

COURSE SYLLABUS
ERS/GEOL 4010 - Petroleum Exploration and Production
Spring 2019

Instructor Information:

Instructor: Dario Grana
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Office: Geology 223

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Office Hours: by appointment (T-W-Th)

Course Information:

Tuesday-Thursday: 11:00 – 12:15 (Room: Geol 209)

Prerequisites:

- GEOL 1100;
- MATH 2200 (or 2350)

Course Description:

The purpose of this course is to provide students with information and skills necessary to understand the oil and gas modeling process from exploration to production. The course will give students insight into theory and applications of field discovery, reservoir modeling, field production, and decision-making. Exploration and Production in oil and gas companies includes discovering, developing and sustainably producing oil and gas resources. Exploration and production is the core of the upstream oil and gas industry. Typically, exploration and production phases includes a discovery phase mostly based on geological information, a modeling phase based on geophysical measurements, and a planning and development phase based on engineering model predictions and measurements. In this course, students will learn the basic scientific components of each phase, and the decision process associated to each of them. Topics will include geophysical exploration, seismic acquisition, geophysical modeling, reservoir characterization, reservoir production, well planning and decision making.

Disability Statement:

If you have a physical, learning, sensory or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall.

Objectives/Outcomes/Standards:

During the class students will learn the basic notions of exploration and production in oil and gas fields. Students are expected at the end of the class to be able to describe the main workflows used in oil and gas companies for exploration, seismic modeling, reservoir characterization, fluid flow simulation and production. Students are expected to be able to analyze a case history, explain which methods should be used and what decisions could be made based on the available data. Students are also expected to be able to complete a short project focusing on acquisition, processing and modeling methodologies for a synthetic oil reservoir.

Text(s) and Readings:

- The instructor will distribute handouts in class

Course Requirements/Assignments:

The class includes 3 assignments. The first assignment will focus on exploration workflows, the second assignment on geophysical data acquisition and processing, the third on rock physics and petrophysics, the fourth one on reservoir characterization and the fifth one on petroleum engineering and production data. Each assignment will include theoretical questions and problem sets based on real data. The class also includes a final project.

Grading Standards:

- Homework: 60%
- Final: 40%

The final letter grade is given based on the numerical grade:

A	A-	B+	B	B-	C+	C	D	F
≥94	90-93	86-89	82-85	78-81	74-77	70-73	60-69	<60

Attendance/Participation Policy:

University sponsored absences are cleared through the Office of Student Life.

Academic Honesty:

UW Regulation 6-802. (Suggested language: The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated [from the University Catalog]. Teachers and students should report suspected violations of standards of academic honesty to the instructor, department head, or dean. Other University regulations can be found at: <http://www.uwyo.edu/generalcounsel/new-regulatory-structure/index.html>)

Course Outline:

- Week 1: Introduction to Petroleum Geology
- Week 2: Exploration
- Week 3: Introduction to geophysics
- Week 4: Seismic acquisition
- Week 5: Seismic processing
- Week 6: Seismic inversion
- Week 7: Rock physics
- Week 8: Acoustic logs and petrophysical logs
- Week 9: Formation evaluation analysis
- Week 10: Well log interpretation
- Week 11: Reservoir characterization
- Week 12: Fluid flow simulation and production

The instructor may make changes to the syllabus as the course proceeds. If necessary, these changes will be announced in class. Substantive changes made to the syllabus shall be communicated in writing to the students.