On the Cutting Edge

An NAGT Professional Development Program for Geoscience Faculty 2013-14

TEACHING AN INTRO COURSE

Preparing for an Academic Career Workshop 2014

Becca Walker, Mt. San Antonio College
Kyle Frederick, California University of Pennsylvania
Rosemary Capo, University of Pittsburgh

Valencia Peak, Los Osos, CA, spring 2013

Owens Lake, CA – Pittsburghers get out of the city

Make intro classes effective

- Know your audience
- Engage students
- Communicate relevance
- Make geoscience accessible to non-majors
- Recruit new majors

Issues

- Syllabus
- Academic integrity
- Classroom management
- Engaging majors and non-majors
- Content: breadth vs. depth

Case studies

Small (20-35), primarily non-science majors, 2-year institution

- Becca Walker
- Mt. San Antonio College, Walnut, CA

Medium (30-60), majors and non-majors, 4-year institution

- Kyle Frederick
- California University of Pennsylvania

Large (>100 students) classes

- Rosemary Capo
- University of Pittsburgh

Geoscience at Mt. SAC

- With one exception, all of our courses are intro-level with no pre-requisites
  - geology, oceanography, meteorology, astronomy
- Satisfy Physical Science GE requirement.
- 3-4 unit courses. Required field trips.
- Enrollment ranges from 18-36. No TAs.
- Population: primarily non-science majors desperately trying to avoid physics and chemistry.

Issues for consideration

- Extremely diverse population of learners
  - geoscience experience
  - English language acquisition
  - quantitative and critical reasoning skills
  - level of interest
- Fear of data (especially quantitative)
- Resistance to collaborative work; unwillingness to engage

Teaching tips

- Issue: diverse population of learners
  - Tip: Have an honest conversation about how learning geoscience ways of thinking is beneficial, regardless of one's major.
  - Tip: Have extension questions/activities ready for more advanced students.
  - Tip: Embrace long pauses. Students need ample time to process during class.
- Issue: data phobia
  - Tip: Establish a routine right out of the gate in which students work with data during every class meeting. (Even for 5 minutes!)

Teaching tips

- Issue: resistance to collaborative work and engagement
  - Tip: IMMEDIATELY and EXPLICITLY establish a culture of participation but be aware that not everyone will participate in the same way.
  - Tip: Ask for deliverables (preparation exercises, group report-outs, etc.)
  - Tip: Move around the room. You should be working collaboratively, too!

Cal U: Intro to Geology

- 30 or 60 students, offered each semester
- 3 hours lecture, 1 hour lab (No TA's)
- Satisfies General Education requirement for…
  - Natural Science
  - Laboratory Course
- Indicated for majors in…
  - Geology, Env. Earth Science, Env. Science & Studies (Bio), Sec. Ed. Earth Science

Issues at Cal U

- Diversity of majors/background
  - Course is directed at the Earth Science Education students
  - Geology majors are targeted → Primary recruitment of other and undeclared
- Syllabus
  - Target integrity issues
  - Clear expectations, especially "University-level" work
  - Attendance, Cell phones, Grade calculations → head off simple ?'s

Teaching Tips

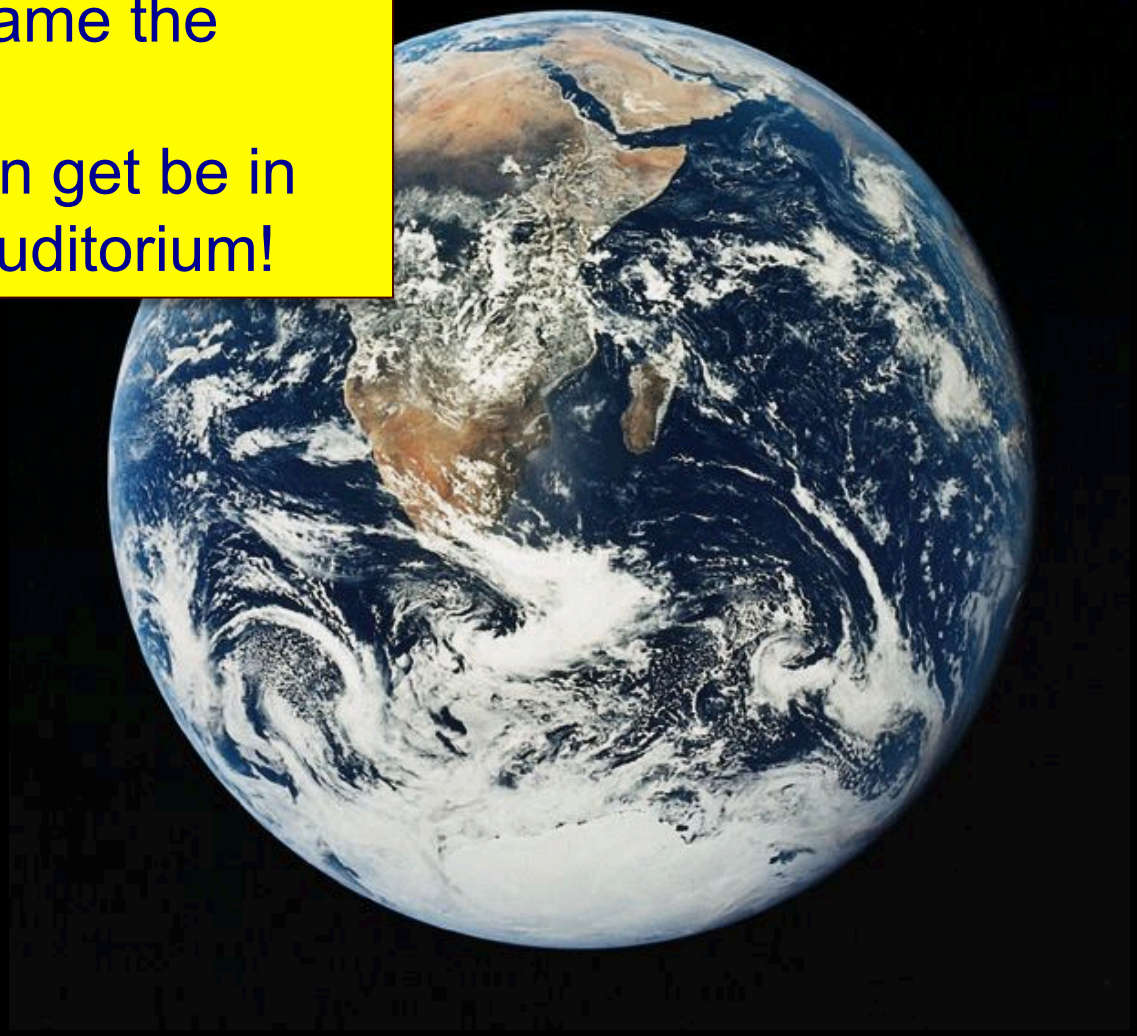
- Build from core topics → Breadth FROM Depth
  - Science Literacy
  - Time (and Evolution)
  - Plate Tectonics
    - Diversity of Earth Materials and Landforms
    - Natural Hazards
- Establish relevance (local, timely)
- Grades
  - Low stakes: In-lecture assignments
  - Med. stakes: Laboratory, hands-on
  - Hi stakes: Exams (4 or 5)

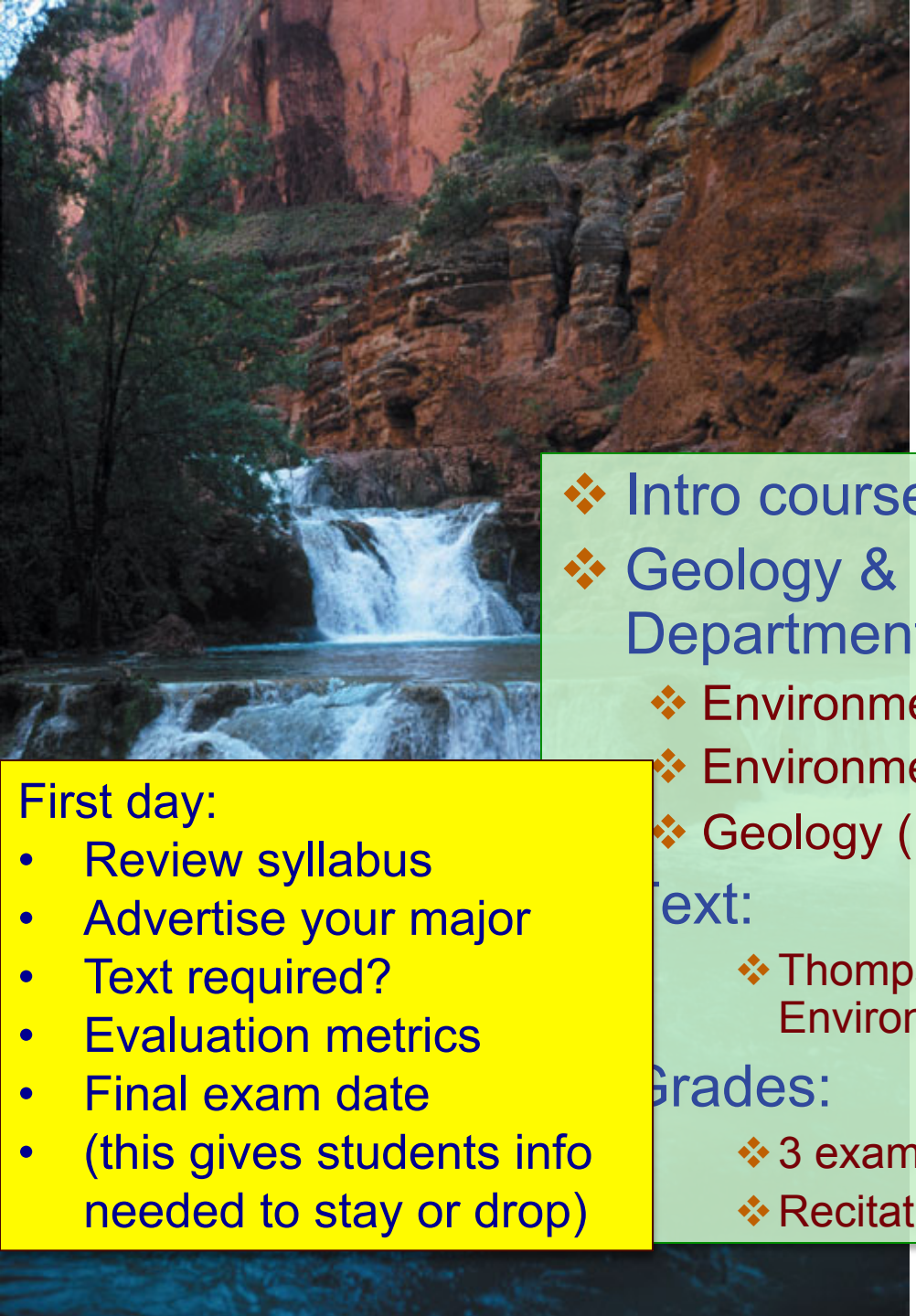
Large classes(>100 students)
University of Pittsburgh

- Large lecture hall environment
  - Know your stage – how will your lectures and your voice project?
  - Take advantage of audiovisual aids
- Attendance can be spotty if there's no incentive; find ways to interface
- Use tools such as Courseweb to post notes and messages
- Be accessible

GEOL 0860
Environmental Geology

First day: Name the course
Students can get be in the wrong auditorium!





The Course: Environmental Geology

- Intro course for three majors in the
- Geology & Planetary Science Department:
  - Environmental Studies (B.A.)
  - Environmental Geology (B.S.)
  - Geology (B.S.)

Text:

- Thompson and Turk, Earth Science & the Environment, 4th edition

Grades:

- 3 exams (25% each)
- Recitation homework/quizzes (25%)

First day:

- Review syllabus
- Advertise your major
- Text required?
- Evaluation metrics
- Final exam date
- (this gives students info needed to stay or drop)

Engage students – majors and non-majors

- **Give examples of active geoscientists – starting with yourself**
- Discuss geoscience careers
- Give opportunities to explore in more depth outside the classroom
- Solicit input from students
- Be approachable

About your instructor -

. Capo

ogy & Planetary Science

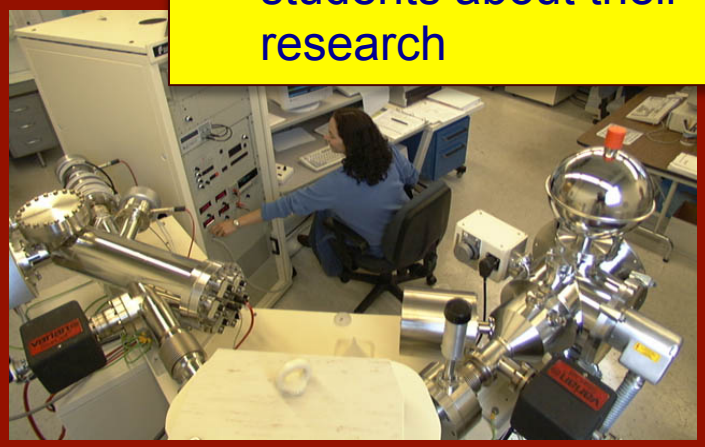
eology, Univ. of Texas at Austin

hemistry, UCLA

l Research: Berkeley, Caltech, JPL

First day:

- Tell them about yourself to break out of the "lecturer recapitulating the text" mode
- Introduce your TAs and tell students about their research



What I do: geology, environmental geochemistry (AMD, energy), geoarchaeology, soils and climate change

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- **Solicit input from students**
- **Be approachable**

Communicate relevance

- What's in the news?
- Use examples that relate to your students
- Use performance art –duck!
- Extra credit – see handout

Classroom Personal Response Systems ("Clickers")

- Ask a multiple choice question
  - Allows anonymous answers to questions
  - Displays and tallies student responses
  - Instant feedback on class understanding

Classroom management
Recitation sections and TAs

- Your TAs are key to the success of your course!
- Recitation sections allow for hands on experience with rocks, minerals, maps
- Allows for evaluation via exercises
- Enthusiasm and accessibility is key

Other issues

- Fair evaluation
  - Test types
  - Extra credit
  - Firm deadlines
- Disability Services/Accessibility
- Academic integrity

Resources

Examples of introductory geoscience courses

- http://serc.carleton.edu/NAGTWorkshops/intro/browse_large.html

Discussion questions

- Balance between breadth and depth
- Assessment and feedback
- Classroom management
  - Recitations
  - TAs
- Academic integrity