Welcome to EART150: Structural Geology

This course will cover a broad range of topics and develop skills you can use in all aspects of science, including observation, documentation, writing, cognition, reading primary literature, and of course, practice with the Brunton compass. While developing your skill base we will explore the range of structural features found in compressional, extensional, and transform regimes on the earth's surface. Topics will include: jointing, vein formation, growth and propagation of faults, pressure and temperature within the crust and characteristic deformation styles, basic mathematics and graphical representations of stress and strain, and techniques used for structural analysis such as stereonets.

Text
Required: Davis, George H. and Reynolds, Stephen J., Structural Geology of Rocks and Regions, John Wiley & Sons, 1996. Although this book is just over $100 new, I was able to find several copies in the $60-70 range in a quick internet search.

Requirements
Concurrent enrollment in the Laboratory Section (ES150L) is required as the laboratory exercises are inextricable from the course and field trips count for both. Field trips will not be missed. Attendance at all class meetings is mandatory. Since much of structural geology depends on experiential learning, you will not be able to substitute somebody else's notes for attendance in class.

Regarding the reading, I've assigned 50 pages or less each week of the quarter. I am fully aware that nobody does all the reading all the time. So, if you don't have time to carefully review each assigned page, take the time to peruse the figures. You can get the gist of it from reading the captions and looking at the pictures. However, this is NOT permission to skip the reading - don't forget you may be responsible for anything in the assigned reading!

Assignments
- Weekly Observations: We geologists like to think of ourselves as the philosophers of hard science. Reflection on our subject and on the state of our own knowledge enables progress. Each week, I will give you a question which deals with your current thinking on course topics, or more generally, how you are thinking about your progress in the class. You'll write a short response (~500wds).
- Web-based Field Trip Guide: We have 4 1/2 days of field trips in this class. For each trip, an expert team will research the locality and create a web-based field trip guide, including research done before the field trip and building in the class results to complete the web page. These will be available online to other geologists and the general public - your structural legacy, so to speak.
- Paper critiques: We will read and critique three papers from the journal "Geology" which utilize techniques you will be learning. We may also have invited speakers who are doing current research in structural geology, of whom you can ask interesting and informed questions.
- Field Trip Reports: These are the essence of the experiential course and will count for most of your lab grade. These will be evaluated on data quality, analysis, strength and brevity of writing, and development and defense of meaningful conclusions, and ability to place your results in context.
- Field and In-Class Participation: Pretty qualitative. I won't be marking points for each time you raise your hand. I will make a special note if you ask something particularly thoughtful, or I notice you helping another student.
- Problem sets: There will only be a couple of these. I will specify whether they are individual or cooperative assignments.
- Exam: Will occur during Week 8 and will be cumulative.
- Final Reports: By week 2, you'll select a geographic region of interest which you will track throughout the course as we cover different aspects of structural geology. We'll use our exam period during finals week for presentations where you will report on the structural features of your region, using handouts and visual aids, either overheads or PowerPoint.

Assessment
There will be two general types of assessment in this class. Formative assessment is for me to determine how things are going and to help you build on your own learning. These will be for credit but not graded. Summative assessments will be projects, presentations, field reports, and the exam, which will count toward your grade. I believe strongly in using fair assessments for all learning styles, so please let me know if you have particular needs, documented or otherwise.

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<thead>
<tr>
<th>Class Assignments</th>
<th>Credit</th>
<th>% of Final Grade</th>
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<tbody>
<tr>
<td>Weekly observation</td>
<td>P/NP</td>
<td>7%</td>
</tr>
<tr>
<td>Web-based Field Trip Guide</td>
<td>Grade</td>
<td>12%</td>
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<tr>
<td>Paper critiques / speaker questions</td>
<td>Grade after first one</td>
<td>8%</td>
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</tbody>
</table>
Field trip reports                      Grade after Natural Bridges 20%
Participation in discussions in class  P/NP 10%
Problem sets                             Grade 10%
Midterm exam                              Grade 15%
Final presentations                       Grade 18%
Total                                      100%

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<thead>
<tr>
<th>Lab Assignments</th>
<th>Credit</th>
<th>% of Final Grade</th>
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<tbody>
<tr>
<td>Field trip reports</td>
<td>Grade</td>
<td>64%</td>
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<tr>
<td>Lab problem sets/ exercises</td>
<td>Grade</td>
<td>36%</td>
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<tr>
<td>Total:</td>
<td></td>
<td>100%</td>
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Grading Policy
All assignments are due one week from when you get them, except field reports, which are due in the second lab following the field trip. Turn things in at the beginning of the class when they are due, i.e. if something is due in lab at 4pm and you work on it during lab and turn it in at 6pm it is one day late. Grades decay exponentially with a half-life of 14 calendar days (counting weekends, since I work most weekends anyway, and you can turn things in via email at any time). \[ G = G_0 e^{-\lambda t} \] where \( G_0 \) = your raw score on the assignment, \( \lambda \) = the decay constant (= one over the half life) and \( t \) = the number of late days. So one day late = 93\% \( G_0 \), two days = 87\% \( G_0 \), three days = 81\% \( G_0 \), seven days = 61\% \( G_0 \), etc. Therefore, if you turn things into my box or the TA's box in the office, it's key to get the office people or some other reputable party to sign off on your turn in date and time.

Opportunities for Extra Credit

1. Mastery Problems
   I will make these available as we learn techniques throughout the course which you might master. They are not easy. You may earn up to 5\% pts on your final grade for each problem completed correctly, partial credit is possible for courageous attempts. THESE ARE SOLO PROBLEMS. No exceptions.

2. Expand your Experience
   Attend a meeting or field trip of any of our local geological societies, and do a write up of the meeting (750 to 1000 words). I'll be announcing monthly meetings of the Peninsula Geological Society, which meets at Stanford University, and the Northern California Geological Society, which meets in Walnut Creek. Write-ups should summarize all aspects of your experience there including contact with other geologists from different fields, as well as the evening presentation. (up to 5\% points available.)

3. Earth Science Department Seminars
   Attend one of the Whole Earth, IGPP, CSIDE, or CDELSI seminars (usually Tuesdays and Fridays at 4 in Nat Sci Annex 101). Do a 750-1000wd write up of the talk, for up to 2\% of your final grade. May be done twice for credit. Check department bulletin boards for talk topics.

4. Community Education
   Occasionally we find opportunities to use earth science knowledge in service to the community. If you do this in some way, lead a field trip, comment to the city on a public works project, do a presentation in a classroom or convalescent home, volunteer tutor, whatever, let me know and we can discuss writing it up for extra credit.