Mathematics TA Training, September 2024

Microteaching

Many new TAs are nervous about getting up in front of a class for the first time. To build your confidence and offer you an opportunity to practice your teaching skills, the Math Department will conduct two microteaching sessions. Instructions for preparing for microteaching are included below. This is intended to be a helpful and low-key activity — *no permanent faculty will be present, and no record of your performance will be kept.*

Thursday, 9/19

9:00 Morning. Please be there, ready to start, promptly at 9:00.

	PDL C-401	**PDL C-038**	**CMU 230**	**CMU 326**
Mentor:	Julie	Junaid	Andrew	Jack
	Connard, Carson	Darwish, Abdalla	Azambou, Johan	Cheng, Feng
	Glaister, Jade	Dudarov, William	Lu, Bryan	MacBrough, Ethan
	Martinez, Martin	Kieke, David	Sevcek, Tomas	Rutherford, Anna
	Murphy, John	Nguyen, Nghi	Szalda-Petree, Erin	Whybra, Nate
	Torabi, Tina	Thomas, Laura	Ward, Nate	Zhan, Jenny

1:00 Afternoon. Please be there, ready to start, promptly at 1:00.

	PDL C-401	**PDL C-038**	**CMU 236**	**CMU 230**
Mentor:	Grace	Tracy	Clare	Yirong
	Golobokov, Konstantin	Guo, Manyi	Brauer, Abigail	Allred, Wolfgang
	McCausland, Connor	Jin, Niyizhen (Jenny)	Jahangiri, Arman	Cheng, Yu-Hao (Howard)
	Shah, Varun	Lin, Zihong	Lau, Winnie	Golm, Jonas
	Sparks, Hailey	Tuggle, Jaxon	Rodriguez, John	Vogt, Anja
	Villamarin Castro, Juan Jose		Taherinassaj, Ali	

If everyone is prompt at the start of the session, you probably will be done earlier that the listed ending time. The microteaching format requires each participant to engage in a **brief** (four to five minute) teaching segment for the group. Since much of a TA's time is spent either facilitating groups or answering questions on assignments, please select one of the questions from the given homework assignment (see page attached) to present as if a student asked you how to solve the problem in class. You are encouraged to interact with your "students" (the rest of your group) and to solicit responses from them, as you would in your actual classroom. Since the allotted time segment is quite short, it is OK if you do not finish the problem, or if you just focus on a small part of the solution.

It is recommended that you pick only one or two aspects of teaching to focus on during microteaching. The following list gives some of the skills on which you might focus during the session; you may have others in mind. Having prepared with a couple of specific skills in mind, you should request that comments in the microteaching session be directed towards these skills by completing the first half of the "Microteaching Worksheet" (see next sheet).

- Organization and pacing of the presentation
- Clarity with which problem is presented or explained
- Use of the board
- Effectiveness of asking questions
- Eye contact with the students
- Voice projection and clarity and pacing of speech
- Connections to students/ level of understanding

During the second microteaching session, you can choose to teach the same problem as you did on Friday, or a different one. You can also change your goals.

You may present any problem. Even if it is not from the course you are teaching. Don't feel like you need to start in the beginning of the problem.

Math 124
Related Rates Problems

1. A plane flying horizontally at an altitude of 1 mi and a speed of 500 mi/h passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 2 mi away from the station.

2. If a snowball melts so that its surface area decreases at a rate of 1 cm^2/min, find the rate at which the diameter decreases when the diameter is 10 cm.

3. A street light is mounted at the top of a 15-ft tall pole. A man 6 ft tall walks away from the pole with a speed of 5 ft/s along a straight path. How fast is the tip of his shadow moving when he is 40 ft from the pole?

4. A man starts walking north at 4 ft/s from a point P. Five minutes later a woman starts walking south at 5 ft/s from a point 500 ft due east of P. At what rate are the people moving apart 15 min after the woman starts walking?

5. The altitude of a triangle is increasing at a rate of 1 cm/min while the area of the triangle is increasing at a rate of 2 cm^2/min. At what rate is the base of the triangle changing when the altitude is 10 cm and the area is 100 cm^2?

6. A trough is 10 ft long and its ends have the shape of isosceles triangles that are 3 ft across at the top and have a height of 1 ft. If the trough is filled with water at a rate of 12 ft^3/min, how fast is the water level rising when the water is 6 inches deep?

Note to TAs: At this stage, the students can take the derivative with respect to time. Some may not be comfortable with this skill, but they should be able to take the derivative because they've probably just had a test on these skills.

Math 125
Work Problems

1. You are helping Reggie get out of a 50 foot well by lifting him with a rope which weighs .2 lb/ft. Since Reggie is wet, he is dripping water and steadily becomes .05 pounds lighter with every foot you lift him. If Reggie initially weighs 200 pounds, find the total work done to get him out of the well.

2. A tank of liquid has the shape of the top half of a sphere of radius 4 ft. It has a spigot located at its topmost point. Find the work done in pumping the liquid out of the tank. Assume that the liquid has density 1 pound per cubic foot.

3. The line $y = 3x$, for $0 \leq x \leq 1$, is rotated about the y-axis to form a cone (units are in feet). The cone is filled with melted ice cream, which weighs 59.2 lb/ft3. How much work does it take to pump all of the ice cream up to the height $y = 10$?

4. A 20-foot rope hangs over the edge of a cliff. It rained earlier, so the rope is wet, and since the water tends to seep downwards, the bottom of the rope is wetter (and hence heavier) than the top. Suppose that the weight density of the wet rope at the distance y feet from the top is $1 + 380y$ lb/ft. Calculate the work needed to pull the rope up to the top.

Note to TAs: Students can compute integrals but tend to be very confused about interpreting work problems as an integral. Do not assume that deriving the appropriate integral is obvious!

Microteaching Worksheet

Background on Microteaching

Microteaching is a training technique designed to assist both new and experienced instructors as they develop specific classroom skills such as the use of visual media, organization, ability to generate interest in the subject matter, etc. It involves the following steps: (1) preparation by each participant of a 4 - 5 minute teaching segment; (2) videotaping this segment in front of other new TA's from your department; and (3) discussion of the participant's teaching in a supportive group environment.

In order to be ready for the microteaching workshop, please prepare a 4 - 5 minute presentation of an explanation of a problem from a homework set. Please complete the two questions below and bring this worksheet with you to the microteaching session.

Preparation for Microteaching (to be completed *before* the workshop)

What is your objective? (What is the essential point your students must understand?)

On which aspects of your teaching would you most like feedback? (Which teaching skills did you focus on while preparing?)

Analysis of the Microteaching Session (to be completed *during* the workshop)

Presentation strengths:

Things you might do differently:

New strategies: