New Faculty Orientation

Course Development
and
Classroom Management:
Techniques for the New Professor

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Overview

- Preparing a syllabus, preparing to teach
- In the classroom
- Assessing student learning… and your teaching
- Mentoring, opportunities outside the classroom
My Perspective

- Teaching physics to undergraduates, but...
- Some experience with other disciplines
- Mentoring outside the classroom
Preparing: Getting started

- Prepare as many lectures as you can in advance
- Take the long view: connections
  - How do the different topics within the course make sense together? What are the common themes? How are the pieces relevant or interesting?
  - The connections and understandings you offer are what students are really paying for! (Otherwise they can just buy the book.)
Preparing: What to cover?

- Curriculum may already be set, especially in science, especially in lower division, especially if course already exists
- BUT! You get to pick the areas of emphasis, the examples.
  - What excited you about the material when you were at that level?
  - What did you find confusing?
  - What were the ahah! moments that brought your understanding together?
Preparing: Learning Objectives

- What do you want students to learn?
  - Big picture, details
- What skills do students need in order to be successful?
  - In your class, but also beyond
- How does this course relate to the overarching learning objectives of the program and the discipline?
  - Non-majors, majors, future grad students…
Bloom’s Taxonomy

**Evaluation**: appraise, argue, assess, attach, choose, compare, defend, estimate, judge, predict, rate, select, support, value, evaluate

**Synthesis**: arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose

**Analysis**: analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test

**Application**: apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve

**Comprehension**: classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate

**Knowledge**: arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce
Bloom’s Taxonomy ...

- Students will [be able to] <action verb> <applicable noun>
  - Action verbs like “identify,” “classify,” “design”
  - Applicable nouns like “the knowledge,” “the skills,” “the values” related to the topic
- Target both foundational knowledge and higher order thinking
Bloom’s Taxonomy ...

Students will be able to...

... **recognize** diverse religious **phenomena**, such as art, music, other cultural expressions of religious belief.

... **interpret** significant **objects**, ideas, issues, and events in their historical contexts.

... **utilize** mathematical **ideas** from multiple perspectives, e.g. the connections between theory and applications.

... **analyze differences** in power and privilege related to race, gender, ethnicity, nationality, age, language, citizenship, religion, class, sexual orientation, or physical ability.

... **apply** scientific **methods** of inquiry, such as formulating testable hypotheses, designing experiments, and collecting data.
Preparing: Syllabi

Text
Recitations
Assignments
Tutoring
Lab
Exam schedule

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Physics

Physics 8.03

1975!

Wed. Sept. 10, 1975

(1) Text "Electromagnetic Vibrations, Waves and Radiation" by C. Beken.
    [The Coop $10.00.]

(2) Course Secretary: Sue Lange
    Room 4-352, Ext. 3-4842

(3) Recitations: The primary function of the recitation instructors will
    be the presentation of a substantial fraction of the course content.
    The material the instructors will lecture on represents an integral
    part of the course for which the student is responsible and on which
    he will be quizzed. The body of material covered by the recitation
    instructors is outlined in the Calendar of Events. A secondary func-
    tion of the instructor will be to deal with questions arising from
    your reading and from the problem sets.

(4) Assignments: Reading and problem assignments will be handed out weekly
    in the Wednesday lectures. You must return your work on Friday, one
    week and two days after the problems are issued. Bankers for collect-
    ing the homework will be available at the Friday lecture. Solutions
    to the problems will be handed out on Monday 12 days after the assign-
    ment is issued. Dr. Judy Bostock, Room 6-204, Ext. 3-7607 is in
    charge of problem solutions.
    The doing of problem assignments is one of the major requirements for
    passing the course. Your work will be graded and will account for 25% of
    the final grade.

(5) Tutoring: You are strongly urged to avail yourself of individual
    tutoring that will take place daily. (The room and the exact hours dur-
    ing the day will be arranged later.) In view of the fact that the
    recitation instructors will spend a minimum of time on problem solving,
    your regular attendance at these tutoring sessions is strongly advised.
    Dr. Judy Bostock, Room 6-204, Ext. 3-7607 is in charge.

(6) Corridor Laboratory, Room 4-309: You may find it fun to spend a few
    hours doing small experiments yourself. There will be about half a
dozon of these set up. They are very relevant to the contents of this
    course.

(7) Examinations: Quiz 1 Wednesday, Oct. 15  [335]
    Quiz 2 Date to be arranged [352]
    Final During Dec. 15-18 [402]
Preparing: Syllabi

- The usual: resources, grading and other policies, dates
- Perhaps: readings, assignments
- Recommended: learning objectives
- Recommended: discussion of how assignments are tied to learning objectives
Preparing: Syllabus example

Advanced Writing

You will be asked to do brief assignments of primary and secondary sources in anticipation of class discussion. These assignments will include 1-page reader responses. These assignments address these two learning objectives of this course:

- Students will be able to write essays that contain well-supported arguable theses and that demonstrate personal engagement and clear purpose.
- Students will reflect on the writing process as a mode of thinking and learning that can be generalized across a range of writing and thinking tasks.
Preparing: Syllabus example

Gender & Sexuality in Biblical Interpretation

To identify diverse perspectives, e.g., feminist, queer, fundamentalist, and evaluate ethical positions on contemporary questions you will participate in Seminar Leadership:

Working with two other people, you will be responsible for presenting a critical analysis of the readings for two separate meetings during the quarter. Your task will be to summarize the material, outline the key theoretical insights, apply these to the primary readings for the day, and lead a discussion. You will prepare a 2-page handout.
Preparing: Syllabus example

Postcolonial United States

Reading and class participation: You are expected to read by the date indicated the material as indicated on the syllabus, and to *actively* contribute to class discussion. As you read, and in class discussions, ask yourself:

- Do the authors share a common approach to their colonial heritage?
- What sets them apart from other postcolonial writers?
- How does a particular reading mesh, or not, with previous readings?
Modern Physics

We will cover special relativity and relativistic mechanics, the quantum nature of energy and matter, the Schrödinger equation, atomic structure, nuclear structure and decays, the physics of solids, the physics of semiconductors, and elementary particle physics. After completing this course,

- Students will be able to apply physical laws at the limits of high velocities and small distances and energies.
- Students will appreciate the probabilistic nature of physics in the quantum regime.
- Students will be able to apply the equivalence of energy and mass to a range of physical phenomena.
In the classroom

- To be effective at any level, you must engage your students
- Students don’t respond to silly, but a little fun is okay. Teaching as theater? Maybe a bit.
- You wouldn’t have gotten this far unless your discipline is your passion. Show it!
In the classroom: Learning styles

- Aren’t “Learning Styles” hokey? After all, *I* don’t have a learning style. I listen, I read, I study, I practice… I learn.
- Contrived? Meaningful?
- What’s the deal?
In the classroom: Learning styles...

- Often, three categories: visual, auditory, kinesthetic (tactile)
In the classroom: Learning styles...
In the classroom: Learning styles...

- Learning styles *do* matter! So use different approaches (as is reasonable for your discipline)
  - Lecture, moderated discussion (of course)
  - Student presentations
  - In-class writing
  - Discussions, problem solving in pairs or groups
  - Demos, hands-on demos
  - Clickers (but use them judiciously)
  - (Outside-of-class writing, peer editing)
Preparing: assignments

• Assignments to be used in assessment… (Gotta give grades…)
  • Does the topic and your approach allow for different ways to demonstrate learning?

• Assignments as tools to help students learn the skills and materials…
  • Does the topic and your approach allow for different ways of learning?

• Assignments should map (although not necessarily one-to-one) to learning objectives
In the classroom

- Start each class with a quick review, and/or an outline of that day.
  - It is possible (IMHO) to spend too much time doing this, but it is helpful for students to tie in backwards and also forwards.
- Avoid starting something – a new topic, a example on the board, a demo – without giving an idea of the goal, how it relates, where you’re heading…
In the classroom

- Don’t allow material to confine you: it’s okay not to get through everything you planned for a lecture
- Pay attention to individuals and to the mood of the class
- The last thing you do leaves the biggest impression
- It’s okay to stop for a stretch or a personal story, or …
... a joke, as long as it fits

Two neutral conducting slabs are walking down the street...

I think I lost some electrons!
Are you sure?
Yes – I’m positive!
In the classroom: Presentation

- What guides your classroom presentation? Notes? PowerPoint? Bullet points?
- Me: Lectures written in full sentences!
- How I set myself free…
- You can really do three things (write, talk, plan ahead) at once!
In the classroom: Demonstrations

- They get students involved
- Ham it up. By definition, demos have to be fun, no?
- It’s okay to look like you are winging it, but don’t. (Especially if electricity is involved!)
In the classroom: Tough questions

• The tough questions – how to answer?
  • “See me after class.”
  • “Let’s discuss that in my office hours.”
  • “What a good question from one so young!”
• No, no, and no! Tough questions are exhilarating!
• If you really don’t know the answer and can’t figure it out on the fly… don’t fake it!
  • “I don’t know.”
“I don’t know” and Cognitive Development

- Reflective Judgment Model (King and Kitchener):
  - Prereflective Reasoning (Stages 1-3): Knowledge is gained through the word of an authority figure
  - Quasi-Reflective Reasoning (Stages 4 and 5): Uncertainty in claims of knowledge attributed to incomplete information; judgments are highly idiosyncratic
  - Reflective Reasoning (Stages 6 and 7): Claims of knowledge cannot be made with certainty; judgments made based on reasonability and evaluation of evidence
Cognitive Development...

- High school students, most college students are consistently in stages 1 to 3: There is a right answer; knowledge is held by an authority figure.
- By senior year, many college students get to stage 4 (judgments are idiosyncratic).
- Consistent upward changes in Reflective Judgment /cognition have been found across educational levels.
- Our job is to help students move along! Can we get to them make judgments made based on reasonability and evidence?(!)
Cognitive Development...

- It’s okay not to know the answer
- It’s okay to make mistakes
- Making a few errors intentionally has pedagogical value:
  - Get a crazy result – do the students see it?
  - Can you get the class to “figure it out together?”
- If they think the professor knows all, they are just borrowing the knowledge from you and won’t engage at the level of making the knowledge their own.
Cognitive Development...

- A corollary: It’s okay to confuse students once in a while..
  - Give them the opportunity/incentive to figure something out for themselves
  - Encourage them to question a previously held belief

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Assessing student learning

- Writing an exam
  - What are your goals? What are you trying to evaluate?
    - Surgical strikes…
  - Grading
    - If a bell curve or a flat distribution better for making grades?
    - Does the raw mean matter?
- Assigning a paper
  - Is the question clear?
  - Ask students to define terms used.
  - Suggested page length: could be good for cognitive ease.
  - Have students peer edit as part of grade.
- Final grades
  - Fudge factor
  - Be consistent. (Fair is okay, but consistent is better)
Assessing your teaching

- Assess for you, not “them/your boss/the man”
- Many opportunities for formal assessment: student evals, the SALG, narrative evals, mid-term evals,…
- Assessment doesn’t necessarily have to be formalized: what forms of feedback will help you evaluate your level of success?
  - Exam scores
  - Quality of papers
  - Quality of projects
Assessing your teaching

- Students’ poor performance: It’s not your fault. (Well, okay, it probably isn’t your fault.)
Outside the classroom: Thoughts

- Homework, papers… sure.
- Reflection essays
  - “Dialogues”
- Peer editing
- Interacting with students outside of class
  - Opportunities to connect with living groups, student organizations?
Outside the classroom

- Students at all levels need to process new information and understanding with their own vocabulary and mental imagery.
- Understanding and recall have an exponential decay... the time constant is longer when students take the opportunity to review and process.
Teaching versus mentoring

- Let students make mistakes
- Give students opportunities to develop and explore their own ideas
- The value to you:
  - Students contribute to your scholarship
    - Yes, even undergrads can!
  - Students’ advancement
  - Isn’t this why you chose this profession?!
In closing...

- Take advantage of the experience of colleagues
- Take advantage of programs for Faculty Development
- Embrace the positive, shrug off the rest
  - Discipuli non carborundum*

*Latin scholars: this is a joke.
Take this away

- Draw on your own excitement about the subject
- Draw on your own understandings and realizations, and remember what confused you
- Engage! (your students)
Is this how they see us?

FIELDS ARRANGED BY PURITY

MORE PURE

SOCIOLOGY IS JUST APPLIED PSYCHOLOGY

PSYCHOLOGY IS JUST APPLIED BIOLOGY.

BIOLOGY IS JUST APPLIED CHEMISTRY

WHICH IS JUST APPLIED PHYSICS.

IT'S NICE TO BE ON TOP.

OH, HEY, I DIDN'T SEE YOU GUYS ALL THE WAY OVER THERE.

SOCIOLOGISTS PSYCHOLOGISTS BIOLOGISTS CHEMISTS PHYSICISTS MATHEMATICIANS

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