



Course Outline

ENVIRONMENTAL TECHNOLOGY

**ENVT 167A
Oil, Gas, and Oil Sands
Winter Semester, 2014**

**3 CREDITS
3 HOURS LECTURE, 3 HOURS LAB PER WEEK**

INSTRUCTOR: [Neil O'Donnell](#)

INSTRUCTOR: Neil O'Donnell
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OFFICE NUMBER: S209g

OFFICE HOURS:

| | |
|----------|--------------------------------|
| Tuesday | 1:00 – 2:00 pm |
| Thursday | 1:00 – 2:00 pm; 4:00 – 5:00 pm |
| Friday | 10:00 am - noon |

HOURS OF INSTRUCTION:

Lectures – Tuesdays, 2:00 – 4:00 pm; Wednesdays, 9:00 – 10:00 am.
Lab – Mondays, 9:00 am – noon.

COURSE DESCRIPTION:

This course provides an introduction to the conventional oil and gas industry in Western Canada, both upstream and downstream, as well as to the new and increasingly important oil sands and heavy oil operations. Topics covered include geology, exploration, ecological impact of exploration and operational disturbances drilling operations, pipeline construction, compressor stations and gas plants, flaring, and the history and public image of the industry, especially in Alberta. Field trips may include visits to local oil sands operations (both open-pit mines and SADG), and a gas plant.

PRE-REQUISITE(S):

CHEM 101 and EAS 100

COURSE OUTCOMES:

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

- Establish and explain connections of course knowledge, as it applies to relevant current events, with emphasis on those of environmental concern.
- 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.
- Discuss and give examples of the various aspects of the upstream oil and gas industry.

- 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.
- Assess and critique the media coverage (TV, Press, Internet, books) concerning the oil sands industry, its successes, and environmental problems.
- Summarize and give examples of contributions to environmental improvement an environmental worker can offer, whether big or small.
- Participate in field trips to an open pit operation, a SAGD operation, and the Oil Sands Discovery Centre.

ECO CANADA ENVIRONMENTAL COMPETENCY OUTCOMES:

The student will gain the:

- Ability to Conduct Environmental Site Assessments (e.g., ESA—Phase 1 and Phase 2) (#2)
- Ability to Develop/Implement Site Restoration/Reclamation (e.g., Phase 3) Plans (#4)
- Ability to Interpret/Enforce/Comply with Environmental Regulations and Standards (#5)
- Ability to Identifying and Mitigating Climate Change Impacts (#7)
- Ability to Develop/Implement Water Supply and Water Efficiency Plans and Programs (#10)
- Ability to Collect Samples and Data for Environmental (#12)
- Ability to Analyze and Interpret Environmental Samples and Data (#13)
- Ability to Develop Environmental Policies, Measures, and Standards (#14)
- Ability to Liaise and Partner with Stakeholders (#15)
- Ability to Monitor/Address Occupational and Public Health and Safety (#23)
- Ability to Develop and Implement Plans, Programs and Practices for Ecosystem and Habitat Preservation and/or Management of Natural Resources (#25)
- Ability to Monitor/Evaluate Effectiveness of Programs and Practices Related to Ecosystem and Habitat Preservation and/or Management of Natural Resources (#26)
- Ability to Conduct Environmental Research and Publish Results (#31)
- Ability to Present Expert Information on Environmental Matters (#35)

ECO CANADA TRANSFERABLE COMPETENCY OUTCOMES:

The student will develop and apply skills in the following transferable competencies:

- Professional ethics & work style (#1)
- Learning & creativity (#2)
- Communicating effectively (#3)
- Collaboration (#4)
- Critical thinking & judgment (#5)
- Planning and organizing work and projects (#6)
- Leading and Influencing Others (#7)

REQUIRED RESOURCES:

| REQUIRED TEXTS TITLE | AUTHOR | PUBLISHER | ISBN |
|---|---------------------|---|---|
| The Petroleum Industry: A Nontechnical Guide | Conaway, Charles F. | PennWell | 0-87814-763-2 |
| Our Petroleum Challenge, 7 th Edition (or newer) | No name | Petroleum Communication Foundation, Calgary | 1-894348-15-X |
| Alberta's Oil Patch | Le Riche, Timothy | Folk Lore Publishing | 1-894864-62-X |
| Canada's Oilsands | No name | Canadian Centre for Energy Information, Calgary, 2011 | Available on-line http://www.centreforenergy.com/shopping/uploads/12.pdf?29112012114624 |
| REQUIRED SUPPLIES NAME | | SUPPLIER | |
| | | | |
| RECOMMENDED TEXTS TITLE | AUTHOR | PUBLISHER | ISBN |
| Tar Sands | Andrew Nikiforuk | Greystone Books, Vancouver | 9 781553 655558 |
| The Oil Sands | Gordon Kelly | Kingsley Publishing, Cochrane, AB | 9 780978 452650 |
| Principles of Petroleum Development Geology | Laudon, Robert C. | Prentice Hall | 0-13-649468-4 |
| RECOMMENDED SUPPLIES NAME | | SUPPLIER | |
| | | | |

TOPICS TO BE COVERED:

| | Topics | Alberta's Oil Patch (Student Presentations) | Labs |
|------------|---|--|--|
| Week 1 | Introduction, Review Oil & Gas Sections from EAS100 Energy and Resources | | Group Project – 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 | Participative Lab – Video : Exploring the Ancient Sea |
| Week 3 | Exploration, P&NG Rights Energy Overview | 3, 4, 5 | Assignment - Mineral Rights, Land Sales, Continuations (2 week completion) |
| Week 4 | Drilling: | 6, 7, 8 | Participative Lab – Video : The Moment of Truth |
| Week 5 | Chemistry of Petroleum, Heavy Oil, and Bitumen | 9, 10, 11 | Participative Lab – Video ; The Rotary Rig |
| Week 6 | Natural Gas Exploration Geology | 12, 13, 14 | Possible Field Trip to Gas Plant |
| Week 7 | Oil Sands videos – Pay Dirt 1 & 2 | 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: Report |
| Week 10 | Oil Sands In-Situ, SAGD | 21, 22, 23 | Field Trip to SAGD Operation: Report |
| Week 11 | Refining and Petrochemicals | 24, 25, 26 | Participative Lab - Video : Product by Design |
| Week 12 | Formation Evaluation, Flaring, Environmental Issues | 27, 28 | Assignment on Flaring (2 week completion) |
| Week 13 | Transportation, Pipelines | 29, 30 | Participative Lab - Video: Fires of Kuwait |
| Week 14 | | ---- | Mid-Term Exam No.2 (10%) |
| Week 15 | <u>Summary & Review</u> | | |
| Week 16/17 | Final Exam (30%) | | |

MOODLE

Go to <http://ilearn.keyano.ca>

This course is supported through Moodle. Assignments, readings and handouts will be posted on Moodle. Login information will be provided by your instructor. For further instructions please see the Moodle handout.

EVALUATION:

| Assignment | Percentage | Due Date |
|--|------------|--------------|
| 5 Videos Short Reports | 10% | See Schedule |
| 3 Labs (Group, Rights, Flaring) | 15% | See Schedule |
| 2 Field Trip Reports | 15% | See Schedule |
| 2 Oil Patch Presentations | 10% | See Schedule |
| Mid-Term Exam 1 | 10% | Week 7 |
| Mid-Term Exam 2 | 10% | Week 14 |
| Final Examination | 30% | TBA |

RULES FOR LABS, REPORTS, AND ASSIGNMENTS

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 are missing, student will not be allowed to write the final exam.

GRADING SYSTEM:

| Letter Grade | Description | Grade Points |
|---------------------|--------------------|---------------------|
| A+ | | 4 |
| A | Excellent | 4 |
| A- | | 3.7 |
| B+ | | 3.3 |
| B | Good | 3 |
| B- | | 2.7 |
| C+ | | 2.3 |
| C | Satisfactory | 2 |
| C- | | 1.7 |
| D+ | | 1.3 |
| D | Minimal Pass | 1 |
| F | Failure | 0 |

Students intending to transfer to other institutions should strive for a 'C-' as a minimum. Transfer information on each course is available at the [Alberta Council on Admission and Transfers](#).

NOTES:

Please dress appropriately for the weather on any field trips! Proper footwear is important. If the weather does not co-operate, the lab schedule will shift.

Individual components of the course will be given a numerical mark. The grading system will be applied using a combination of absolute achievement and relative standing in the class.

MISSED TERM EXAM OR LABS:

A student who cannot write a term examination or complete a lab assignment due to incapacitating illness, severe domestic affliction or other compelling reasons can apply to have the weight of the missed midterm transferred to the final. All attempts should be made to make up missed labs. Missed labs with no attempts to complete the work will be assigned a “0”.

You must notify the instructor of a missed midterm or lab assignment within 48 hours.

Deferral of term work is a privilege and not a right; there is no guarantee that a deferral will be granted. Misrepresentation of Facts to gain a deferral is a serious breach of the Code of Student Behaviour.

CELL PHONES: Cell phones and other electronic devices are to be turned off during class times. If you need to use one, leave the room. If you have to text someone, leave the room.

STUDENTS WITH DISABILITIES: Students who require accommodation in this course due to a disability are advised to discuss their needs with counsellors in the Registrar’s office . Please ensure that the required forms for exams are submitted to the instructor **one week** before the date of midterms or **by the last lecture class** for the final exam.

SKILL CENTRE: Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Keyano College Skill Centre.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar.

Note: Recording is permitted only with the prior written consent of the instructor or if recording is part of an approved accommodation plan.

Students should consult pp.30-31 on
<http://keyano.ca/future-student/calendar>

IMPORTANT DATES:

| | |
|------------------------|---|
| January 6, 2014 | First day of classes |
| January 17, 2014 | Courses dropped after this date will be designated “W”. (A withdrawal (W) is not reflected in your GPA). |
| February 24 – 28, 2014 | Reading Week |
| March 7, 2014 | Courses dropped after this date will be designated “WF”. (A withdrawal failure (WF) counts as a 0 in your GPA). |
| April 17, 2014 | Last day of classes |
| April 22-30, 2014 | Final Exams |

COLLEGE POLICIES

Equality, Equity and Respect

The Keyano College is committed to providing an environment of equality, equity and respect for all people within the College community. All members of this community are considered partners in developing teaching and learning contexts that are welcoming to all. Faculty, staff, and students are encouraged to use inclusive language to create a classroom atmosphere in which students' experiences and views are treated with equal respect and valued in relation to their gender, ethnic and cultural background, and sexual orientation.

Students should consult:

<http://keyano.ca/current-students/individual-rights>

Plagiarism and Cheating

Every student expects to be treated and evaluated fairly in a course. Plagiarism and cheating robs everyone of this right.

No student may submit words, ideas or data of another student or person as his or her own in any writing, project, assignment, quiz, electronic presentation, exam etc. Any work used that is not the student's own must be clearly cited as belonging to someone else. There are penalties for using other's work and not citing it. The Student's Rights & Responsibilities document clearly outlines these penalties and the appeal process.

- No learner can obtain information from another student during an exam.
- No learner can bring unauthorized information (paper or electronic) into an exam or quiz.
- No student can submit work done in another course for grading in this course without the written prior approval of the course instructor.
- No student can submit copyright protected or commercially produced materials as part or all of an assignment without proper citation & permission.

Student Rights & Responsibilities

Students should consult pp.36-40 in the Keyano College Credit Calendar at:

<http://keyano.ca/future-student/calendar>

Specialized Supports and Duty to Accommodate

Disability Support Services: Learner Assistance Program

If you have a documented disability or you think that you would benefit from some assistance from a Disabilities Counsellor, please call or visit the Disability Supports Office 780-792-5608 to book an appointment (across from the library). Services and accommodations are intended to assist you in your program of study, while maintaining the academic standards of Keyano College. We can be of assistance to you in disclosing your disability to your instructor, providing accommodations, and supporting your overall success at Keyano College.

Specialized Supports and Duty to Accommodate

Specialized Support and Duty to Accommodate are aligned with the office of Disability Support Services: Learner Assistance Program (LAP) guided by federal and provincial human rights legislation, and defined by a number of Keyano College policies. Keyano College is obligated by legislation to provide disability-related accommodations to students with identified disabilities to the point of undue hardship.



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ENVT 167A

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Winter, 2014

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3 HOURS LECTURE, 3 HOURS LAB PER WEEK**

Neil O'Donnell, Instructor

Date

Reviewed and approved by:

Louis Dingley, Chair

Date

Guy Harmer, Dean

Date

