# Oil & Gas Production III

Subject: Career Development and Career and Technical Education
Grade: 11
Expectations: 26
Breakouts: 73

(a) Introduction.

1. Career and technical education instruction provides 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 Energy Career Cluster focuses on Texas's diverse economic landscape, geography and natural resources, including renewable energy potential, transportation system, labor force, and leadership in environmental research.
3. In Oil and Gas Production III, students will gain knowledge of hydraulic and pneumatic systems and skill requirements to work in oil and gas and related industries. Students complete an advance core curriculum that includes hydraulic and pneumatic systems involved in oil and gas production. This program is designed to train students in all areas of down and mid-stream operation skills.
4. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
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.

(b) Knowledge and Skills Statements

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify career development, education, and entrepreneurship opportunities in the oil and gas production field;

(i) identify career development opportunities in the oil and gas production field

(ii) identify education opportunities in the oil and gas production field

(iii) identify entrepreneurship opportunities in the oil and gas production field

(B) identify careers in oil and gas production with required aptitudes in science, technology, engineering, mathematics, language arts, and/or social studies;

(i) identify careers in oil and gas production with required aptitudes in science, technology, engineering, mathematics, language arts, and/or social studies

(C) apply technology skills to create an electronic portfolio of skills and abilities;

(i) apply technology skills to create an electronic portfolio of skills

(ii) apply technology skills to create an electronic portfolio of abilities

(D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation;

(i) apply competencies related to resources

(ii) apply competencies related to information

(iii) apply competencies related to interpersonal skills

(iv) apply competencies related to problem solving

(v) apply competencies related to critical thinking

(vi) apply competencies related to systems of operation

(E) demonstrate knowledge of personal and occupational safety, health, environmental regulations, and first-aid policy in the workplace; and

(i) demonstrate knowledge of personal safety policy in the workplace

(ii) demonstrate knowledge of occupational safety policy in the workplace

(iii) demonstrate knowledge of personal health policy in the workplace

(iv) demonstrate knowledge of occupational health policy in the workplace

(v) demonstrate knowledge of personal environmental regulations policy in the workplace

(vi) demonstrate knowledge of occupational environmental regulations policy in the workplace

(vii) demonstrate knowledge of personal first-aid policy in the workplace

(viii) demonstrate knowledge of occupational first-aid policy in the workplace

(2) The student identifies the importance of oil field hydraulics and its contributions to the oil and gas industry. The student is expected to:

(A) identify companies that contributed to oil field hydraulics and fracturing and discuss those contributions;

(i) identify companies that contributed to oil field hydraulics

(ii) identify companies that contributed to oil field fracturing

(iii) discuss [the] contributions [of companies that contributed to oil field hydraulics]

(iv) discuss [the] contributions [of companies that contributed to oil field fracturing]

(B) explain the history of hydraulic fracturing and its importance to the oil field industry and the process of producing wells in North America;

(i) explain the history of hydraulic fracturing

(ii) explain [the] importance [hydraulic fracturing] to the oil field industry

(iii) explain the process of producing wells in North America

(C) describe the impact of hydraulics on energy in North America; and

(i) describe the impact of hydraulics on energy in North America

(D) explain the impact on new oil and natural gas production in North America as it relates to technology.

(i) explain the impact on new oil production in North America as it relates to technology

(ii) explain the impact on new natural gas production in North America as it relates to technology

(3) The student demonstrates an understanding of pneumatics and hydraulics and their significance and application in the petroleum engineering industry. The student is expected to:

(A) describe and define the basic functional components of the pneumatic system and the function of a pneumatic schematic;

(i) describe the basic functional components of the pneumatic system

(ii) define the basic functional components of the pneumatic system

(iii) describe the function of a pneumatic schematic

(iv) define the function of a pneumatic schematic

(B) explain pneumatic pressure and identify its unit of measure during application procedures;

(i) explain pneumatic pressure

(ii) identify [pneumatic pressure's] unit of measure during application procedures

(C) explain the importance of a hydraulic system and identify the hydraulic system's five basic components (hydraulic pump, control valves, actuators, reservoir, and accumulators), including the hydraulic system's significance in the petroleum engineering industry; and

(i) explain the importance of a hydraulic system, including the hydraulic system's significance in the petroleum engineering industry

(ii) identify the hydraulic system's five basic components (hydraulic pump)

(iii) identify the hydraulic system's five basic components (control valves)

(iv) identify the hydraulic system's five basic components (actuators)

(v) identify the hydraulic system's five basic components (reservoir)

(vi) identify the hydraulic system's five basic components (accumulators)

(D) define hydraulics and identify its unit of measure during application procedures.

(i) define hydraulics

(ii) identify [hydraulics'] unit of measure during application procedures

(4) The student explains and demonstrates the six pneumatic safety rules and the importance of the rules in the petroleum industry. The student is expected to:

(A) explain the six pneumatic safety rules, including wearing safety glasses when building and operating pneumatics, keeping fingers clear of piston rods, never blowing compressed air at anyone, not turning the main air supply on until a circuit is connected, turning the air off if air is leaking from a joint, and turning the air off before altering a circuit;

(i) explain the six pneumatic safety rules, including wearing safety glasses when building pneumatics

(ii) explain the six pneumatic safety rules, including wearing safety glasses when operating pneumatics

(iii) explain the six pneumatic safety rules, including keeping fingers clear of piston rods

(iv) explain the six pneumatic safety rules, including never blowing compressed air at anyone

(v) explain the six pneumatic safety rules, including not turning the main air supply on until a circuit is connected

(vi) explain the six pneumatic safety rules, including turning the air off if air is leaking from a joint

(vii) explain the six pneumatic safety rules, including turning the air off before altering a circuit

(B) demonstrate safety precaution measures in pneumatics and discuss the importance of safety equipment during this process; and

(i) demonstrate safety precaution measures in pneumatics

(ii) discuss the importance of safety equipment during [the pneumatic] process

(C) demonstrate and explain the importance of a pressure regulator in pneumatics, including the historical significance.

(i) demonstrate the importance of a pressure regulator in pneumatics, including the historical significance.

(ii) explain the importance of a pressure regulator in pneumatics, including the historical significance.

(5) The student demonstrates an understanding of basic cylinder circuits and pneumatic cylinder circuits and their significance and applications in the petroleum engineering industry. The student is expected to:

(A) explain the functions of the operation of a double acting pneumatic cylinder and each of its functions;

(i) explain the functions of the operation of a double acting pneumatic cylinder

(ii) explain each of [double acting pneumatic cylinder's] functions

(B) describe the operation of five-way three-position directional control valves (DCV);

(i) describe the operation of five-way three-position directional control valves (DCV)

(C) describe the function of a pneumatic quick-connect fitting; and

(i) describe the function of a pneumatic quick-connect fitting

(D) demonstrate how to safely connect the pneumatic circuit with a quick-connect fitting.

(i) demonstrate how to safely connect the pneumatic circuit with a quick-connect fitting

(6) The student understands the impact of a hydraulic schematic in oil field applications. The student is expected to:

(A) describe ISO symbols and appropriately use them to draw a hydraulic schematic; and

(i) describe ISO symbols

(ii) appropriately use [ISO symbols] to draw a hydraulic schematic

(B) create a hydraulic schematic.

(i) create a hydraulic schematic

(7) The student identifies the principles of hydraulic pressure and flow and discusses the basic hydraulic cylinder circuits and their application. The student is expected to:

(A) calculate the force output of an extending cylinder and the retraction force of a cylinder;

(i) calculate the force output of an extending cylinder

(ii) calculate the retraction force of a cylinder

(B) explain the relevance of Pascal's Law to hydraulics;

(i) explain the relevance of Pascal's Law to hydraulics

(C) identify and discuss hydraulic motors and pumps; and

(i) identify hydraulic motors

(ii) identify hydraulic pumps

(iii) discuss hydraulic motors

(iv) discuss hydraulic pumps

(D) identify hydraulic cylinders and their impact on single and double acting circuits.

(i) identify hydraulic cylinders

(ii) identify [hydraulic cylinders'] impact on single acting circuits

(iii) identify [hydraulic cylinders'] impact on double acting circuits