Geophys 377
Seismic Interpretation

Syllabus – Fall 2013
Instructor: Dr. Kelly Liu
Professor of Geophysics

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URL: http://www.mst.edu/~liukh
Lectures: Mondays & Wednesdays 2:00 – 2:50 am; Labs: M. or W. or F. 3-4:50 (selected wks)
Room: Lectures: Egmt: 00103, Labs: McNutt: B14
Office hours: Mon., Wed. 3 – 4 pm

Catalog Description
An introduction to 2-D/3-D seismic structural interpretation, stratigraphic interpretation, reservoir identification and evaluation, and horizon and formation attributes. The students are expected to master interactive 2-D/3-D seismic interpretation software packages that are routinely used in the petroleum industry. Prerequisite: Geophys 270 or 385.

Course Objectives
GEOPHYS 377: Seismic Interpretation is a course designed for undergraduate students:

- To acquire basic skills in interpretation of 2-D/3-D seismic data
- To gain theoretical knowledge of seismic structural interpretation, stratigraphic interpretation, reservoir identification and evaluation, and horizon and formation attributes
- To master the SMT-KINGDOM Suite seismic interpretation software

Course Grading
Course grade will be based on the labs on interpretation of seismic data on the geo-workstations and data processing (20%), a midterm exam (25%), course attendance and participation (5%), Homework (15%), and a final exam (35%).

A: ≥90%; B: 80%-89%; C: 70-79%; D: 60-69%; F: <60.

Reference Books
- Interpretation of Three-Dimensional Seismic Data, 7th edn by Brown
- Basic Exploration Geophysics by Robinson and Coruh

How to get a good grade
- Come to lectures
- Memorizing through understanding
- Do homework and labs individually
- Questions? Ask
## Tentative Course Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Content</th>
<th>Refs</th>
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<tbody>
<tr>
<td>W1 – Aug. 19</td>
<td>Introduction; Elasticity</td>
<td>Handout-Ch1</td>
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<tr>
<td>W2 – Aug. 26</td>
<td>Elasticity; Seismic body waves; Snell’s law</td>
<td>H-Ch1</td>
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<td>W3 – Sept. 2</td>
<td>Critical refraction; Seismogram; Dynamic range Lab 1 – Data acquisition</td>
<td>H-Ch1</td>
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<td>W4 – Sept. 9</td>
<td>Reflected seismic waves Lab 2 – SMT Kingdom – color display</td>
<td>H-Ch2</td>
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<td>W5 – Sept. 16</td>
<td>Acoustical Impedance; Convolution Lab 3 – SMT Kingdom – fault interpretation</td>
<td>H-Ch3</td>
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<td>W6 – Sept. 23</td>
<td>Reflection Coefficient</td>
<td>H-Ch3</td>
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<tr>
<td>W7 – Sept. 30</td>
<td>2D vs. 3D; Seismic display; Polarity and color Character and zero-phaseness Lab 4 – SMT Kingdom – horizon interpretation</td>
<td>H-Ch3</td>
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<td>W8 – Oct. 7</td>
<td>Midterm Exam</td>
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<td>W9 – Oct. 14</td>
<td>Petroleum Systems</td>
<td>Handout</td>
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<td>W10 – Oct. 21</td>
<td>Structure interpretation Direct contouring and the importance of the strike perspective; Fault recognition and mapping; Interpretation in the vicinity of salt; Composite displays; Interpretation procedures; Visualization and autotracking Lab 5 – SMT Kingdom – Fault and horizon interpretation</td>
<td>Brown-Ch3</td>
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<td>W11 – Oct. 28</td>
<td>Stratigraphic interpretation Methods of making horizon slices; Horizon slice examples; Windowed amplitude; Reconstructing a depositional surface Lab 6 – SMT Kingdom – Synthetic seismic generation</td>
<td>B-Ch4</td>
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<tr>
<td>W12 – Nov. 4</td>
<td>Reservoir identification Bright &amp; dim spots; Polarity reversal, Polarity and phase problems; Use of frequency, amplitude variations with offset and shear waves</td>
<td>B-Ch5</td>
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<td>W13 – Nov. 11</td>
<td>Direct hydrocarbon indicators examples Lab 7 – SMT Kingdom - VuPak</td>
<td>B-Ch5</td>
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<td>W14 – Nov. 18</td>
<td>Reservoir Evaluation Net pay thickness; Pore volume</td>
<td>B-Ch7</td>
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<td>W15 – Dec. 2</td>
<td>Horizon and formation attributes 4D seismic interpretation</td>
<td>B-Ch8</td>
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<tr>
<td>Finals week</td>
<td>Final exam (Comprehensive)</td>
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### Class Policies

- Class attendance and participation is required. Please come to classes on time. You need to get my pre-approval to receive credit for any absence.
- Homework is due at the beginning of class on the due date. Late works will be accepted with reduced points, with a 20% reduction each additional day.
- Assignments must be completed independently. While discussions and collaborations during class time are encouraged, homework problems must be solved independently.
Academic Alert System: [http://academicalert.mst.edu](http://academicalert.mst.edu) The purpose of the Academic Alert System is to improve the overall academic success of students by improving communication among students, instructors and advisors; reducing the time required for students to be informed of their academic status; and informing students of actions necessary by them in order to meet the academic requirements in their courses.

Academic Dishonesty: [http://registrar.mst.edu/academicregs/index.html](http://registrar.mst.edu/academicregs/index.html) Page 30 of the Student Academic Regulations handbook describes the student standard of conduct relative to the System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism or sabotage.

Classroom Egress Maps: Please familiarize yourself with the classroom egress maps posted on-line at: [http://registrar.mst.edu/links/egress.html](http://registrar.mst.edu/links/egress.html).

Disability Support Services: [http://dss.mst.edu](http://dss.mst.edu); Disability Support Services is located in 204 Norwood Hall. Their phone number is 341-4211 and their email is dss@mst.edu.

**Tips for a Successful Student Created by S&T Faculty**

*Modified by Kelly Liu*

1. GO TO CLASS.
2. Set goals and know your priorities.
3. Turn off cell phones in class – NO TEXTING!!!!!
4. Read the course syllabus and note: classroom expectations; when tests are scheduled; and projects are due.
5. Take notes in class; Review notes from class.
6. Hand in assignments on time.
7. Ask questions.
8. Ask for help early – know when and where to get help.
9. Study every day – form and join study groups – don’t wait for a study group to come to you.
10. Balance your time – leave Halo 3 at home!!
11. Eat right, get enough sleep, and stay healthy.
12. Know the difference between “collaboration” and cheating/plagiarism.
13. Check emails and BB often.