



University of North Carolina at Chapel Hill

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# **Reforming “Gateway” Science Courses through a Mentor-Apprentice Model**

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**&**

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In one word, what do faculty need once they are convinced they should redesign their course?

*Answer at:* [pollev.com/khogan](http://www.pollev.com/khogan)

[http://www.polleverywhere.com/free\\_text\\_polls/V8kaJf3gpncvqvy](http://www.polleverywhere.com/free_text_polls/V8kaJf3gpncvqvy)

# 2013 Survey to all College of Arts and Science faculty

	Not important at all	Slightly important	Important	Extremely important
Assurance of positive valuation in the tenure and promotion process	125 (31.5%)	87 (21.9%)	105 (26.4%)	80 (20.2%)
Financial compensation to cover extra time spent on the course	105 (26.4%)	112 (28.2%)	124 (31.2%)	56 (14.1%)
Knowledge about how students are likely to respond to changes	16 (4.0%)	57 (14.4%)	191 (48.1%)	133 (33.5%)
Departmental permission to cover less material during the course	191 (48.8%)	84 (21.5%)	84 (21.5%)	32 (8.2%)
Course release	84 (21.4%)	97 (24.7%)	119 (30.4%)	92 (23.5%)
More TA support	49 (12.3%)	56 (14.1%)	132 (33.2%)	160 (40.3%)
Consultations or workshops with teaching and learning experts	60 (15.3%)	131 (33.3%)	162 (41.2%)	40 (10.2%)
More knowledge on what changes are even possible	41 (10.4%)	98 (24.7%)	172 (43.4%)	85 (21.5%)



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CULTURAL CHANGE

SCAFFOLDING

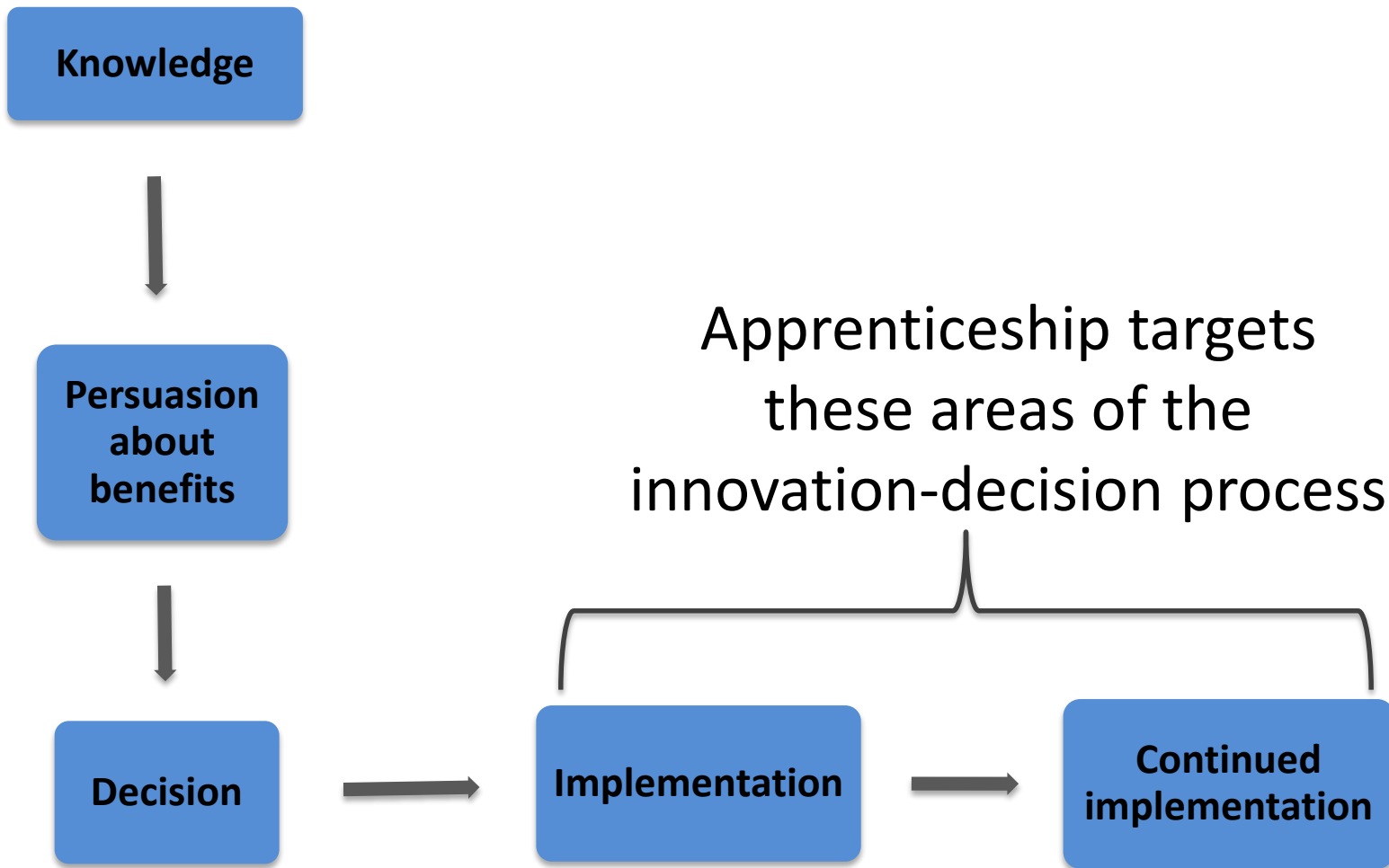
PEDAGOGY

Faculty **COURSE RELEASE** time

- *to develop course materials*
- *to apprentice in a transformed course*

Faculty Learning Communities (FLCs)

**Transform large lecture gateway courses** in Chemistry, Physics and Astronomy, and Biology using evidence-based techniques.



Henderson *et al.*-- As many of 1/3 of faculty who try don't continue.

1. Faculty redesign courses with a student-centered focus.

2. Mentors train apprentices in these redesigned courses in real classrooms.

3. Mentors and apprentices in faculty learning communities (FLCs).

3: Departments  
3: Cultures  
3: Approaches

# 1. Faculty redesign courses with a student-centered focus.



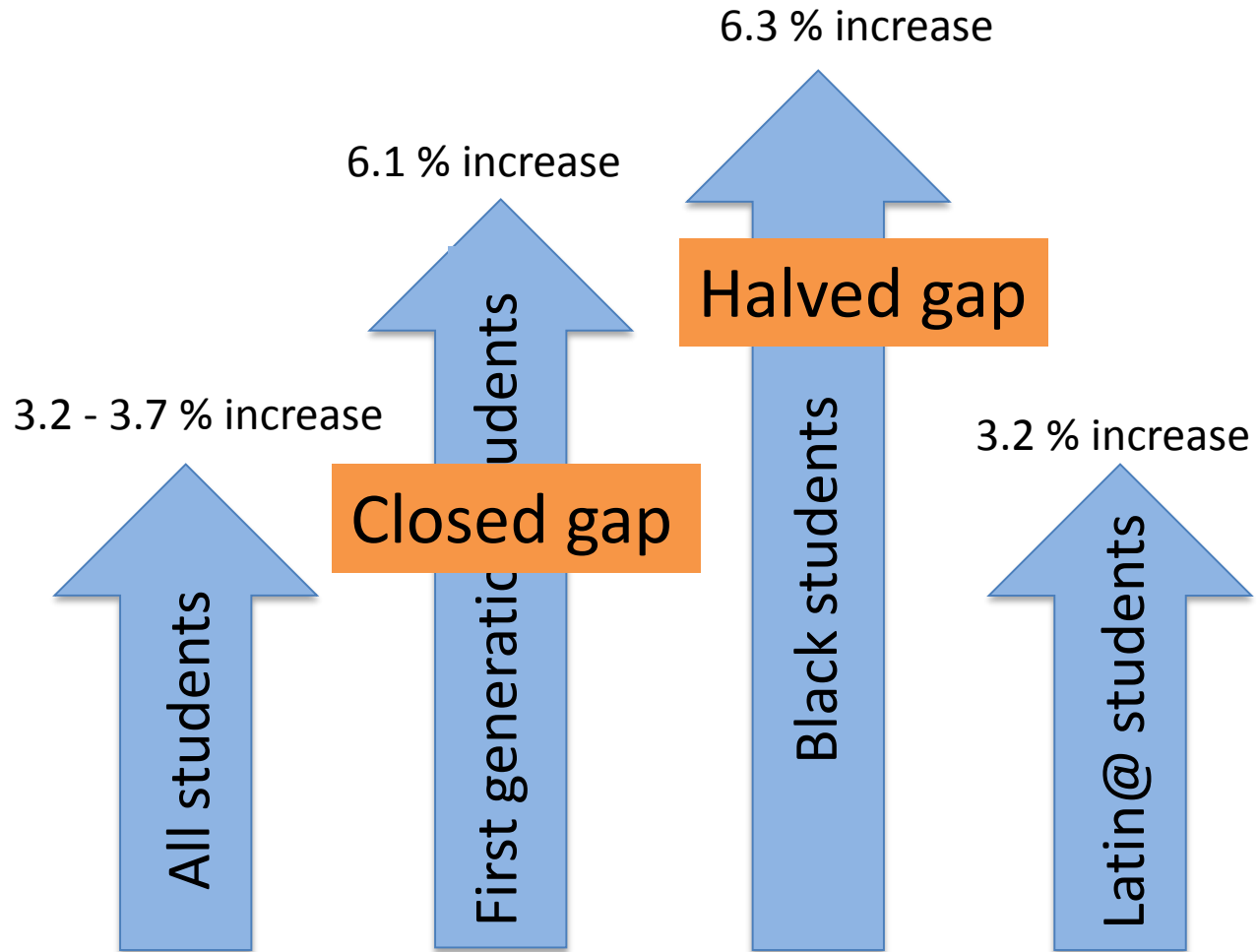
PHYSICS: Lecture/Studio Model



CHEMISTRY and BIOLOGY:  
Large lecture

# We have some evidence our reforms work:

## Biology 101





# Redesigning and teaching 11 courses in Physics, Chemistry, and Biology

Course number	Course name	Sections taught in high structure, active method	When redesigned?
Physics 116	Mechanics	All sections	Before AAU project
Physics 117	Electricity and Magnetism	All sections	Before AAU project
Physics 104	General Physics I	All sections	Before AAU project
Physics 105	General Physics II	All sections	Before AAU project
Chemistry 101	General Chemistry I	Some sections	Before AAU project
Chemistry 102	General Chemistry II	Some sections	Before AAU project
Chemistry 261	Organic Chemistry I	Some sections	Before AAU project
Chemistry 261	Organic Chemistry I	Some sections	Before AAU project
			first year of AAU funding
			second year of AAU funding

**TEAM-BASED APPROACH IN PHYSICS**


**INDIVIDUALIZED APPROACH IN CHEMISTRY & BIOLOGY**

**Which approach does your department take in designing and teaching introductory courses?**

1. Faculty redesign courses with a student-centered focus.



2. Mentors train apprentices in these redesigned courses in real classrooms.

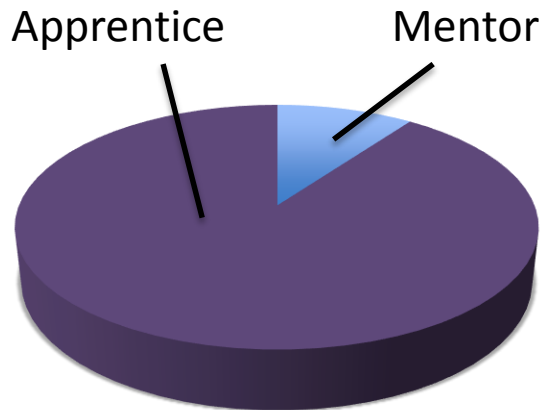


You have been  
assigned as a  
**MENTOR**  
in this program.

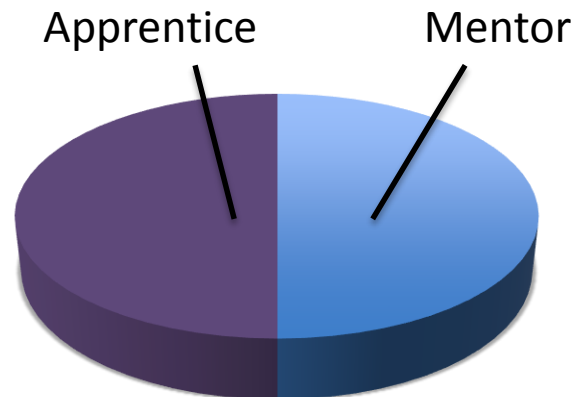
What  
responsibilities  
do you think you  
should have inside  
the classroom?

You have been  
assigned as an  
**APPRENTICE**  
in this program.

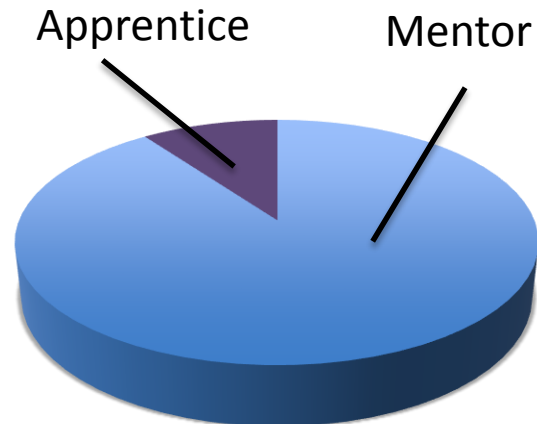
What  
responsibilities  
do you think you  
should have inside  
the classroom?



**CHEMISTRY:** Apprentice taught all class sessions (large lecture); mentor observed and occasionally stepped in.



**BIOLOGY:** Apprentice and mentor each taught ~50% of each session (large lecture).



**PHYSICS:** Apprentice co-taught studio session with graduate TA; mentor taught most class sessions (large lecture).

TEAM  
BASED  
COURSES

Who can serve as  
**MENTORS**  
at your institution?  
What are their  
ranks and titles?

Who can serve as  
**APPRENTICES**  
at your institution?  
What are their  
ranks and titles?

## Mentor- apprentice relationships to date:

<b>Department</b>	<b>Mentor</b>	<b>Apprentice</b>
<b>Chemistry</b>	Lecturer	Distinguished Professor
<b>Chemistry</b>	Lecturer	Assistant Professor
<b>Chemistry</b>	Lecturer	Distinguished Professor
<b>Biology</b>	Lecturer	Assistant Professor
<b>Biology</b>	Lecturer	Professor
<b>Biology</b>	Senior Lecturer	Assistant Professor
<b>Biology</b>	Lecturer	Associate Professor
<b>Physics</b>	Associate Professor	Assistant Professor
<b>Physics</b>	Distinguished Professor	Professor
<b>Physics</b>	Lecturer	Assistant Professor
<b>Physics</b>	Professor	Assistant Professor

What observations do you make from this table?

## Faculty interviews completed by an external evaluator. Summary report not complete but there may be a need for:

- More clarity in role **expectations** for both mentor and apprentice.
- Earlier communication with the apprentice about **expected benefits** from the experience .
- More conversations about differences in **prioritizing** the work, given other demands on time and attention.
- Formal **mentor training** to provide a toolbox of strategies working with different apprentices.

1. Faculty redesign courses with a student-centered focus.

2. Mentors train apprentices in these redesigned courses in real classrooms.

3. Mentors and apprentices in faculty learning communities (FLCs).





# Faculty Learning Communities:

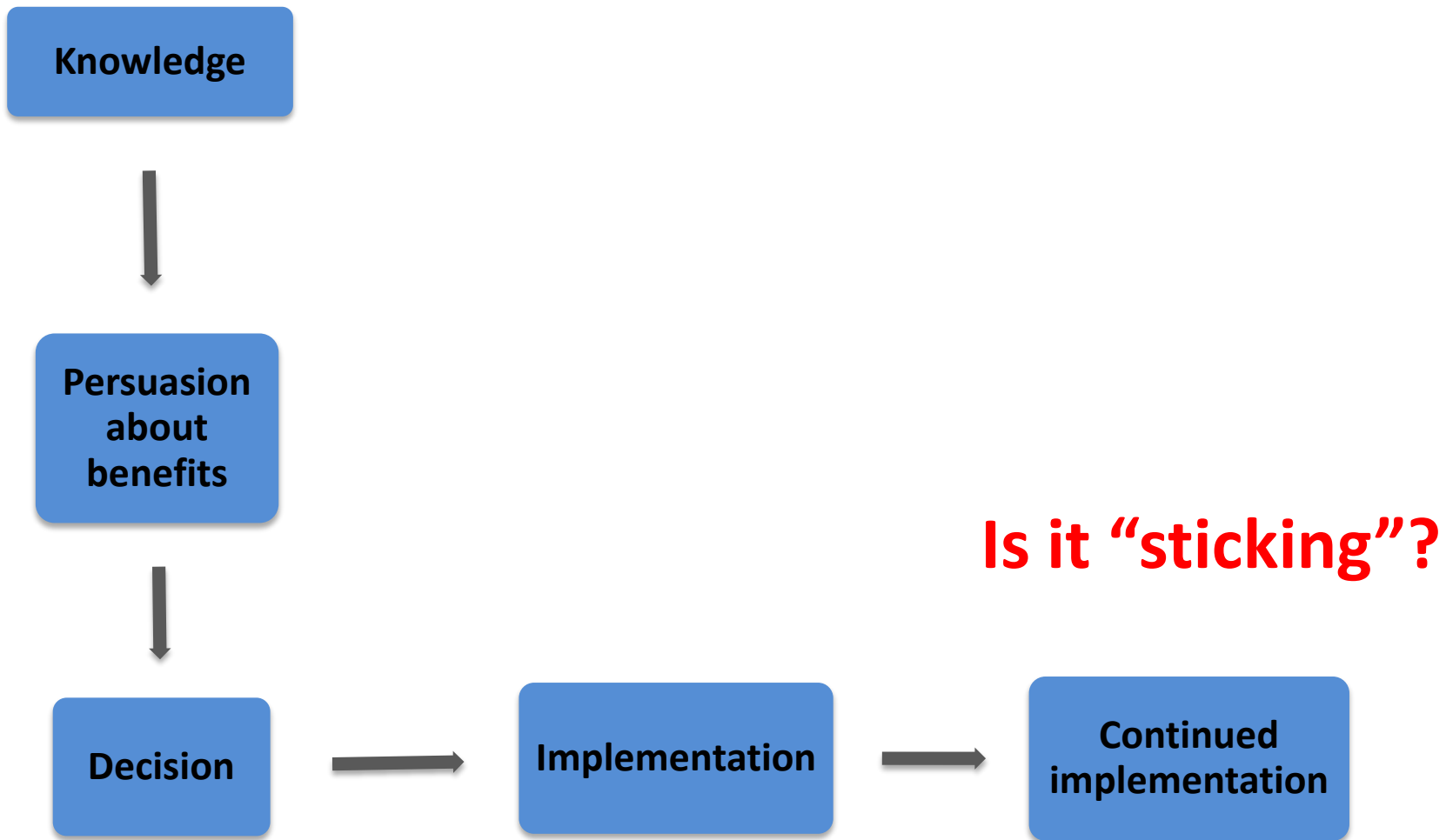
Professional Development + Social Network

Organized and co-facilitated with our Center for Teaching and Learning

Includes faculty mixed from three departments.

Year 1: One FLC  
Year 2: Three FLCs

- **Discussions around:**
  - Challenges in teaching and prioritizing
    - Successes
  - Teaching videos watched together
  - Peer visits using formative rubrics



**Is it “sticking”?**

**TWO unannounced evaluative observations of apprentices in each of the following semesters.**



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- **Surveys** (no measure yet)
- **Leadership:** 9 new “teaching only” faculty lines in STEM departments; hiring student support, retention initiatives in STEM, RFPs
- **Non AAU project faculty engagement:** Attendance at DBER seminars, discussions at faculty meetings, informal interest meetings, peer visits
- **Additional course redesigns** from non-AAU project faculty

Faculty course release  
Faculty Learning Communities (FLCs)

Transform large lecture gateway courses.



“Having someone observe my class on a daily basis to give me some feedback-- on what was working—was very helpful, particularly since she was sitting with the students and could get a better sense of how they were reacting to different activities.

The main challenge was that we didn't always see things the same way and I felt like it sometimes kept me from trying new ideas that I thought might be interesting or productive.”

-Apprentice



“I didn't have to create the course from scratch-  
- this allowed me to focus my time on becoming  
an effective instructor and engaging the  
students.

Adopting someone else's class came with its  
own challenges. In the beginning, I struggled to  
teach with lecture notes/slides that I hadn't  
created from scratch. Over the course of the  
semester I figured out how to revise the  
lectures to 'fit' me as an instructor. I found when  
I did this, I felt more confident teaching and  
classes went smoother.

Yet, it took a tremendous amount of time and  
this was my most exhausting semester so far at  
Carolina.”

-Apprentice



“From being a mentor, I have learned a few tricks for my own classes. In particular, I've really enjoyed seeing how my "apprentice" uses problems at the cutting edge of research to provide bigger picture context for the basics in General Chemistry.

Also, I absolutely love being a part of a team. The sense of camaraderie created by this project is a huge plus. It adds to my sense of joy in the job. Teaching feels even more fun when doing it as a team.”

-Mentor

## Advice for mentors:

- Set clear expectations *together*.
- Be flexible and ready to mentor each apprentice differently.
- Don't overwhelm your apprentice with suggestions, ideas, and tasks. Pick a few key goals.
- Have explicit lesson plans for each class session that can be communicated clearly.
- Resist temptation to be a “helicopter” apprentice who continually steps in.
- Handle course logistics and details.
- Give the apprentice tools to succeed in the future: Ask the apprentice to complete a small course development project that you can both use in the future, such as in-class or recitation activity. Mentor them through this process as well.
- Invite constructive criticism on current materials and methods.
- Check-in with the apprentice's next teaching experience. Ask if you can observe and give feedback via an observation rubric.

## **Advice for apprentices:**

- Observe the class taught by your mentor for several weeks before your apprenticeship.
- Ensure you can spend most of your energies focused on learning the teaching methods not catching up on course material.
- Consider this “your” class as well as your mentor’s.
- To learn student perspectives, hold your own office hours or Q&A sessions on course content at least once a week.
- Don’t learn technology during class time, be prepared.
- Stick to time goals for class activities.
- Be brutally self-reflective.
- Encourage your mentor to be frank about how you can improve.
- As much as possible, learn how your mentor approaches the administrative side of managing the
- Keep the relationship open in future semesters. Ask for advice and invite your mentor and other instructors to observe you periodically.





**Thank You**

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