Geol 415 Petroleum Geology
Spring, 2004

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COURSE OUTLINE
&
REFERENCES
Tentative List of the Topics to be Covered

- General Introduction
- Sources of Information
- Terminology
- A Brief History of the Science of Petroleum Geology
- Facts and Figures
- Physical Properties
- Chemistry of Hydrocarbons
- Origin of Petroleum
- Migration of Hydrocarbons
- Reservoirs and Accumulation of Hydrocarbons
- Basins
- Wire-line Logs
- Subsurface Mapping
- Case Histories (including examples from Saudi Arabia)
Methods of Instruction

The course consists of two sessions of 75 minutes lectures per week. When deemed necessary, some lectures will be substituted with appropriate instruction videos. Most of the lecture materials will be posted in the university WebCT®.

Class Attendance Policy

Attendance in the class is expected and required. If you are going to miss a class for a valid reason, you must inform your instructor at least a week ahead of the lecture to arrange alternatives to cover the missed lecture(s).

Grading & Examination

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<td>Major Examination 1</td>
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<td>Assignments (3)</td>
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<td>Quizzes (3)</td>
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Example of an Examination

Section A

Answer any thirty

1. The most commonly used parameters for determining the origin (organic vs. inorganic) of natural gas:
   a. Isoprenoid
   b. Carbon isotope
   c. Polyaromatic hydrocarbons
   d. n-alkane

2. Oils having API gravities about \( \text{---} \) are usually biodegraded, high in sulfur content, or both.
   a. 40\(^\circ\)
   b. 50\(^\circ\)
   c. 10\(^\circ\)

3. Dry gases are usually formed during: formed either by or by.
   a. Early cracking of oil
   b. Catagenesis of kerogen
   c. Iagenesis of freshly-deposited organic matter in the sediment.
Section B

Answer any one of the following: 10 x 1 = 10

1. What is Oil shale? Are they really shale? Prepare a table to show the difference between oil shales and oil-source sediments (source rocks for hydrocarbons).

OR

2. List the common solid and plastic hydrocarbons. What is tar sand? Discuss the origin of Athabasca Tar Sand in Alberta, Canada.
Tissot, B.P., and Welte, D.H., 1978, Petroleum Formation and Occurrence – A New Approach to Oil and Gas Exploration: Springer-Verlag, Berlin. (Not available at the KFUPM bookstore this semester.)
Other Suggested References

Waples, D.W., 1985, Geochemistry in Petroleum Exploration: International Human Resources Development Corporation, Boston, USA.


Petroleum Geology Resources
Main sources

- Bibliographies, Abstracts, Indices
- Textbooks of petroleum geology
- Journals and periodicals for petroleum geologists
- Geological journals of direct concern to petroleum geologists
- Vital petroleum periodicals, not geological
- Short-article periodicals
- Standard geological periodicals or series
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**ARTICLES**

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- Ancient horizons and the formation of modern crystal silt in Upper Jurassic carbonate (southern Germany)  
  Carsten Riedhold  
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- Petrology and geochemistry of diagnostically altered rhyolitic rocks from the Middle Triassic of Central Spitsbergen  
  R. Muehl, A. Hall, S. Garcia-Gil, and M.G. Stumatskis  
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- Mn- and Fe-rich black shierite shales: bacterially (and nanobacterially) induced precipitates  
  Henry S. Chafetz, Brabham Akhtian, Ranera Joel, and Arch Reid  
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- Microbial biofilms in hot-spring sinters: a model based on Ohaui Pool, North Island, New Zealand  
  Brian Jones, Robin W. Renaut, and Michael R. Boman  
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- Preservation of biogenic opal-A in earliest Cretaceous radiolarian cherty rock from the western Pacific  
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- Multicomponent analysis of FTIR spectra: quantification of amorphous and crystallized mineral phases in volcanic and terrestrial sediments  
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- Processes controlling the distribution of Ti and Al in weathering profiles: calcareous sediments and sedimentary rocks  
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- An oxygen-isotope study of limestones and carbonates in three Appalachian Paleozoic vertebrate localities  
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- Unraveling the history of the eastern Himalaya and the Indo-Himalayan ranges: heavy-mineral study of Cenozoic sediments from the Bengal basin, Bangladesh  
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- Origin of fluvial gravel-size terraces in a fluvial basin: the Picnic Formation on the central Appalachian Piedmont  
  Ruth A.I. Robinson and Robert L. Shiverick  
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- Sedimentary processes at the base of a west Antarctic ice stream: constraints from terrestrial and compositional properties of subglacial and basal sediments  
  Slawek Tulaczyk, Bardoey Kamb, Reed F. Sherwood, and Hermann S. Engelhardt  
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- Cross-shore distribution of sediment textures under breaking waves along low-energy coastlines  
  Ping Wang, Richard A. Davis, Jr., and Nicholas C. Kraus  
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- Tidal dunce and sand waves in deep outer-shelf environments, Bajocian, SE Jura, France  
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