

**ENVT 268 Resource Exploitation - Oil, Gas, Bitumen, & Mining**

*3 Credits, 16 weeks, 3 Hours Lecture, 3 Hours Lab per week*

Official course description : This course provides an introduction to the upstream and downstream oil, gas, oil sands and mining industries primarily in Western Canada. Topics covered include geology of the hydrocarbon reservoirs, exploration, market and economic conditions, ecological impact of linear disturbances, lease tenure systems, drilling operations, site reclamation, pipeline networks, sour gas, and history of development in Alberta. Aspects of other mineral resource activities in Alberta and the NWT are also covered.

*Prerequisite:* EAS100 (Planet Earth)

**Instructor**

Instructor: Neil O'Donnell  
Office location : S209G  
Phone number: 780-791-4821  
[email neil.o'donnell@keyano.ca](mailto:neil.o'donnell@keyano.ca)

**Office Hours (Winter 2016)**

Monday 11:00 – 12:00  
Wednesday 10:00 – 12:00  
Thursday 10:00 – 12:00

**Hours of Instruction**

Tuesday 1:00 – 2:50  
Thursday 2:00 – 4:50 (Lab)  
Friday 9:00 – 9:50

**Required Resources**

**The Petroleum Industry: A Nontechnical Guide** 0-87814-763-2  
**Our Petroleum Challenge, 8th Edition (or newer)** 1-894348-15-X  
**Alberta's Oil Patch** 1-894864-62-X  
**Canada's Oilsands** available on-line  
<http://www.centreforenergy.com/shopping/uploads/12.pdf?29112012114624>

**Course Outcomes**

Upon successful completion of this course, students will be able to:

- Identify the location and characteristics of the major oil and gas fields in the boreal forest region of western Canada, and summarize the operations.
- Summarize and give examples of the industries owning oil sands leases and the extent of current and planned operations; also of the various environmental contractors and industry organizations; including employment opportunities.

- Summarize and illustrate the physical and chemical characteristics of crude oil, natural gas, heavy oil, and bitumen; also the basic geology of different ore deposit types, their mineralogy, and chemistry.
- Assess and critique various environmental issues related to exploration, development, water issues (both surface and ground water), pipelines, oil spills, cleanup procedures, and the upstream oil and gas industry in western Canada.
- Summarize and give examples of the mining, extraction, upgrading, tailings, and environmental operations at the open-pit mining operations in the Athabasca area.
- Summarize and give examples of SAGD and other in-situ oil sands operations in the Athabasca and Cold Lake areas.
- Participate in field trips to an open pit operation, a SAGD operation, and the Oil Sands Discovery Centre.
- Contrast differences in open pit, underground, and solution mining.
- List and summarize special issues related to quarries, industrial minerals, and limestone excavations.

### Evaluation

5 Videos Short Reports	10%
3 2-wk. Labs (Group, Rights, Flaring)	15%
2 Field Trip Reports	10%
1 Hands-on Ore Mineral Lab	5%
2 Oil Patch Presentations	10%
Mid-Term Exam 1 (Feb.19, 2016)	10%
Mid-Term Exam 2 (April 8, 2016)	10%
Final Examination	30%
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Total	100%

*A grade of C- is required for progression or transfer.*

### Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	<b>Progression</b>	C-	1.7	
Poor	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
	<b>Minimum Pass</b>	D	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

**Proposed Schedule of Topics (Lectures)**

	<b>Topics</b>	<b>T. LeRiche Alberta's Oil Patch (Student Presentations) (2 per student)</b>	<b>Labs</b>
Week 1	Introduction, Review Mineral and Energy Resources Sections from EAS100 course		<b>Group Project</b> – Oil Sands Open Pit and SAGD operations in Athabasca area. (2 week completion)
Week 2	Origin and Accumulation of Petroleum and Gas	Introduction, 1, 2	<b>Participative Lab – Video</b> : Exploring the Ancient Sea
Week 3	Exploration, P&NG Rights Energy Overview	3, 4, 5	<b>Assignment</b> - Mineral Rights, Land Sales, Continuations (2 week completion)
Week 4	Drilling: Chemistry of Petroleum, Heavy Oil, and Bitumen: Natural Gas	6, 7, 8	<b>Participative Lab – Video</b> : The Moment of Truth
Week 5	Open pit and underground mining; Environmental Impact of Mining	9, 10, 11	<b>Participative Lab – Video</b> ; The Rotary Rig Environmental Impact of Mining (continued)
Week 6	Basic Geology Ore Deposits	12, 13, 14	<b>Hands-on lab</b> - ore minerals
Week 7	Quarries, Industrial Minerals, Limestone, Sand & Gravel	15, 16, 17	Mid-Term Exam No.1 (10%)
Week 8	Reading Week		
Week 9	Oil Sands Mining & Extraction; Tailings	18, 19, 20	Field Trip to Open-Pit Oil Sands Mine: <b>Report</b>
Week 10	Oil Sands In-Situ, SAGD	21, 22, 23	<b>Participative Lab</b> - Video: Fires of Kuwait
Week 11	Oil Sands In-Situ, SAGD (continued)	24, 25, 26	Field Trip to SAGD Operation: <b>Report</b>
Week 12	Formation Evaluation, Flaring, Environmental Issues	27, 28	<b>Assignment</b> on Flaring (2 week completion)
Week 13	Refining and Petrochemicals	29, 30	<b>Participative Lab</b> - Video : Product by Design
Week 14	Transportation, Pipelines		Mid-Term Exam No.2 (10%)
Week 15	Summary & Review	Discovery Centre (no report)	
Week 16	Final Exam (30%)		

**Please Note:**

Date and time allotted to each topic is subject to change. It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College Credit Calendar.

**Performance Requirements**

Laboratory work will be conducted weekly starting the first week of classes. Labs will be graded. Completion of the labs and a passing grade on that component of the course are considered mandatory to pass ENVT 268.

The labs will run 3 hours per week. Attendance is mandatory. Students may hand in completed assignments before the end or at the end of **that** lab session, or no later than one week following, with no penalty. Ordinarily, after one week, a late penalty will be assessed, as outlined below.

**Due Dates**

- Due Dates usually are set for one week following a lab, video assignment, report, field trip, or presentation.
- Unless specified differently by instructor, labs, reports, and assignments will be submitted electronically via Moodle.
- If submitted on or before the Due Date – full marks; *may be extended another 7 days for reasonable cause approved by instructor.*
- Otherwise, if submitted within one week (7 days) after the Due Date – 50% of regular mark.
- More than one week late – must be handed in, but will not be marked – zero assigned.
- Any changes due to special circumstances will be communicated by instructor via Moodle.

**Term Mark**

- Will be determined from all the labs, reports, and assignments.
- Mark will be weighted average of all submissions.
- If 20% or more of submissions (labs, reports, and assignments) are missing, student will not be allowed to write the final exam.

**Laboratory Safety**

In the science laboratories, safety is important.

Students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

**Student Attendance**

Class attendance is useful for two reasons. First, class attendance maximizes a student's learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

**Academic Misconduct**

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College 2015-2016 credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on [ilearn.keyano.ca](http://ilearn.keyano.ca). Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

**Specialized Supports****Counselling and Disability Services**

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

**SKILL Centre**

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

**Authorization**

This course outline has been reviewed and approved by the Program Chair.

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Neil O'Donnell, Instructor

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Louis Dingley, Chair

Date Authorized

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Guy Harmer, Dean

Date Authorized

**Signed copies to be delivered to:**

Instructor

Registrar's Office