GOL 535 001  
Non-Seismic Methods

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Office Hours: M-F 8:00 - 9:30 AM & T&R 2:00 – 3:00 PM  
Class meeting time: Lecture T 9:30-11:10; Lab R 9:30-12:00  
Class meeting place: Online (Zoom); Reserved Classroom: MS 326

Text and Materials:  
Introduction to Applied Geophysics by Burger, Sheehan and Jones

Course Description:  
This course is designed to teach students to collect and interpret non-seismic data that will help solve problems in the environmental, petroleum, mining and engineering fields. Lectures will cover theory, instrumentation and interpretation techniques for various geophysical methods. Labs will emphasize the collection, processing and analyses of real or simulated data sets.

Tentative Course Outline (GOL 535)

**Electrical Methods** (Chapters 5): electrical properties of Earth materials, theory of current flow in the earth, collection of electrical data (SP, DC resistivity, EM), interpretation of electrical data, applications, discussion of journal articles

**Electromagnetic Methods** (Chapter 8 and supplements): electromagnetic properties of Earth materials at radar frequencies, data collection, data interpretation, applications, discussion of journal articles

**Lecture Exam #1**

**Gravity Methods** (Chapter 6): density distribution in the earth, collection of gravity data, analysis of gravity data (including various corrections applied to gravity data), interpretation of gravity data, applications to geological and geophysical studies, discussion of journal articles

**Magnetic Methods** (Chapter 7): magnetic properties of Earth materials, Earth's magnetic field, collection of magnetic data, data enhancement techniques, interpretation techniques, applications, discussion of journal articles related to case studies in magnetics.

**Lecture Exam #2**
Tentative Lecture and Laboratory Schedule

<table>
<thead>
<tr>
<th>Wk#</th>
<th>Wk of</th>
<th>Lecture Topics</th>
<th>Lab Assign Topics</th>
<th>Reading Assign</th>
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<tbody>
<tr>
<td>1</td>
<td>25-Aug</td>
<td>Introductory Lecture</td>
<td>Introduction/Proj. Assign</td>
<td>Burger, Ch 1</td>
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<tr>
<td>2</td>
<td>1-Sep</td>
<td>Electrical Methods I</td>
<td>Resistivity I</td>
<td>Burger, Ch 5</td>
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<tr>
<td>3</td>
<td>8-Sep</td>
<td>Electrical Methods II</td>
<td>Resistivity II</td>
<td>Burger, Ch 5</td>
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<tr>
<td>4</td>
<td>15-Sep</td>
<td>Electrical Methods III</td>
<td>Resistivity III</td>
<td>Burger, Ch 5</td>
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<td>5</td>
<td>22-Sep</td>
<td>Electromagnetic Methods I</td>
<td>Electro Magnetic I</td>
<td>Burger, Ch 8</td>
</tr>
<tr>
<td>6</td>
<td>29-Sep</td>
<td>Electromagnetic Methods II</td>
<td>Methodology Due/Pres.</td>
<td>Burger, Ch 8</td>
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<td>7</td>
<td>6-Oct</td>
<td>Review</td>
<td>Exam #1</td>
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<td>8</td>
<td>13-Oct</td>
<td>Gravity I</td>
<td>Gravity Prospecting I</td>
<td>Burger, Ch 6</td>
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<td>9</td>
<td>20-Oct</td>
<td>Gravity II</td>
<td>Gravity Prospecting II</td>
<td>Burger, Ch 6</td>
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<td>10</td>
<td>27-Oct</td>
<td>Gravity/Magnetics</td>
<td>Gravity Prospecting III</td>
<td>Burger, Ch 6/7</td>
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<td>11</td>
<td>3-Nov</td>
<td>Magnetics</td>
<td>Magnetic Prospecting</td>
<td>Burger, Ch 7</td>
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<td>12</td>
<td>10-Nov</td>
<td>Magnetics/Review</td>
<td>Presentations</td>
<td>Burger, Ch 7</td>
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<td>13</td>
<td>17-Nov</td>
<td>Other Non-Seismic Methods</td>
<td>Exam #2</td>
<td>TBD</td>
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<tr>
<td>14</td>
<td>24-Nov</td>
<td>Thanks Giving</td>
<td>Thanks Giving</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>1-Dec</td>
<td>Other Non-Seismic Methods</td>
<td>Final Proj. Presentation</td>
<td>TBD</td>
</tr>
<tr>
<td>16</td>
<td>8-Dec</td>
<td>Week of Finals</td>
<td>Final Proj. Presentation</td>
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GRADING:

- Lecture Exam #1 20%
- Lecture Exam #2 20%
- Final Project 30% (Paper – 20%; Pres. 10%)
- Lab Assignments 20%
- Quizzes 10%
- Overall grading: >90% = A
  80-89% = B
  70-79% = C
  60-69% = D
  <60% = F

Program Learning Outcomes:

1. Demonstrate knowledge of the fundamental core geologic concepts (Mineralogy, Petrology, Structural Geology, Stratigraphy, Geophysics and Geochemistry). (Concepts)
2. Execute geologic procedures and methods accurately, appropriately and efficiently. (Skills)
3. Apply principles of logic and reasoning to develop and analyze geologic problems. (Logical - Reasoning)
4. Demonstrate competence in using various geologic tools, including technology, to formulate, represent, and solve problems. (Critical thinking - Problem Solving)
5. Demonstrate proficiency in communicating geologic information in an appropriate form to the expected audience. (Communication)
**Student Learning Outcomes:**
Upon completion of this course, the students will acquire an understanding of the following topics:
1. Gravity data acquisition, processing, and application
2. Magnetic data acquisition, processing, and application
3. Electrical data acquisition, processing, and application
4. Electromagnetic data acquisition, processing, and application

**Topics Covered:**
1. Gravity Methods  3 Weeks
2. Magnetic Methods  2.5 Weeks
3. Electrical methods  6.5 Weeks
   a. Spontaneous Potential
   b. DC Resistivity
   c. Electromagnetic Methods
   d. Induced Polarization Methods
4. Electromagnetic Methods  3 Weeks

**CLASSROOM POLICIES**

**Exams**
Exam may include a multiple-choice section. However, you will not be required totake a scantron to the exam room. Other sections may include: matching; true/false questions; short answers; fill in the blanks; and/or short essay questions. All exams will take place in the regular classroom, unless otherwise stated. The use of calculators will not be permitted during exams. A review sheet for the upcoming exam may be issued prior to the date of the exam.

If you have a scheduling conflict with an exam for an officially sanctioned University reason, you may take the exam at a different time or date. However, you must inform me at least a week before the exam. **Make-up exams** will only be given in documented the cases of illnesses, official university activities, or deaths in the family. Bear in mind that this is a graduate class and if there is going to be a scheduling conflict, I will be able to discuss it with you on a one to one basis. If the final exam is missed for a legitimate excuse, an "Incomplete" will be given and the final can be taken next semester. **Make-up exams** may be in essay format.

**Final Project:** Before 8:00 AM on Monday, November 30th, 2018, students will email digital copies of their final term project papers to a D2L dropbox account setup by course instructor. Manuscripts must be 3500 words (±10%) not including figure captions and reference citations.

The topic of the final project will be decided on the first day of lab. We have several industry grade geophysical tools here in the Department of Geology and each student will be assigned a tool, which will be used to collect geophysical data for their final project. The first lab session will be used to introduce students to the operation, use and care of their assigned geophysical equipment.
You will read several articles and extract useful information from them to help you write up your final project. There should be at least 8 peer reviewed publications referenced in writing up the final reports. Textbook information can be used for reference but will not be counted as a peer-reviewed article.

Students are responsible for the planning, execution and interpretation of their research project from beginning to end. A project methodology writeup and presentation will be due by the end of week 6 (September 29th lab meeting). A separate presentation of a selected peer-reviewed journal article over the assigned topic will be made during the lab session of week 12 (November 10th). Further instructions will be given for the journal article presentation during the first four weeks of class.

Your term paper should have ample figures to illustrate your findings. All illustrations need unique figure numbers and a caption explaining the figure. All figures need to be mentioned by number in the text of your paper. Figures should appear in the order in which they are mentioned in the text and references should follow the format of the GSA.

**The Final Presentation:** Each student will make one formal presentation to the class. The topic will be the same as your term project.

**Final Project Methodology:** Students will upload a digital copy of their planned methodology for their final project. The project methodology must include at least 4 peer-reviewed articles and a minimum of 1000 words. This is due on Thursday, October 1, by 8AM. The methodology writeup carries the same value as a weekly lab.

**Lecture:**
You are expected to be prepared for each lecture period by reading the material to be covered in lecture prior to attending class. This will help you to better comprehend the material given during the lecture.

**Late policy:** Homework/Projects will be due at beginning of lecture/lab on due date. Late assignments will be penalized 10% plus an additional 5%/day after the due date. No credit will be given after the corrected assignment has been handed back.

**Electronic Devices:** Please turn off all cell phones and audio pagers before class.

**Office Hours:**
I have listed my scheduled office hours at the top of this syllabus. Please feel free to drop by or call to raise questions or concerns regarding this course. If you need to speak to me but cannot come to my office during the posted hours, I will make an appointment to meet with you at another time. You can also email me at anytime.
HELPFUL HINTS:
- Attend classes regularly and punctually
- Review both lecture and laboratory material regularly (Don’t cram).
- Read your textbook(s)
- Communicate with your classmates.
- Participate fully in lab exercises.
- Develop and practice good note taking skills.
- Ask questions in class.

UNIVERSITY POLICIES
Add/Drop Policy
Students may add courses through the 2nd class day during the summer semesters and through the 4th class day during the fall or spring semesters. Academic Department Chairs may reconcile class schedules through the official reporting date. Students may drop classes through five working days past mid-semester or mid-session as applicable. A student will not be allowed to drop a course after these dates, unless he or she withdraws from the University. For information please visit: (http://www.sfasu.edu/upp/pap/academic_affairs/add_drop.html)

Academic Integrity
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own.
In the hopes of deterring incidents of cheating and/or plagiarism this class employs a "zero tolerance" policy meaning that if a student commits cheating or plagiarism they receive a grade of F for the class.

Disability Services (DS)
If you have a documented disability that may require assistance, you will need to contact the Disability Services (DS) for coordination in your academic accommodations. Disability Services is located within The Human Services Building, Room # 325. The DS phone number is (936) 468 3004. You may also visit their website at http://www.sfasu.edu/disabilityservices/index.htm. If you have a special need/disability, please let me know outside of class sometime during the first week of the course. This helps me to adjust or alter plans so that problems can be minimized and your learning experience can be maximized.

COVID-19 MASK POLICY
Masks (cloth face coverings) must be worn over the nose and mouth at all times in this class and appropriate physical distancing must be observed. Students not wearing a mask and/or not observing appropriate physical distancing will be asked to leave the class. All incidents of not wearing a mask and/or not observing appropriate physical distancing will
be reported to the Office of Student Rights and Responsibilities. Students who are reported for multiple infractions of not wearing a mask and/or not observing appropriate physical distancing may be subject to disciplinary actions.