Geophys 488
Advanced Seismic Interpretation

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

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Lecture: Mondays & Wednesdays 11:00 – 12:15 McNutt 312
Office hours: by appointment

Catalog Description
The integration of geologic information, well log data and seismic information for interpreting the earth's subsurface using advanced 3-D seismic interpretation software packages. Reservoir identification and evaluation as well as horizon and formation attributes are included. Prerequisite: Geophys 270 or Geophys 385.

Course Objectives
GEOPHYS 488: Seismic Interpretation is a course designed for graduate students:

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

Course Grading
Course grade will be based on the homework and labs on interpretation of seismic data on the geoworkstations and data processing (30%); a midterm exam (20%); a course project with presentation (15%); course attendance and participation (5%); and a final exam (30%).
A: ⩾90%; B: 80%-89%; C: 70-79%; 60-69%; F: <60.

Required Book: Interpretation of Three-Dimensional Seismic Data, Brown
Reference Books:
- Basic exploration geophysics, Robinson and Coruh
- Seismic stratigraphy, basin analysis and reservoir characterisation, Veeken
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| W1 – Aug. 19 | Introduction  
Review basic concepts: Seismic waves; Wavelet; Seismic sections |        |
| W2 – Aug. 26 | 2D vs. 3D; Seismic display; Volume concept; Slicing the data volume; Dynamic range and data loading; Polarity and color; Character and zero-phaseness | Ch1    |
| W3 – Sept. 2 | Labor Day Holiday – no class Sept. 2  
Color principles; Interpretative value of color; SMT Kingdom | Ch2    |
| W4 – Sept. 9 | Structural interpretation  
Direct contouring and the importance of the strike perspective; Fault recognition and mapping; Interpretation in the vicinity of salt; Composite displays; Interpretation procedure; Advantage and disadvantages of different displays; Subtle structural features; Visualization and autotracking | Ch3    |
| W5 – Sept. 16 | Stratigraphic interpretation  
Seismic facies; Internal reflection configuration; External geometry of seismic facies units | Veeken Ch3 |
| W6 – Sept. 23 | Stratigraphic interpretation  
Recognition of characteristic shape; Methods of making horizon slices; Unconformity horizon slices; Windowed amplitude | Ch4    |
| W7 – Sept. 30 | **Midterm Exam**  
Reservoir identification  
Bright spot; Dim spot; Polarity Reversal | Ch5    |
| W8 – Oct. 7 | Reservoir identification  
Examples of bright spots, flat spots, dim spots, phase changes; Polarity and phase problems | Ch5    |
| W9 – Oct. 14 | Seismic resolution, vertical and horizontal resolutions  
Tuning phenomena in reservoirs | Ch6    |
| W10 – Oct. 21 | Tuning phenomena in reservoirs  
Statistical tuning curves | Ch6    |
| W11 – Oct. 28 | Reservoir evaluation  
Reservoir properties from seismic; Horizon slices over reservoir interfaces; Composite amplitude; Net pay thickness | Ch7    |
| W12 – Nov. 4 | Horizon and formation attributes  
Classification of attributes; Time-derived horizon attributes; Coherence; Post-stack amplitude attributes | Ch8    |
| W13 – Nov. 11 | Horizon and formation attributes  
Hybrid attributes; Frequency-derived attributes; Volumetric attributes and curvature; AVO | Ch8    |
| W14 – Nov. 18 | Horizon and formation attributes  
Spectral decomposition | Ch8    |
| W15 – Dec. 2 | 4D | Ch13 |
| Finals week | **Final exam - Comprehensive - TBA** |        |
Class Policies

- Class attendance and participation is required. Please be 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 not be accepted, unless you get the approval from the instructor before the deadline.

How to get a good grade

- Come to lectures; Memorizing through understanding
- Do homework and labs individually; Questions? Ask

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).