Skills and concepts-driven revision of the Texas A&M B.S. Geology and B.S. Geophysics degrees

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Overview of TAMU Geology and Geophysics Dept.

30 tenure/tenure-track faculty
(8 newly added over last 3 years)

large recent increases in undergrad majors
(currently ~550)

~100 graduate students
Service teaching : 900-1200 students/sem.

Last revision of curriculum: 1998
Formed the **Curriculum Study Group** (G&G faculty and CTE curriculum experts, students, academic advisor)

- Gathered Data... *Summer/Fall 2014*
- Identified Ideal Student, Program Learning outcomes
  And wrote rubrics for outcomes *Spring 2015*

Discipline-specific working groups *Summer/Fall 2015*

- Designed plan for courses using the developed rubrics

Entire Faculty

- Settled on plan of courses *Fall 2015*
- Create Curriculum Map *In progress*
- Design/Redesign courses *Spring 2016*
- Develop assessment plan/instruments
Former Student Survey

How prepared do students feel?

**Most used**
- Oral communication
- Problem solving
- Working in teams
- Learning and using computer software
- Written communication
- Analyzing data
- Maps, cross-sections, and stratigraphic columns
- Using scientific literature
- Quantitative skills (math, statistics)
- Field observations and data collection
- Identifying and classifying rocks and minerals
- Lab work

**Least used**
- Computer programming
Geoscience Learning Outcomes

1. **Earth Materials:** Evaluate relationships between Earth materials and Earth system processes
2. **Earth Dynamics:** Infer the state and evolution of the global Earth system from fundamental physical/chemical/biological processes
3. **Space & Time:** Recognize the variability and interdependence of Earth’s systems through time and space, from the micro- to macro-scale
4. **Modeling and Manipulating Data:** Analyze data and develop models to understand geological systems
5. **Earth System Processes:** Interpret Earth’s surface based on interaction between the atmosphere, biosphere, hydrosphere and geosphere.

Texas A&M Undergraduate Learning Outcomes (Professional Skills)

6. **Demonstrate Critical Thinking**
7. **Effectively communicate**
8. **Practice Personal & Social Responsibility**
9. **Demonstrate social, cultural and global competence**
10. **Prepare to engage in Lifelong Learning**
11. **Work collaboratively**
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Novice</th>
<th>Developing</th>
<th>Proficient</th>
<th>Exemplary</th>
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<tbody>
<tr>
<td>Global Heat Budget</td>
<td>Define pressure, temperature, and describe their variation within the Earth</td>
<td>Describe how changes in pressure and temperature affect the state and rheology of Earth materials</td>
<td>Identify the sources of heat in the deep Earth and the mechanisms of heat transfer</td>
<td>Quantify the balance of heat sources and transfer mechanisms and relate to global cooling rates and region tectonic processes</td>
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<td>Visual Communication</td>
<td>Define types of graphs and variables; identify structures and processes displayed in drawings of the Earth</td>
<td>Construct graphs to display data, and reproduce drawings that display Earth structure and dynamic</td>
<td>Infer relationships from visualized data. Connect graphical relationships with geological concepts.</td>
<td>Combine text, visualizations and quantitative arguments to communicate interpretations of geologic processes</td>
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Lessons Learned (so far)

Get the right mix of people involved from the start

Keep touching base with reality/constraints

Bring (almost) everyone along