# GEOS 446

# Petroleum Geology

# 3 credits

Hydrocarbons fuel today's economy, but remain a relatively rare natural resource. The objective of this course is to review the geologic controls on the distribution and accumulation of hydrocarbons, how those hydrocarbons are found, and how they are subsequently extracted. At the end of the course, students should be able to explain:

the subsurface environment
the origin and nature of hydrocarbons
how and where hydrocarbons accumulate
methods of hydrocarbon exploration and exploitation
unconventional hydrocarbon resources
basic reservoir engineering techniques

Examples from classic hydrocarbon-producing regions will be used to illustrate the principles and techniques discussed in class.

**Prerequisites:** Geos 314 and 322 or equivalent

**Instructor:** Cathy Hanks, NSB 346/Duckering 417, 474-5562 or 2668
chanks@gi.alaska.edu

**Office Hours: TBD**

**Text:** Selley, 1999, Elements of Petroleum Geology. Academic Press, 470 p.

**Class format:**

The class will consist of lectures and homework assignments.

**Grading Policy**

The course grade will be a letter grade (plus, minus) and will be based on:

2 mid-term exams (25% each)
final exam (25% each)
homeworks (25%)

Grades will be assigned as follows:

A+ = 97-100%

A = 93-96
A- = 90-92
B+ = 87 - 89
B = 83-86%
B- = 80-82
C+ = 77-79
C = 73 – 76%
C- = 70 - 72
D+ = 65-69
D = 55-64%
D- = 50 - 54
F = <55%

The instructor reserves the right to curve the grades where appropriate.

Late homeworks will not be accepted.

**COURSE OUTLINE: (28 CLASS DAYS)**

| | | | |
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| **1** | **Intro—Why petroleum?** | | |
| | **What is Petroleum?**<br>Organic vs. inorganic origin of petroleum<br>Chemical Properties<br>Physical Properties | | **Selley Ch. 2** |
| **2** | **The subsurface environment**<br>Temperature within the earth<br>Pressure<br>Subsurface waters | **Hwk 1: Calculating geothermal gradients** | **Selley, Ch. 4** |
| | **Methods of Exploration**<br>Drilling a well<br>Well logging | **Hwk 2: Rock id** | **Selley, Ch. 3.1, 3.2, 3.5** |
| **3** | Subsurface geology and maps<br>Formation Evaluation | **Hwk 3: Examining well cuttings and well logs** | |
| | Gravity and Magnetics | | |
| **4** | Geophysical methods—Reflection Seismic--acquisition | **Hwk 4: Interpreting seismic** | **Selley, Ch. 3.3** |
| | Seismic interpretation, 3 D, 4D | | |
| **5** | **The source: How oil forms**<br>Source rock characteristics<br>Productivity and Preservation of Organic Matter.<br>Hydrocarbon Maturation | | **Selley, Ch. 5** |

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|---|---|---|---|
| | Hydrocarbon Migration | | |
| | **Midterm I** | | |
| **6** | **The Reservoir:** | | |