management System, including the four steps of plan, do, assess, and adjust.
- (4) Demonstrate and explain the procedures of industrial hygiene, such as exposure to toxic or hazardous materials. The student explains the processes of energy balances. The student is expected to:
- (A) investigate and calculate quantities using the work-energy theorem in various situations using the laws of conservation of energy and momentum;
  - (B) investigate examples of kinetic and potential energy and their transformations;
  - (C) calculate the mechanical energy of power generated within, impulse applied to, and momentum of a physical system;
  - (D) demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension; and

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- (E) explain everyday examples that illustrate the four laws of thermodynamics and the processes of thermal energy transfer.
- (5) Investigate and apply the energy-balance principles to given situations such as open system fluid circuit, closed system fluid circuits; heat added or removal systems (thermodynamic processes); and heat cycle efficiency. The student explains the regulations and environmental impact in the energy industry. The student is expected to:
- (A) summarize how OSHA regulates the industry;
  - (B) describe the role of Texas Railroad Commission in the regulation of the industry;
  - (C) explain the role the Texas Commission on Environmental protection and the Quality Texas Commission on Environmental Quality (TCEQ) standards has in the regulation of the industry;
  - (D) analyze the concepts of eminent domain, royalty payments, landowner rights regarding the oil and gas industry; and
  - (E) explain the role of (ERCOT) in the regulation and the distribution of power.
- (6) The student identifies the basic systems and the required components used in the oil and gas, refining and/or renewable energy. The student is expected to:
- (A) identify and explain drilling performance including performance planning;
  - (B) identify and explain gas and oil well site management such as well site logistics management;
  - (C) identify and explain wellbore integrity such as drilling phase;
  - (D) identify and explain shale environments such as unconventional shale operations; and
  - (E) identify and explain mobilization/demobilization such as site preparation for rig move.
- (7) The student explains the distribution of energy, including Upstream, Midstream, and Downstream. The student is expected to:
- (A) define and illustrate the role of the upstream operations in the energy industry;
  - (B) define and illustrate the role of the midstream operations in the energy industry;
  - (C) define and illustrate the role of the downstream operations in the energy industry; and
  - (D) define and illustrate the role of the transportation, distribution, and logistics systems in the energy industry.
- (8) The student develops knowledge of the technology used in the field. The student is expected to:
- (A) demonstrates proficiency in business application platforms, directories, file, management, sorting, and searching;
  - (B) demonstrate computer information technology skills in networking, networking navigation, and programming;

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- (C) identify the basic components of electrical systems and circuits used in the industry;
  - (D) demonstrate knowledge of Ohm's Law and other critical principles of electronics and electricity; and
  - (E) discuss the basics of small engines repair and diesel technology, internal combustion engines, and electrical motors.
- (9) The student explores the careers available in the energy industry. The students are expected to:
- (A) research and report on the employment opportunities in the energy industry that require a high school diploma, an associate's degree, a bachelor's degree or a master's degree; and
  - (B) research and report on the employment opportunities in the upstream, midstream, and downstream energy industry.
- (10) The student explains the business practices and economic principles of the energy industry. The students are expected to:
- (A) demonstrate proficiency in business acumen;
  - (B) demonstrate knowledge of the energy industry market;
  - (C) demonstrate the financial skills related to project management in the energy industry;
  - (D) identify and explain trends in the energy industry market; and
  - (E) create a strategic prospective business plan for a small business in the oil, gas, or natural resource industry.

### Recommended Resources and Materials:

- NCCER (2011). Alternative Energy Trainee Guide (1<sup>st</sup> ed.). Alachua, FL: Pearson.
- NCCER (2017). Introduction to the Pipeline Industry Trainee Guide (3<sup>rd</sup> ed.). Alachua, FL: Pearson.
- NCCER (2017). Pipeline Maintenance and Mechanical Level 1 Trainee Guide (3<sup>rd</sup> ed.). Alachua, FL: Pearson.
- NCCER (2011). Power Line Worker Trainee Guide (1<sup>st</sup> ed.). Alachua, FL: Pearson.
- NCCER (2011). Wind Energy Trainee Guide (1<sup>st</sup> ed.). Alachua, FL: Pearson.

### Recommended Course Activities:

- Visit a refinery or chemical processing plant and report on career opportunities in the industry.
- Create a resume.
- Research the environmental impact of using Renewable Energy resources such as: wind and solar.
- Use regional labor market information to identify careers in oil and gas exploration and production in your region and the state.
- Research the transportation, distribution, and logistics of delivering power across the state and nation.
- Create a Training Plan between the employer, student, and district.

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### Suggested methods for evaluating student outcomes:

- Employer evaluations
- Approved training plan
- Career portfolio
- Test/quizzes
- Research projects

### Teacher qualifications:

An assignment for the Practicum in Energy course is allowed with one of the following certificates.

- Agriculture, Food, and Natural Resources: Grades 6-12
- Agricultural Science and Technology: Grades 6-12
- Any vocational agriculture certificate
- Trade and Industrial Education: Grades 6-12 This assignment requires appropriate work approval
- Trade and Industrial Education: Grades 8-12. This assignment requires appropriate work approval
- Vocational Trades and Industry This assignment requires appropriate work approval.
- Secondary Industrial Arts: Grades 6-12
- Secondary Industrial Technology: Grades 6-12
- Technology Education: Grades 6-12
- Mathematics/Physical Science/Engineering: Grades 8-12
- Any business or office education certificate.
- Business and Finance: Grades 6-12.
- Business Education: Grades 6-12.

### Additional information: