

## **COURSE ENR2020: CONVENTIONAL OIL/GAS 1 (RESOURCE EXPLORATION)**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students examine specific exploration techniques and technologies within the context of Alberta's conventional oil and/or gas deposits, and they describe related career opportunities.

**Parameters:** Access to government and industry organizations involved in the exploration of conventional oil and gas deposits (e.g., Alberta Energy and Utilities Board, Petroleum Communication Foundation, local industry).

This module requires off-campus learning experiences and should be combined with relevant work study, work experience and/or modules from the Career Transitions strand; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Courses:** ENM1020: Nonrenewable Resources  
CTR1010: Safety Systems and Career Planning [Career Transitions Strand]; recommended for off-campus learning.

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific exploration sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

**Outcomes:** The student will:

- 1. demonstrate knowledge of current and emerging technologies used in the exploration of conventional oil and gas deposits**
  - 1.1 define what constitutes conventional oil and gas deposits
  - 1.2 explain basic theories and/or principles regarding the formation and migration of conventional underground oil and gas deposits
  - 1.3 gather information regarding both known and probable reserves of oil and gas in major sedimentary basin areas of Canada
  - 1.4 illustrate subsurface rock structures capable of trapping oil and gas deposits; e.g., anticlinal trap, fault trap, stratigraphic trap, reef trap, salt domes
  - 1.5 research current and emerging applications used to identify sedimentary basins likely to contain petroleum deposits; e.g., aerial surveys and satellite imagery (3-D scanning; measurement of magnetic fields, gravity, and radiation) and other technological applications
  - 1.6 describe steps taken to gather further information about subsurface rock formations within a basin prior to seismic and/or drilling operations; e.g., first-hand observation of outcrop geology and surface features, review of existing information such as

- government reports and other published papers, use of cuttings and cores to determine subsurface rock properties
- 1.7 research current and emerging theories and applications of seismic technology in mapping potential oil and gas-bearing formations; e.g., steps taken during seismic exploration, data processing, 2-D and 3-D analysis of sedimentary structures
  - 1.8 research current and emerging applications of drilling technology in determining the composition of subsurface rock and the presence of oil and gas deposits; e.g., drill rig components, drilling techniques (directional, horizontal and underbalanced), logging and testing procedures
  - 1.9 explain environmental assessment and management practices conducted by industry throughout exploration operations; e.g.: AEUB policies and guidelines, water, soil and wildlife impact studies, management plans, reclamation techniques, environmental standards and safe operating procedures
  - 1.10 describe technological advances used to address environmental concerns throughout the exploration process; e.g.: seismic technology, horizontal drilling, use of helicopters/packhorses, disposal of drilling fluids, and land surface restoration
- 2. interpret sample seismic log data and well logs in order to predict the nature and extent of a hydrocarbon deposit**
    - 2.1 explain basic terminology and methodology used in seismic line analysis
    - 2.2 given sample seismic line data, make predictions regarding the presence of hydrocarbon-bearing rock structures
    - 2.3 explain basic terminology and methodology used in geological log analysis
    - 2.4 given sample well log data, make predictions regarding the presence of a hydrocarbon deposit; e.g.: type and thickness of rock layers, speed of penetration.
    - 2.5 research the use of wireline tools; seismic line and well log data; to estimate the potential volume of a hydrocarbon deposit; e.g.: thickness, porosity and permeability, fluid composition of rock formations.
  - 3. demonstrate basic competencies**
    - 3.1 demonstrate fundamental skills to:
      - 3.1.1 communicate
      - 3.1.2 manage information
      - 3.1.3 use numbers
      - 3.1.4 think and solve problems
    - 3.2 demonstrate personal management skills to:
      - 3.2.1 demonstrate positive attitudes and behaviours
      - 3.2.2 be responsible
      - 3.2.3 be adaptable
      - 3.2.4 learn continuously
      - 3.2.5 work safely
    - 3.3 demonstrate teamwork skills to:
      - 3.3.1 work with others
      - 3.3.2 participate in projects and tasks
  - 4. identify possible life roles related to the skills and content of this cluster**
    - 4.1 recognize and then analyze the opportunities and barriers in the immediate environment
    - 4.2 identify potential resources to minimize barriers and maximize opportunities

**COURSE ENR2030: NON-CONVENTIONAL HYDROCARBONS (RESOURCE EXPLORATION)**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students examine specific exploration techniques and technologies within the context of Alberta's oil sands, heavy oil, non-conventional methane or coal deposits, and they describe related career opportunities.

**Parameters:** Access to government and industry organizations involved in the exploration of nonconventional hydrocarbon resources (e.g., Fort McMurray Oil Sands Interpretive Centre, Western Research Centre).

This module requires off-campus learning experiences and should be combined with relevant work study, work experience and/or modules from the Career Transitions strand; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Courses:** ENR1020: Nonrenewable Resources  
CTR1010: Safety Systems and Career Planning [Career Transitions Strand] recommended for off-campus learning

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific exploration sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C of this Guide for further information regarding student safety.

**Outcomes:** The student will:

- 1. demonstrate knowledge of current and emerging technologies used in the exploration of non-conventional hydrocarbons**
  - 1.1 define non-conventional hydrocarbons and give examples; e.g., oil sands (bitumen), heavy oil, non-conventional methane (coalbed methane, methane hydrates, tight gas sands, shale gas) and coal deposits
  - 1.2 explain basic theories and/or principles regarding the origin and formation of one or more non-conventional hydrocarbon deposits in Alberta; e.g., theories of origin/formation, surface and subsurface geology, source rock and migration, the difference between porosity and permeability
  - 1.3 identify major geographical areas of Alberta in which bitumen, heavy oil, non-conventional methane and coal deposits are located, and relate geographic patterns to theories of origin
  - 1.4 compare and contrast physical and chemical characteristics of bitumen, heavy oil, conventional oil and coal

- 1.5 compare known reserves of energy stored in oil sands and coal to known reserves of energy available through other fossil fuels; e.g., in Alberta, in Canada, in the world
  - 1.6 describe the types of reserves (proved, probable, and established) and techniques used to estimate Alberta's recoverable bitumen, heavy oil, non-conventional methane, or coal; e.g., volumetric method, materials balance method, production decline curve method
  - 1.7 illustrate surface and subsurface rock structures capable of containing oil sands, heavy oil or coal deposits
  - 1.8 research current and emerging applications used to locate non-conventional hydrocarbon deposits; e.g., aerial surveys and satellite imagery (3-D scanning; measurement of magnetic fields, gravity, and radiation) and other technological applications
  - 1.9 describe steps taken to gather further information about potential oil- or coal-bearing formations prior to seismic and drilling operations; e.g., first-hand observation of outcrop geology and surface features, review of geological reports and other published papers, use of cuttings and cores
  - 1.10 research current and emerging theories and applications of seismic technology in mapping and analysis of potential oil- and coal-bearing formations; e.g., steps taken during seismic exploration, data processing, 2-D and 3-D analysis of sedimentary structures
  - 1.11 research current and emerging applications of drilling or other exploration technology in determining the composition of subsurface rock and establishing the presence of non-conventional hydrocarbon deposits e.g., drill rig components, drilling techniques (directional, horizontal and underbalanced), logging and testing procedures
  - 1.12 explain environmental assessment and management practices conducted by industry throughout exploration operations; e.g., AEUB policies and guidelines, water, soil and wildlife impact studies, management plans, reclamation techniques, environmental standards and safe operating procedures
  - 1.13 describe technological advances used to address environmental concerns throughout the exploration process; e.g., seismic technology, horizontal drilling, use of helicopters/packhorses, disposal of drilling fluids, and land surface restoration
- 2. explain applications of low-depth drilling and log analysis in predicting the nature and extent of an oil sands, heavy oil, non-conventional methane or coal deposit**
- 2.1 explain basic terminology and methodology used in low-depth drilling and core analysis
  - 2.2 given assays or samples, make predictions regarding the extent and grade of an oil sands, heavy oil, methane or coal deposit; e.g., combustibility, sulfur content, toxic chemical content, coal hardness
  - 2.3 explain basic terminology and methodology used in geological log analysis; e.g., wireline logs, seismic logs
  - 2.4 given sample log data from a bore hole, make predictions regarding the extent and grade of an oil sands, heavy oil, methane or coal deposit
  - 2.5 describe hydrocarbon content necessary to make a nonconventional hydrocarbon deposit economically viable; e.g., percentage of bitumen, percentage of methane, rank of coal
- 3. demonstrate basic competencies**
- 3.1 demonstrate fundamental skills
    - 3.1.1 communicate
    - 3.1.2 manage information to:
    - 3.1.3 use numbers

- 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
  - 3.2.1 demonstrate positive attitudes and behaviours
  - 3.2.2 be responsible
  - 3.2.3 be adaptable
  - 3.2.4 learn continuously
  - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
  - 3.3.1 work with others
  - 3.3.2 participate in projects and tasks
- 4. identify possible life roles related to the skills and content of this cluster**
  - 4.1 recognize then analyze the opportunities and barriers in the immediate environment
  - 4.2 identify potential resources to minimize barriers and maximize opportunities

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**COURSE ENR2040: METALS/NONMETALS 1 (RESOURCE EXPLORATION)**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students examine specific exploration techniques and technologies within the context of a metallic and/or nonmetallic mineral deposit, and they describe related career opportunities.

**Parameters:** Access to government and industry organizations involved in the exploration of metallic and/or non-metallic minerals.

This module requires off-campus learning experiences and should be combined with relevant work study, work experience and/or modules from the Career Transitions strand; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Courses:** ENR1020: Nonrenewable Resources  
CTR1010: Safety Systems and Career Planning [Career Transitions Strand]; recommended for off-campus learning

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific exploration sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C of this Guide for further information regarding student safety.

**Outcomes:** The student will:

**1. demonstrate knowledge of current and emerging technologies used in the exploration of economic mineral deposits**

- 1.1 describe which mineral deposits in Alberta may have economic value and explain why
- 1.2 explain basic theories and/or principles regarding the origin and formation of metallic and nonmetallic minerals and structural materials in Alberta
- 1.3 illustrate surface and subsurface rock structures in which metallic and industrial minerals are commonly found
- 1.4 describe the mineral potential of major geological areas of Alberta; e.g., Precambrian Shield, Interior Plains, Foothills, Rocky Mountains
- 1.5 identify geographical areas of Alberta in which occurrences of specific minerals are known to exist, and relate geographic and distribution patterns to theories of origin
- 1.6 explain possible reasons why the potential of the minerals industry in Alberta has not been fully established, nor have known deposits of industrial and metallic minerals been fully developed
- 1.7 research current and emerging applications used in prospecting, mapping, and analyzing metallic and non-metallic mineral deposits; e.g.: aerial surveys and satellite imagery (3-D scanning; electromagnetics; measurement of magnetic fields,

- gravity, and radioactivity), seismic surveys, geochemical analysis of soils and other technological applications
- 1.8 describe steps taken to gather further information about potential mineral-bearing formations prior to seismic mapping and/or drilling operations; e.g., first-hand observation of outcrop geology and surface features, review of geological reports and other published papers
  - 1.9 research current and emerging applications of drilling technology in determining the composition of subsurface rock and establishing the presence of mineral deposits; e.g., drill rig components, drilling techniques (directional, horizontal and underbalanced), logging and testing procedures
  - 1.10 summarize recent developments in Alberta regarding gold, diamonds and base-metals
  - 1.11 explain environmental assessment and management practices conducted by industry throughout exploration operations; e.g., legislative policies and guidelines, water, soil and wildlife impact studies, management plans, reclamation techniques, environmental standards and safe operating procedures
  - 1.12 describe technological advances used to address environmental concerns throughout the exploration process; e.g., seismic technology, horizontal drilling, use of helicopters/packhorses, disposal of drilling fluids, and land surface restoration
- 2. interpret geological logs in order to predict the nature and extent of a metallic or nonmetallic mineral deposit**
- 2.1 explain basic terminology and methodology used in core analysis
  - 2.2 given assays or samples, make predictions regarding the extent and grade of a mineral deposit
  - 2.3 explain basic terminology and methodology use in geological log interpretation; e.g., wireline logs, seismic logs
  - 2.4 given sample log data from a bore hole, make predictions regarding the extent and grade of a mineral deposit
- 3. demonstrate basic competencies**
- 3.1 demonstrate fundamental skills to:
    - 3.1.1 communicate
    - 3.1.2 manage information
    - 3.1.3 use numbers
    - 3.1.4 think and solve problems
  - 3.2 demonstrate personal management skills to:
    - 3.2.1 demonstrate positive attitudes and behaviours
    - 3.2.2 be responsible
    - 3.2.3 be adaptable
    - 3.2.4 learn continuously
    - 3.2.5 work safely
  - 3.3 demonstrate teamwork skills to:
    - 3.3.1 work with others
    - 3.3.2 participate in projects and tasks
- 4. identify possible life roles related to the skills and content of this cluster**
- 4.1 recognize then analyze the opportunities and barriers in the immediate environment
  - 4.2 identify potential resources to minimize barriers and maximize opportunities

## COURSE ENR2060: REFINING HYDROCARBONS

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students examine the principles and technologies involved in processing natural gas, refining crude oil, upgrading heavy oils and bitumen, or processing coal. Students also describe related career opportunities.

**Parameters:** Access to a hydrocarbon refining industry  
Access to a science laboratory.

This module requires off-campus learning experiences and should be combined with relevant work study, work experience and/or modules from the Career Transitions strand; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Courses:** ENR1060: Consumer Products & Services  
CTR1010: Safety Systems and Career Planning [Career Transitions Strand]; recommended for off-campus learning.

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific processing sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C of this Guide for further information regarding student safety.

**Outcomes:** The student will:

- 1. explain techniques used to process natural gas, refine crude oil, upgrade heavy oils and bitumen, or process coal**
  - 1.1 describe relatively simple field facilities used to prepare a raw hydrocarbon for further processing and/or refining in the upstream sector; e.g., cleaning, separating, upgrading
  - 1.2 research more sophisticated techniques and technologies used in the upstream sector to process natural gas, refine crude oil, upgrade heavy oil and bitumen, or process coal; e.g., removal of contaminants and/or impurities conversion into saleable products, manufacture of petrochemicals
  - 1.3 explain reasons for sulphur recovery throughout processing, refining and/or upgrading processes; e.g., to sweeten product for industrial and residential use, to produce elemental sulphur, to maintain environmental standards
  - 1.4 create a simplified representation of a processing, refining or upgrading facility
  - 1.5 research and/or investigate the physical and/or chemical properties of a hydrocarbon, and relate these to technologies used for processing, refining or upgrading; e.g., molecular structure; heat content; temperature, pressure, and volume relationships; catalytic reaction

- 1.6 research basic fractionating, cracking and/or reforming processes used within the industry
- 1.7 explain how the hydrocarbon industry uses technology in monitoring, processing, refining or upgrading operations; e.g., Discuss Canada as a world leader in developing technologies for recovering and safely handling sulphur
- 1.8 describe storage facilities and distribution systems within the industry, and their impact on industry location and product costs; e.g., flow charts of storage and distribution systems
- 1.9 explain how management practices conducted by industry throughout processing, refining or upgrading operations are influenced by environmental standards, environmental assessment, and the enforcement of safe operating procedures
- 1.10 describe industry initiatives that respond to environmental concerns; e.g., advances in sulphur recovery technology, development of clean-coal technology, water treatment, waste treatment, emission control
- 1.11 describe industry initiatives that address occupational health and safety requirements; e.g., odour scrubbers, noise suppressants, water purification, personal protective equipment, safety courses, emergency response strategies
- 2. describe commodity inputs and consumer products characteristic of the hydrocarbon processing industry**
  - 2.1 describe the range of products and/or services provided as a result of processing natural gas, refining crude oil, upgrading heavy oils and bitumen, processing coal
  - 2.2 describe inputs to processing within an oil, gas, oil sands or coal industry including raw materials (feedstocks), financial, human and natural resources, technology requirements
  - 2.3 identify factors that influence the nature of a processing or refining industry; e.g., supply of feedstocks and/or other materials, allowable production volumes, access to markets
  - 2.4 explain how the mix of products produced may vary according to market demand; e.g., asphalt for road paving in summer, home heating fuels in winter
  - 2.5 identify environmental and safety concerns that influence practices within a processing or refining industry; e.g., workers and nearby residents; crops, forests, livestock and wildlife, air, soil and water quality
- 3. demonstrate basic competencies**
  - 3.1 demonstrate fundamental skills to:
    - 3.1.1 communicate
    - 3.1.2 manage information
    - 3.1.3 use numbers
    - 3.1.4 think and solve problems
  - 3.2 demonstrate personal management skills to:
    - 3.2.1 demonstrate positive attitudes and behaviours
    - 3.2.2 be responsible
    - 3.2.3 be adaptable
    - 3.2.4 learn continuously
    - 3.2.5 work safely
  - 3.3 demonstrate teamwork skills to:
    - 3.3.1 work with others
    - 3.3.2 participate in projects and tasks
- 4. identify possible life roles related to the skills and content of this cluster**
  - 4.1 recognize then analyze the opportunities and barriers in the immediate environment
  - 4.2 identify potential resources to minimize barriers and maximize opportunities

## **COURSE ENR2070: REFINING ROCKS & MINERALS**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students examine the principles and processes involved in refining an industrial (nonmetallic) mineral or a metallic mineral, and they describe related career opportunities.

**Parameters:** Access to a rock/mineral processing facility

Access to a science laboratory.

This module requires off-campus learning experiences and should be combined with relevant work study, work experience and/or modules from the Career Transitions strand; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Courses:** ENR1060: Consumer Products & Services  
CTR2210: Safety Systems and Career Planning [Career Transitions Strand]; recommended for off-campus learning.

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific processing sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C of this Guide for further information regarding student safety.

**Outcomes:** The student will:

**1. describe commodity inputs and consumer products characteristic of the mineral processing industry**

- 1.1 explain the social, economic and environmental significance of Alberta's rocks and minerals
- 1.2 describe applications of Alberta's industrial (nonmetallic) and metallic minerals; e.g., sand and gravel, cement and lime, peat moss, building stone, gypsum, clay products, sulphur, salt, gold and copper, iron ore, lead and zinc
- 1.3 describe inputs to processing within a mineral industry; e.g., mineral ores or aggregates; financial, human and natural resources; technology requirements
- 1.4 identify factors that influence the nature of a mineral processing industry; e.g., supply of raw materials, allowable production volumes, access to markets
- 1.5 identify environmental and safety concerns that influence practices within a mineral processing industry; e.g., workers and nearby residents; crops, forests, livestock and wildlife; air, soil and water quality

**2. explain techniques used to refine an industrial (nonmetallic) mineral or a metallic mineral**

- 2.1 explain the stages, steps and technologies used in processing an industrial (nonmetallic) or metallic mineral; e.g., milling, dressing and cleaning; smelting, refining and upgrading
- 2.2 demonstrate basic extractive technologies used in the mineral industry; e.g., thermal, mechanical, chemical, electrical
- 2.3 create a simplified representation of a mineral processing and/or refining facility
- 2.4 research and /or investigate the physical and chemical properties of a mineral substance, and relate these to technologies used for processing and refining; e.g., molecular structure, mass and density, magnetic characteristics, elasticity and stress
- 2.5 explain how industry uses technology in monitoring and controlling various refining processes
- 2.6 describe storage facilities and distribution systems within the industry, and their impact on industry location and product costs; e.g., flow charts of storage and distribution systems
- 2.7 explain how management practices conducted by industry, throughout refining operations, are influenced by environmental standards, environmental assessment, and the enforcement of safe operating procedures
- 2.8 describe industry initiatives that respond to environmental concerns; e.g., advances in sulphur recovery technology, management of reactive rock wastes, water treatment, waste treatment, emission control
- 2.9 describe industry initiatives that address occupational health and safety requirements; e.g., odour scrubbers, noise suppressants, water purification, personal protective equipment, safety courses, emergency response strategies
- 2.10 describe industry initiatives in reprocessing and recycling mineral products to ensure a life-cycle approach to resource management; e.g., waste and by-products

**3. demonstrate basic competencies**

- 3.1 demonstrate fundamental skills to:
  - 3.1.1 communicate
  - 3.1.2 manage information
  - 3.1.3 use numbers
  - 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
  - 3.2.1 demonstrate positive attitudes and behaviours
  - 3.2.2 be responsible
  - 3.2.3 be adaptable
  - 3.2.4 learn continuously
  - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
  - 3.3.1 work with others
  - 3.3.2 participate in projects and tasks

**4. identify possible life roles related to the skills and content of this cluster**

- 4.1 recognize then analyze the opportunities and barriers in the immediate environment
- 4.2 identify potential resources to minimize barriers and maximize opportunities

## **COURSE ENR2080: ENERGY DESIGNS/SYSTEMS 1 (BASIC PRINCIPLES)**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students investigate the basic principles of energy conservation and efficiency and relate them to energy designs and systems used in the residential, commercial or transportation sector.

**Parameters:**

**Outcomes:** The student will:

### **1. explain basic principles of energy conservation and efficiency**

- 1.1 provide a rationale for energy conservation and efficiency based on economic and environmental factors
- 1.2 identify basic forms of energy and describe applications of each: radiant, chemical, thermal, mechanical, electrical, nuclear
  - 1.2.1 trace various forms of energy back to the sun
  - 1.2.2 distinguish between energy and power
  - 1.2.3 distinguish between kinetic and potential energy
- 1.3 cite examples of energy technology used to convert one form of energy into another useful form; e.g., turbines, generators, motors, electric bulbs
- 1.4 demonstrate your understanding and explain applications of the First Law of Thermodynamics and Second Law of Thermodynamics
- 1.5 define energy efficiency and explain its application in determining how well a technology converts energy from one form to another

### **2. demonstrate applications of energy technology in the residential, commercial or transportation sector**

- 2.1 identify energy sources, and illustrate the flow of energy, for an existing residential/commercial structure or transportation system
- 2.2 demonstrate an understanding of the functions of technology in converting energy into useful forms within one structure or system. Include component parts and principles of operation
- 2.3 illustrate and /or describe applications of energy conservation and efficiency evident in one structure or system design; e.g., mechanical efficiency, volumetric efficiency, thermal efficiency
- 2.4 explain design principles incorporated to transfer energy throughout one structure or system
- 2.5 research methods used to measure energy and power within one structure or system; e.g., British thermal unit and calorie, joules, kilowatt hours, watts, horsepower, torque
- 2.6 perform simple efficiency calculations and compare energy input/output for components within one structure or system; e.g., windows, lighting, wall structure, insulation, mechanical devices
- 2.7 evaluate energy use within one structure or system based on; total system efficiency, cost of operation, environmental and social effect. Possible considerations can include land use, atmospheric emissions, health, convenience, and aesthetics

### **3. demonstrate basic competencies**

- 3.1 demonstrate fundamental skills to:
  - 3.1.1 communicate
  - 3.1.2 manage information

- 3.1.3 use numbers
- 3.1.4 think and solve problems
- 3.2 demonstrate personal management skills to:
  - 3.2.1 demonstrate positive attitudes and behaviours
  - 3.2.2 be responsible
  - 3.2.3 be adaptable
  - 3.2.4 learn continuously
  - 3.2.5 work safely
- 3.3 demonstrate teamwork skills to:
  - 3.3.1 work with others
  - 3.3.2 participate in projects and tasks
- 4. identify possible life roles related to the skills and content of this cluster**
  - 4.1 recognize then analyze the opportunities and barriers in the immediate environment
  - 4.2 identify potential resources to minimize barriers and maximize opportunities

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**COURSE ENR2910: ENR PROJECT B**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students develop project design and management skills to extend and enhance competencies and skills in other Career and Technology Studies (CTS) courses through contexts that are personally relevant.

**Parameters:** This course must make connections with a minimum of 2 CTS courses, one of which must be at the intermediate level.

**All projects and/or performances whether teacher or student led, must include a course outline or student proposal.**

**Outcomes:**

The teacher/student will:

- 1. identify the two or more CTS courses being linked to this course**
  - 1.1. justify the connection
  - 1.2. identify key outcomes
- 2. propose, manage and assess a project and/or performance**
  - 2.1. identify project and/or performance:
    - 2.1.1. prepare a plan
    - 2.1.2. clarify the purposes
    - 2.1.3. define deliverables
    - 2.1.4. specify timelines
    - 2.1.5. explain terminology, tools and processes consistently throughout
    - 2.1.6. define resources; e.g., materials, costs, staffing
  - 2.2. identify and comply with all related health and safety standards
  - 2.3. define assessment standards (indicators for success)
  - 2.4. present proposal and obtain necessary approvals

The student will:

- 3. meet goals as defined within the plan**
  - 3.1. complete the project and/or performance as outlined
  - 3.2. monitor project and/or performance and make necessary adjustments
  - 3.3. present the project and/or performance:
    - 3.3.1. outcomes attained
    - 3.3.2. relationship to goals set originally
  - 3.4. evaluate the project and/or performance:
    - 3.4.1. processes and strategies used
    - 3.4.2. recommendations for how the project and/or performance could have been improved
- 4. demonstrate basic competencies**
  - 4.1. fundamental skills
    - 4.1.1. communicate
    - 4.1.2. manage information
    - 4.1.3. use numbers

- 4.1.4. think & solve problems
- 4.2. personal management skills
  - 4.2.1. demonstrate positive attitudes & behaviours
  - 4.2.2. be responsible
  - 4.2.3. be adaptable
  - 4.2.4. learn continuously
  - 4.2.5. work safely
- 4.3. teamwork skills
  - 4.3.1. work with others
  - 4.3.2. participate in projects & tasks
- 5. identify possible life roles related to the skills and content of this cluster**
  - 5.1. recognize then analyze the opportunities and barriers in your immediate environment
  - 5.2. identify potential resources to minimize barriers and maximize opportunities

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**COURSE ENR2920: ENR PROJECT C**

**Level:** Intermediate

**Prerequisite:** None

**Description:** Students develop project design and management skills to extend and enhance competencies and skills in other Career and Technology Studies (CTS) courses through contexts that are personally relevant.

**Parameters:** This course must make connections with a minimum of 2 CTS courses, one of which must be at the intermediate level.

**All projects and/or performances whether teacher or student led, must include a course outline or student proposal.**

**Outcomes:**

The teacher/student will:

- 1. identify the two or more CTS courses being linked to this course**
  - 1.1. justify the connection
  - 1.2. identify key outcomes
- 2. propose, manage and assess a project and/or performance**
  - 2.1. identify project and/or performance:
    - 2.1.1. prepare a plan
    - 2.1.2. clarify the purposes
    - 2.1.3. define deliverables
    - 2.1.4. specify timelines
    - 2.1.5. explain terminology, tools and processes consistently throughout
    - 2.1.6. define resources; e.g., materials, costs, staffing
  - 2.2. identify and comply with all related health and safety standards
  - 2.3. define assessment standards (indicators for success)
  - 2.4. present proposal and obtain necessary approvals

The student will:

- 3. meet goals as defined within the plan**
  - 3.1. complete the project and/or performance as outlined
  - 3.2. monitor project and/or performance and make necessary adjustments
  - 3.3. present the project and/or performance:
    - 3.3.1. outcomes attained
    - 3.3.2. relationship to goals set originally
  - 3.4. evaluate the project and/or performance:
    - 3.4.1. processes and strategies used
    - 3.4.2. recommendations for how the project and/or performance could have been improved
- 4. demonstrate basic competencies**
  - 4.1. fundamental skills
    - 4.1.1. communicate
    - 4.1.2. manage information

- 4.1.3. use numbers
- 4.1.4. think & solve problems
- 4.2. personal management skills
  - 4.2.1. demonstrate positive attitudes & behaviours
  - 4.2.2. be responsible
  - 4.2.3. be adaptable
  - 4.2.4. learn continuously
  - 4.2.5. work safely
- 4.3. teamwork skills
  - 4.3.1. work with others
  - 4.3.2. participate in projects & tasks
- 5. identify possible life roles related to the skills and content of this cluster**
  - 5.1. recognize then analyze the opportunities and barriers in your immediate environment
  - 5.2. identify potential resources to minimize barriers and maximize opportunities

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