Fall 2014 COURSE SYLLABUS

Meeting Times  Lecture/Lab:  Tues/Thurs 9:35-11:35 a.m.  Room 0319 Old Main

Instructors  Dr. Lawrence D. Lemke  Dr. Edmond van Hees
Room 0224 Old Main  Room 0224 Old Main
Phone: 577-6412  Phone: 577-9436
ldlemke@wayne.edu  midas@wayne.edu

Office Hours  Tuesday noon-1:00 pm  Monday and Wednesday 11:00-11:45 am
and by appointment  and by appointment

Course Materials  There is no required textbook for this course. A series of course readings will be assigned throughout the semester.

Course Grading  Final grades will be comprised of:
  • Mineral Exploration Field Trip (or term paper)  15%
  • Petroleum Exploration Simulation  15%
  • Midterm Exams (2 exams @ 10% each)  20%
  • Homework and Lab Assignments
    o Petroleum  20%
    o Metallic Minerals  20%
  • Final Exam  10%

Course Prerequisites  Physical Geology (GEL 1010 or equivalent); Mineralogy (GEL 2130), Petrology (GEL 3160), Structural Geology (GEL 3300), Sedimentation and Stratigraphy (GEL 3400), or permission of instructors.

Course Objectives:
This course provides an introduction to economic geology of metallic and nonmetallic mineral deposits, including hydrocarbon deposits and their different tectonic settings. It is an applied course that will expose students to general principles and practical aspects of exploration for natural resources within the context of economic and strategic decision-making and responsible environmental stewardship. Experience gained in this course will benefit students seeking professional employment in applied geology and management in the mineral, petroleum or environmental fields, as well as students seeking advanced academic degrees in science or engineering disciplines that involve subsurface characterization and geologic modeling.
By the end of this semester, students should be able to:

1. Evaluate the viability of an investment opportunity using several different economic yardsticks.
2. Use common petrophysical logs to interpret the subsurface properties of oil and gas reservoirs.
3. Construct subsurface structure-contour and isopach maps using well data.
4. Estimate in-place and recoverable reserves for petroleum and ore deposits using suitable geologic maps, drill logs, and cross sections.
5. Communicate the fundamental elements of an oil and gas prospect to managers or potential investors.
6. Recognize various ore and their related gangue minerals.
7. Apply different ore deposit formation models to mineral exploration and recognize the limitations of this approach.
8. Describe the major processes involved in discovering and exploiting a mineral resource.
9. Articulate some of the causes and consequences of environmental problems that can occur if a mineral deposit is not managed properly.

Course Format and Procedures. GEL 6500 is a four credit hour course designed for graduate students and upper division undergraduate students in geology and environmental science. Meeting times will be utilized in a combination of lecture and lab format. Early in the semester, teams of students will form their own energy exploration company and compete to develop oil and gas resources in a simulated sedimentary basin. A mandatory class field trip is planned for the period of October 7th-11th. Students who cannot attend the field trip are required to complete a 15-page research paper on a topic relevant to metallic ore exploration prior to the last scheduled day of classes. Students are expected to attend all meetings of the course and should be prepared to answer questions and participate in class discussions. You may be excused from class, however, to participate in religious observances provided that arrangements are made with the instructors in advance (by September 18, 2014). If an urgent personal situation develops that precludes attending class, please inform the instructors as soon as possible. Conflicts such as student travel plans are not valid reasons for missing exams or the fieldtrip.

Academic Integrity. Each student in this course is expected to abide by the University Student Code of Conduct. Any work submitted by a student in this course for academic credit will be the student's own work. For this course, collaboration on homework and laboratory assignments is allowed in the following instances:

- Students are encouraged to study together and to discuss information and concepts covered in lecture and course readings with other students.
- Students are expected to collaborate with student team members on petroleum exploration simulation activities.
- Students can give "consulting" help to or receive "consulting" help from other students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, digital file, CD, DVD, or hard copy.

During examinations, you must do your own work. Talking or discussion is not permitted during the examinations. You may not compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course. Additionally, the Assistant Director of Student Affairs may be contacted to begin University disciplinary action.

Class recordings. Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.

Accommodations for students with special needs. The instructors are available to discuss accommodations that may be required for students with special needs of any kind. Requests for academic accommodations should be made during the first two weeks of the semester, except for unusual circumstances, so that appropriate arrangements can be made. If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, we will be glad to meet with you privately during our office hours to discuss your special needs.
## Fall 2014 Course Outline

First Day of Class: Thursday, August 28th  
Last Day of Class: Thursday, December 4th

<table>
<thead>
<tr>
<th>Week</th>
<th>Week of</th>
<th>Petroleum Topics</th>
<th>Minerals Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 28</td>
<td>Course Intro and Overview</td>
<td>Course Intro and Overview</td>
</tr>
<tr>
<td>2</td>
<td>Sept 2</td>
<td>Exploration Economics</td>
<td>Ore Minerals</td>
</tr>
<tr>
<td>3</td>
<td>Sept 9</td>
<td>Fundamentals of Petroleum Exploration</td>
<td>Exploration Drilling Strategy</td>
</tr>
<tr>
<td>4</td>
<td>Sept 16</td>
<td>Subsurface Mapping</td>
<td>Gold Deposits</td>
</tr>
<tr>
<td>5</td>
<td>Sept 23</td>
<td>Confusion Flats Exploration Simulation</td>
<td>Gold/VMS Deposits</td>
</tr>
<tr>
<td>6</td>
<td>Sept 30</td>
<td>Petrophysical Log Analysis</td>
<td>VMS Deposits</td>
</tr>
</tbody>
</table>

***** Field Trip – Oct 7-11 ******

<table>
<thead>
<tr>
<th>Week</th>
<th>Week of</th>
<th>Petroleum Topics</th>
<th>Minerals Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Oct 7</td>
<td>Field Trip</td>
<td>Field Trip</td>
</tr>
<tr>
<td>8</td>
<td>Oct 14</td>
<td>Oil and Gas Volumetrics</td>
<td>Fe/Mn-Oxide Deposits</td>
</tr>
<tr>
<td>10</td>
<td>Oct 21</td>
<td>Risk</td>
<td>Ti/Cr Deposits</td>
</tr>
<tr>
<td>11</td>
<td>Oct 28</td>
<td>Geologic Cross Sections</td>
<td>10/30 Midterm Exam – Part 1</td>
</tr>
<tr>
<td>12</td>
<td>Nov 4</td>
<td>11/4 Midterm Exam – Part 2</td>
<td>Porphyry/Stratigraphic Cu Deposits – Mineral Venture Intro</td>
</tr>
<tr>
<td>13</td>
<td>Nov 11</td>
<td>Sedimentary Basins and Plate Tectonics</td>
<td>Uranium Deposits</td>
</tr>
<tr>
<td>14</td>
<td>Nov 18</td>
<td>Confusion Flats Wrap-up</td>
<td>REE &amp; Strategic Mineral Deposits</td>
</tr>
<tr>
<td>15</td>
<td>Nov 25¹</td>
<td>Environmental Impacts</td>
<td>Environmental Impacts</td>
</tr>
<tr>
<td>16</td>
<td>Dec 2</td>
<td>Course Evals &amp; Wrap Up</td>
<td>Course Evals &amp; Wrap Up</td>
</tr>
</tbody>
</table>

¹ No Class on Thursday November 27th (Thanksgiving).

**Final Exam:** Monday, December 15th, 8:00 am.

Note: The instructors reserve the right to modify the course content and schedule as the semester progresses in order to take into account changing needs of the students and instructors, weather-related closures, power outages, or any other unforeseen circumstances.