

Energy and Mines 30

2017-18

GENERAL INFORMATION

- i. Energy and Mines 30
 - a. 30 Level PAA Credit
 - b. Available Semester I & 2
 - c. Independent Study Course (Asynchronous)
- ii. Location: HorizoniSchool Course is accessible at <http://courses.horizonsd.ca/course/view.php?id=390>
- iii. Instructor: Jim Swan, Winston High School
- iv. Ways to contact Mr. Swan
 - a. Send me a Private Message in Moodle (*Preferred)
 - b. **Email address:** Jim.Swan@horizonsd.ca
 - c. **school:** 306.946.7929 **home:** 306.946.3000
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COURSE DESCRIPTION

Energy and Mines 30

Energy and Mines 30 is a Practical and Applied Art that is modular in nature and is designed to give students the background and knowledge necessary to evaluate potential career options and gain some insight into the role of the energy and mining sectors in Saskatchewan: historically, presently and into the future.

The major goals of the course are supported by several foundational objectives:

Awareness: To provide students with an awareness of the nature, technology and products of Saskatchewan's energy and mining industries, as well as the related markets, goods, services and processes that support those industries.

Environmental Stewardship: To foster positive attitudes toward and creative problem solving about, responsible resource management and environmental sustainability.

Connections between School, Work and Community: To create a connection for students between the world of school and the world of work and to use relevant community examples and sources wherever possible

In particular, Energy and Mines 30 focuses on two themes:

- **The Potash Industry of Saskatchewan:** Students will explore concepts of geology, mining, refining, use and economic significance.
- **Alternative, Renewable and Sustainable Energy Sources:** Students will look at oil sands and offshore oil, hydroelectricity, wind, solar and geothermal energy as well as the application of alternative energy to everyday life, such as heating and transportation.

Course Prerequisites (None)

STUDENT LEARNING OUTCOMES:

Module 1: Oil and Gas Refinement, Use and Economic Benefits

1.1 Student Biographies Entry

- * Foundational: To create a connection for students between the world of school and the world of work and to use relevant community examples and sources wherever possible

- 1.2 What's trending now! An Introduction to #Energy and #Mining 30! Assignment
- * 5.1.1 To assess the impact of individual attitudes, actions and lifestyle on Energy/Mining and the environment.
- 1.3 Resource Exploration - Seismic Review
- * 5.8 To understand the theory and practice of seismic exploration
- 1.4 Finding Oil and Gas Assignment
- * 5.7 To recognize the relationship between the large-scale geology of an area and the process of locating oil
 - * 5.9 The student will explore the theory and practice of geophysical or other exploration techniques useful in locating potential petroleum-bearing sub-surface formations
- 1.4.1 Let's Talk: Is it ok to look in my backyard? Forum
- * 5.6 The student will demonstrate familiarity with the various types of oil traps.
 - * 6.1 To understand the distinction, in land ownership, between mineral rights and surface rights, will outline the steps an oil company must take in acquiring mineral rights and property access prior to drilling and will identify some potential positive and negative consequences for landowners
 - * 6.3 To identify specific safety procedures, blowout prevention and other environmental protection procedures normally observed at a drilling site
- 1.5 Offshore Exploration Reading
- * 5.4 To identify oil and gas producing areas in Saskatchewan and Canada.
- 1.5.1 Offshore Drilling Assignment
- * 5.4 To identify oil and gas producing areas in Saskatchewan and Canada.
- 1.6 Oil Sands Reading
- * 5.4 To identify oil and gas producing areas in Saskatchewan and Canada.
- 1.6.1 Go Deep: Exploring an Oil Sands Company Assignment
- * 7.6 To demonstrate familiarity with the companies that produce, refine and market petroleum products in Saskatchewan and Canada.
- 1.6.2 Let's Talk: How dirty is the oil? Forum
- * 6.2 To describe site preparation, the parts and operation of a drilling rig and the jobs associated with a working rig.
- 1.7 Shale Oil Reading
- * 5.4 To identify oil and gas producing areas in Saskatchewan and Canada.
- 1.7.1 To Frack or Not To Frack Assignment
- * 8.2 To investigate the potential environmental effects of oil and gas exploration, drilling, extraction, transport and processing
- 1.7.2 Fracking Debate Forum
- * 5.5 To describe the petroleum-bearing formations for each oil and gas producing area
- 1.8 Refining Oil and Gas Lesson
- * 7.1 To identify and describe the various chemical components of Canadian crude oil.
 - * 7.2 To describe the stages of processing necessary to create marketable natural gas from natural gas in its raw form as it comes from the wellhead, as well as the usual methods of handling, storing, or disposing of processing by-products
 - * 7.5 To explain the crude oil refining process and the methods by which specific end products, both fuels and petrochemicals, are created
- 1.9 Pipeline Challenge Assignment
- * 7.3 To identify the two Canadian pipeline systems (crude oil and natural gas)
 - * 7.4 To explain the mechanics of the movement of oil and gas through pipelines.

Module 2: Electricity - Properties and Production

- 2.1 Electricity Basics Lesson
- * 9.1 Using correct terminology, the student will demonstrate a basic understanding of the nature of electrical energy and its movement through conducting materials and circuits.
 - * 9.2 To demonstrate facility with Ohm's Law and power (wattage) determination in simple calculations.
- 2.2 Electrical Circuits Reading
- * 9.1 Using correct terminology, the student will demonstrate a basic understanding of the nature of electrical energy and its movement through conducting materials and circuits.
- 2.3 Electricity Generating Resources in Saskatchewan Reading
- * 9.3 Using appropriate terminology, the student will describe common methods of commercial electrical generation, identify the energy source in each case and indicate whether the energy source is renewable or non-renewable.
- 2.3.1 Electricity Resource Map Assignment
- * 9.4 To locate and describe the various commercial electrical generating facilities in Saskatchewan.
- 2.4 Go: Deep: Research a Saskatchewan Power Generating Station Assignment

- * 9.6 To collect and present information on the details of the design and operation of one specific electrical generation facility in Saskatchewan.
- * 9.5 To model or construct and explain the operation of a simple water turbine, steam turbine, or gas turbine

2.5 How Electricity is Made Reading

- * 9.3 Using appropriate terminology, the student will describe common methods of commercial electrical generation, identify the energy source in each case and indicate whether the energy source is renewable or non-renewable

2.5.1 Let's Talk: Power Consumption of the Charts! Forum

- * 9.7 To make and support predictions about future trends in Saskatchewan's electrical production and consumption

Module 3: Electricity – Transmission and Distribution

3.1 Introduction to Electricity Transmission

3.2 AC and DC Power

- 10.1 To know the basic properties of alternating current, to understand the differences between AC and DC circuits and to be able to state the advantages of AC over DC for commercial electrical distribution.

3.3 Electricity Transmission and Distribution Documentary

- 10.2 To be familiar with the voltages carried, visual appearance, location and total number of kilometers, for the various sizes of transmission lines in the Saskatchewan power grid.

3.3.1 Go Deep: The importance of electricity

- 10.3 To describe the control systems that regulate the SaskPower

3.4 Electricity Grids and Distribution to Consumers Lesson

- 10.4 To describe and explain the process by which electricity is distributed from local transformers to residences, businesses and public buildings

3.5 Cost of Electricity

- 10.5 To recognize and read common types of electrical utility meters and calculate service fees based on meter readings and fee schedules

3.5.1 Cost of Electricity Quiz

- 10.5 To recognize and read common types of electrical utility meters and calculate service fees based on meter readings and fee schedules

3.5.2 Let's Talk: Electrically Inclined! Forum

- 10.6 To describe the characteristics of the interprovincial power grid and explain how power outages and demand overload are handled to minimize service disruption.

Module 4: Alternate Energy Sources - Electrical Generation – Wind

4.1 History of Wind Power Lesson

- 20.1 To explore the historical uses of wind energy in human enterprise

4.1.1 Wind Power Timeline Assignment

- 20.1 To explore the historical uses of wind energy in human enterprise

4.2 Harnessing the Wind

- 20.2 To explore the various technologies developed worldwide to harness wind energy in generating Electricity and identify regions in Saskatchewan and Canada that have potential for wind electrical generation.

4.3 "Wind Rush" CBC Documentary

- 20.3 To assess the advantages and disadvantages of wind power as a source of electricity

4.4 Make a Wind Powered Device

- 20.2 To explore the various technologies developed worldwide to harness wind energy in generating Electricity and identify regions in Saskatchewan and Canada that have potential for wind electrical generation

4.4.1 Wind Powered device submission Assignment

4.4.2 Wind Powered Devices Database

4.4.3 Let's Talk: If the price was right!

4.5 Go Deep: The answer my friend is blowing in the Wind Game Show! Assignment

- 20.3 To assess the advantages and disadvantages of wind power as a source of electricity

Module 5: Alternate Energy Sources - Electrical Generation – Solar

5.1 What is solar energy???? Reading

- * 20.7 To assess the advantages and disadvantages of solar power as a source of electricity
- 5.2 Solar - a Really Bright Idea Lesson
 - * 20.7 To assess the advantages and disadvantages of solar power as a source of electricity
- 5.3 Here Comes the Sun (solar power documentary)
 - * 20.5 To identify regions in Saskatchewan and Canada with potential for solar electrical generation
 - 5.3.1 Go Deep! Here Comes the Sun on A.C.I.D. Assignment
- 5.4 Photovoltaic (solar) panels Lesson
 - * 20.4 To learn how photocells are made and how they work
- 5.4.1 Let's Talk: How green is solar? Forum
 - * 20.7 To assess the advantages and disadvantages of solar power as a source of electricity
- 5.5 Building a Solar Oven...Reading
 - * 20.6 To investigate examples of solar power use in Saskatchewan and elsewhere
 - 5.5.1 Building a Solar Oven Submission Assignment
 - * 19.6 To explore technologies for concentrating solar energy
 - 5.5.2 Building a Solar Oven Database (share)

Module 6: Alternate Energy Sources - Heat

- 6.1 Heat as Energy Lesson
 - * 19.1 To understand the nature of heat energy and the relationship between heat and other forms of Energy
 - * 19.2 To distinguish between heat and temperature and be familiar with the measurement of each
- 6.2 Geothermal in Saskatchewan Reading
 - * 19.3 To identify sources of energy currently used in space heating and water heating in Saskatchewan.
 - * 19.9 To become familiar with sources and uses of geothermal heat.
- 6.3 The Straight Poop on Biomass Energy Lesson
 - * 19.8 To become familiar with the use of wood and other biomass as a source of heat.
- 6.3.1 Let's Talk: Geothermal or Biomass in Your House? Forum
 - * 19.4 To make comparisons among fuel types regarding cost, convenience and fuel efficiency.
- 6.4 Keeping the Heat In Reading
 - * 19.10 To assess the advantages of energy conservation in the context of heating.
- 6.5 Go Deep - Understanding Simple Insulating Principles Values - The Mitt Report! Assignment
 - * 19.10 To assess the advantages of energy conservation in the context of heating.

Module 7: Potash - Formation, Location and Exploration

- 7.1 What do you know about Potash?
 - * 22.1 To identify the physical and chemical characteristics of potash and examine potash ore
 - 7.1.1 Let's Talk: If the price was right! Forum
 - 7.1.2 Potash Twitter
- 7.2 The Scoop on Potash Assignment
 - * 22.1 To identify the physical and chemical characteristics of potash and examine potash ore
 - * 22.3 To explain how potash was used historically.
- 7.3 The History and Formation of Potash in Saskatchewan Visualized! Assignment
 - * 22.2 To describe the significance of the Devonian period in the formation of Western Canada's mineral resources
 - * 22.4 To describe the location of Saskatchewan potash
 - * 22.5 To describe how potash was discovered in Saskatchewan.
- 7.4 Go Deep: Feasibility studies and Environmental Impact Assessments? Assignment
 - * 22.6 To explain why mining companies conduct feasibility studies and environmental impact assessments
- 7.5 Saskatchewan's True Gold Mines - the 3 Potash Formations
 - * 22.7 To compare the three main potash beds being mined in the province and to map the locations of the operating mines.
- 7.5.1 Let's Talk: The Problem with Potash
 - * 24.8 To be familiar with the economics of potash
 - * 25.2 To investigate the potential environmental effects of potash exploration, mining, milling, transport and use

Module 8: Potash - Refinement, Distribution, Use and Economic Significance

8.1 K Decode / Informed Explanation Assignment

- * 24.5 To describe other uses of Saskatchewan potash and its by-products.

8.2 Processing Potash: Conventional and Solution! Lesson

- * 24.1 To describe the steps in processing potash ore from the head frame of a conventional mine to the mill.
- * 24.2 To trace the steps in processing potash from a solution mine

8.3 Go Deep: K for Life: Ignite presentation Assignment

- * 24.4 To investigate how potash (potassium) fertilizers affect plant development.
- * 24.5 To describe other uses of Saskatchewan potash and its by-products.
- * 24.6 To become acquainted with the forms and uses of potash produced outside Saskatchewan
- * 24.7 To know how and where, potash is transported.

8.4 The \$\$\$ of Potash Game! Assignment

- * 24.8 To be familiar with the economics of potash marketing, including the systems governing price setting, government incentives, taxes and royalties

8.4.1 Let's Talk: Your Potash Game

Major Project: Outdoor Experience or Inquiry

The major project is an extended study portion of the course. It is meant to build off of what you have learned within the course and take the learning a direction that interests you! There is plenty of choice and 4 different modes of learning!

In your chosen exploration, challenge, simulation or inquiry project you will need to develop and demonstrate new skills and knowledge you will acquire to further enhance your understanding of Energy and Mines 30.



The ultimate goals of these projects is for you to further:

- *Demonstrate knowledge of the diversity and the economic, social and environmental significance, of Saskatchewan energy and mining industries.*
- *Assess the environmental impact of resource exploration, production, transport and processing.*
- *Assess the efforts made by the resource industry to protect the environment.*
- *Foster an attitude of environmental responsibility.*
- *Become familiar with the technology of the energy and mining industries.*
- *Become familiar with the nature and requirements of careers and job opportunities in Saskatchewan's energy and mining industries.*
- *Become familiar with the safety standards of Saskatchewan's energy and mining industries and to develop workplace and safety skills appropriate to these industries and related services.*

***Any one of these projects can be done with a partner in the class if you wish.** If you have chosen to work with a partner be aware that I am looking for these additional things:

- Prior to starting the project you must send me request to work with a partner indicating who that selected individual is
- The work within the project should reflect the efforts of two: a little deeper, a little higher quality.
- Both students will submit the project and share the same identical evaluation

TEACHING and LEARNING STRATEGIES:

The majority of this course is based around online Energy and Mines 30 course in moodle. I wanted to create a blend of online and offline activities so that some of the course could be worked on even if access to the internet was slow or unavailable. This course provides plenty of learner choice in ways to learn and respond to your understandings. Inquiry and exploration are encouraged in many of the “Go Deep”, and in your major project. In general each lesson consists of a reading and a video lesson to watch so that then you will have the required base to complete the assigned activities. Many of the activities/assignments within the course will require you to access websites, research and to present your understandings through video, podcasts, web tools and written responses. Of note the major project is a large assignment that will require plenty of planning in advance and conversations with your teacher. It is my hope each year to provide you an opportunity to tour a Potash Mining Facility with the assistance of you home schools (this career exploration is subject to availability). You will be required to log into moodle regularly and participate in the online discussions so that we can learn from each by reading and commenting on each other's learning! A twitter feed and a shout box are also available within the course for students to carry on learning conversations and to get to know each other as classmates. Although each assignment is structured with suggested products I do not mind if you choose a different way to demonstrate your understandings. Here are many ways you can show me you know what your know! I expect you to demonstrate your understandings to me in a variety of ways!



i. Course Schedules

Semester 1 students - 2016-17

Module of Study	Dates
Module 1: Oil and Gas Refinement, Use and Economic Benefits (~10 hours)	September 5 - Sept 22
Module 2: Electricity - Properties and Production (~10 hours)	Sept 22 - Oct 4
Module 3: Electricity – Transmission and Distribution (~10 hours)	Oct 4 – Oct 20
Module 4: Alternate Energy Sources - Electrical Generation - Wind (~10 hours)	Oct 20 - November 3
Module 5: Alternate Energy Sources - Electrical Generation - Solar (~10 hours)	November 3 - November 17
Module 6: Alternate Energy Sources - Heat (~10 hours)	November 17 - December 4
Module 7: Potash - Formation, Location and Exploration (~10 hours)	December 4 - Dec 15
Module 8: Potash - Refinement, Distribution, Use and Economic Significance (~10)	Dec 15 – Jan 5
Major Project - Exploration, Challenge, Simulation or Inquiry (~ 20 hours)	Jan 5 - Jan 19 2018

Semester 2 students - 2015-16

Module of Study	Dates
Module 1: Oil and Gas Refinement, Use and Economic Benefits (~10 hours)	Feb 1 – Feb 9
Module 2: Electricity - Properties and Production (~10 hours)	Feb 9 – Feb 28
Module 3: Electricity – Transmission and Distribution (~10 hours)	Feb 28 - Mar 15
Module 4: Alternate Energy Sources - Electrical Generation - Wind (~10 hours)	Mar 15 – Mar 29
Module 5: Alternate Energy Sources - Electrical Generation - Solar (~10 hours)	Mar 29 – Apr 13
Module 6: Alternate Energy Sources - Heat (~10 hours)	Apr 13 - May 2
Module 7: Potash - Formation, Location and Exploration (~10 hours)	May 2 – May 25
Module 8: Potash - Refinement, Distribution, Use and Economic Significance (~10)	May 25 – Jun 6
Major Project - Exploration, Challenge, Simulation or Inquiry (~ 20 hours)	Jun 6 - Jun 19 2018

- There are no specific assignment due dates in this course. Students are welcome to complete modules in any order they wish.
- Energy and Mines 30 does not include any exams but it does have a larger assignment as a culminating assessment for each module where concepts, terminology and understandings from the module are applied.
- The Major Project is based on 2 themes: Potash and Alternative Energy Sources. I would recommend checking them out early as making a choice later in the course on which project to do will be much easier and you can start developing a plan of attack!

Unit of Study	Essential Questions
Module 1: Oil and Gas Refinement, Use and Economic Benefits	Are oil and gas energy sources sustainable and worth it?
Module 2: Electricity - Properties and Production	Why should Saskatchewan be called the energy capital of the world?
Module 3: Electricity – Transmission and Distribution	How does Saskpower make the electricity magic happen?
Module 4: Alternate Energy Sources - Electrical Generation - Wind	Is wind a viable energy source for electricity generation in Saskatchewan?
Module 5: Alternate Energy Sources - Electrical Generation - Solar	Is solar a viable energy source for electricity generation in Saskatchewan?
Module 6: Alternate Energy Sources - Heat	Is geothermal or biomass a viable energy source for heat in Saskatchewan?
Module 7: Potash - Formation, Location and Exploration	What fueled the Potash boom?
Module 8: Potash - Refinement, Distribution, Use and Economic Significance	How is potash Saskatchewan's golden opportunity?

COURSE MATERIALS

- There is no required textbook, videos or workbooks for the course. The online course itself is resource based and all the materials required for this course are included in it. You may find the [Saskatchewan Mining Association Website](#) very useful for your major project. *Should any of the online course content links become broken please notify your teacher and a fixup will be provided shortly.
- Other resources: This course makes extensive use of a PC, mobile device and broadband internet to access, learn, create and submit your course work. Because of the digital nature of this course you will be required to have a youtube, google, prezi and other online creation tools accounts to create and share your responses with me.

EVALUATION:

Marks Breakdown:

1) Modules of instruction are worth 80% of your final mark.

- Unit Assignments/Lessons 20%
- Unit Discussions 20%
- “Go Deep” Unit Assignments - 40%

2) Final Evaluation - Outdoor Experience or Inquiry Project - 20%

All assignments, lessons/quizzes and the major project are to be submitted digitally within your course. In general I will return submissions within a day or so and will use one of the following rubrics below to evaluate them.

Assessment Beliefs

Ultimately I want you to learn the bigger concepts of each Unit and provide every opportunity for success:

- 1. Content is not assessed, understanding is. If you can google it as content, you don't have to "learn" it.*
- 2. No assignment is done evaluation until you are happy with your mark. You can resubmit as assignment again. Be reasonable here though! At times I may not be happy with the first submission and may ask you to simply redo.*
- 3. "Borrowed" Answers - if there is evidence of cut and paste responses I will ignore the submission and ask you to resubmit*
- 4. Learning is a conversation. I will provide meaningful feedback on your assignments and may at times ask for you to respond back. Please feel free and do to ask questions along the way to clarify you learning.*

Mr. Swan

Unit Assignments Rubric

Understandings	Your show a deep understanding of the concepts and topics presented in this assignment. You have applied critical and creative thinking to a exceptional response. <i>3 points</i>	You demonstrated understanding of the concepts and topics presented in this assignment but your response needs to be further developed and thought out. <i>2 points</i>	You demonstrated basic understanding of the concepts and topics presented in this assignment. Your response needs to show evidence of thought to each question. <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Knowledge / Research	Information is skillfully researched, accurate and highly relevant <i>3 points</i>	Information is accurate and relevant <i>2 points</i>	Information is somewhat accurate and relevant <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Complete (see original assignment for expected details)	Above and beyond expectations/elements of assignment <i>3 points</i>	All elements of assignment present <i>2 points</i>	Not all assignment details present. <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Quality of Assignment Submission	* Assignment is complete! Thank you for your effort and keep up the good work! <i>1 points</i>		* It is my expectation that your assignment would be written with proper grammar, organized for my understanding and completely answered. If your assignment falls short of reasonable length, grammar, organization and readability you will be required to resubmit it. <i>0 points</i>	

Go Deep / Media Project Assessment Rubric

Knowledge / Research	Information is skillfully researched, accurate and highly relevant <i>4 points</i>	Information is accurate and relevant <i>3 points</i>	Information is somewhat accurate and relevant <i>2 points</i>	Information lacks accuracy and relevance <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Thinking / Inquiry	Ideas are creative and sophisticated understandings presented <i>4 points</i>	Ideas are creative and understandings explained <i>3 points</i>	Ideas show some original thinking <i>2 points</i>	Limited understanding presented <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Criterion (see original assignment for expected details)	Above and beyond expectations of assignment <i>4 points</i>	All elements of assignment present <i>3 points</i>	Missing some aspect of assignment <i>2 points</i>	Little or no detail to actual assignment <i>1 points</i>	Lacking, please resubmit assignment <i>0 points</i>
Quality of Assignment Submission	* Effort and quality are met! Keep up the good work! <i>1 points</i>		* It is my expectation that your assignment would be written with proper grammar, organized for my understanding and completely answered. If your assignment falls short of reasonable length, grammar, organization and readability you will be required to resubmit it. <i>0 points</i>		

Throughout the course you are expected to participate in discussion forums. You are required to make one intelligent post of your own and response to one other post - interjecting a new idea or thought each time.

When participating in online forums you must remember to follow forum etiquette by being polite and trying hard to show enthusiasm and energy and not to post just to fulfill the requirement of posting. You must try to push the conversation forward through the **SEE** Model!

ie: Make a **s**tatement, follow up with an **e**xample, and then **e**xplain what you mean.

Forums Participation Rubric:

Criteria	Advanced (3)	Proficient (2)	Not Yet There (1)	Not There at All (0)
Development of Ideas	Well-developed ideas; introduces new ideas, and stimulates discussion	Developing ideas; sometimes stimulates discussion	Poorly developed ideas which do not add to the discussion	Does not enter the discussion
Evidence of Critical Thinking	Clear evidence of critical thinking-application, analysis, synthesis, and evaluation. Postings are characterized by clarity of argument, depth of insight into theoretical issues, originality of treatment, and relevance. Sometimes include unusual insights. Arguments are well supported	Beginning of critical thinking; postings tend to address peripheral issues. Generally accurate, but could be improved with more analysis and creative thought. Tendency to recite facts rather than address issues	Poorly developed critical thinking of what was learned	Does not enter the discussion
Clarity	Posts are well articulated and understandable	Posts are understandable, but some thought is required	Posts are difficult to clarify	Posts are unintelligible or not present
Responds to Other Students and Teacher Posts			Interacts at least once with other student or Teacher	Does not enter the discussion