Teaching Engineering: Getting Started

Engineering Teaching Orientation
Engagement Norms

- Listen respectfully
- Share responsibility for including everyone
- Take group work seriously
Learning Objectives

- **Build rapport and set boundaries**
- Respond to challenging situations
- Provide useful feedback without giving out answers
- Engage students and check their understanding
Ice-Breaker

Introduce yourself to as many people as you can:

- First name
- Department (of the class you are teaching)
- 1 goal of the class you will teach in

Build Rapport With Students

- Why is this important?
Entry Activity

Debrief

Is it Appropriate?

• Separate your roles
• Don’t give an unfair advantage
• Set boundaries
Activity 1

- Brainstorm
- Discuss
- Reflect (RP top of P. 7)

Authority in Teaching

Develop trust

- Show you care
- Be prepared
- Be transparent
Learning Objectives

- Build rapport and set boundaries
- **Respond to challenging situations**
- Provide useful feedback without giving out answers
- Engage students and check their understanding
Activity 2
Gallery Walk

What would you do/say if...

1.

2.

3.
Activity 2
Gallery Walk

Main Take-Aways

• Some situations can be avoided:
  ➢ Try to anticipate
  ➢ Know or set norms

• Unexpected things happen:
  ➢ Consult your supervisor
  ➢ Resources
    ▪ Resource Packet
    ▪ CRLT-Engin (website, ETCs)
    ▪ Discuss with other experienced IAs, GSIs
Learning Objectives

Build rapport and set boundaries

Respond to challenging situations

Provide useful feedback without giving out answers

Engage students and check their understanding
Feedback

Information about a student’s progress towards a learning goal
Useful Feedback

Tips for Grading
Resource Packet P. 17

- Balanced
- Specific and goal-oriented
- Timely
- Elevates student thinking
Facilitating Learning

Activity 3: Role Play in Pairs

- Each member chooses one role:
  - **IA or GSI:**
    - Guide the student with questions or prompts
    - Provide feedback on the problem-solving process
    - Don’t give out the answer
  - **Student:**
    - Play a student who can’t figure it out
    - Tries to solve the problem like a beginner
    - Ask questions from a student’s perspective
Teaching Metacognition

We become better learners when we examine how we learn

- Encourage students to:
  - think aloud
  - clarify their thinking
  - improve their strategy

- Model your strategy
Activity 3: Role Play #1

- You have four minutes to role play.
- You will have time to discuss afterwards.

4:00

What would the next line in this pyramid be?

```
1
11
21
1211
111221
312211
```

Solution: 13 11 22 21
Teaching Metacognition

Reflection and Debrief

- think aloud
- clarify their thinking
- improve their strategy
Activity 3: Role Play #2

- **Switch roles**
- You have four minutes
- We will discuss as a class

What is the next symbol in this sequence?

![Sequence of symbols]

4:00
Activity 3: Role Play #2

What is the next symbol in this sequence?

1 2 3 4 5 \(\alpha\)

- What was difficult?
- What worked?
If you are unsure about the answer...

- **Say “good question”, then be honest**
  - It’s ok to say “let me get back to you on this...”
  - Look it up and ask the Professor to make sure.
  - *Do not provide incorrect information.*
  - *Do not be pressured to answer at the moment.*

- **Get the student involved, discuss your approach.**
  - Say “I don’t know, let’s try to figure it out together”

- **Provide alternative resources.**

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Ensuring the integrity of your advice will help them trust you
Learning Objectives

- Build rapport and set boundaries
- Respond to challenging situations
- Provide useful feedback without giving out answers

Engage students and check their understanding
Lesson Planning

Backward Design

“Begin with the end in mind”

1. Learning Objectives

2. Classroom Assessment

3. Learning Activities
Learning Objectives

- Direct Teaching
- Prioritize Feedback
- Focus Learning
Good Learning Objectives

Resource Packet
P. 9

- **Learner-centered**
  - We will cover content-addressable memory.
  - Instead: Students will be able to implement a content-addressable memory using the CAD tools.

- **Measurable**
  - Students will understand the basics of parallel circuits.
  - Instead: Students will be able to calculate power usage and current draw in parallel circuits.

**Activity 4A:** Think of a learning objective for a class
Classroom Assessment

• Gives feedback to students

• Directs instruction

• Are students achieving the objectives?

• Are the students prepared for class?
Activity 4
Think-Pair-Share

- **Think**
  - Questions about your objective
  - Classify C or O

- **Pair**
  - Discuss with partner

- **Share**
  - with the entire group

Types of Questions

- **Close-ended:**
  - single short answer

- **Open-ended:**
  - different answers are possible
  - require an explanation

Revised Bloom’s Taxonomy

- Resource Packet P. 10
Learning Activities

Help students engage in learning

• How do these activities lead students to the learning objectives?

• Would a diverse group of learners be able to fully participate?
Active Learning

“any instructional method that engages students in the learning process.

... requires students to do meaningful learning activities and think about what they are doing.”

- Enhances learning
  - Increases short term and long-term recall
  - Increases performance on assessments
- Helps personalize learning and build community
- Energizes the class

### Active Learning Strategies

<table>
<thead>
<tr>
<th>Name</th>
<th>Description / Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minute Paper</td>
<td>“Today, we discussed conductive heat transfer. List as many of the principal features of this process as you can remember. You have two minutes – go!”</td>
</tr>
<tr>
<td>Think-Pair-Share</td>
<td>Used in Activity 4</td>
</tr>
</tbody>
</table>
| Thinking Aloud Paired Problem Solving     | • Similar to pair-programming  
• One “explainer”, one “listener”  
• Switch roles                                                                                                                                           |
Activity 5

• Read about your technique
  ➢ How could you use it with your learning objective?
  ➢ Summarize in Lesson Plan

• Discuss
  ➢ How will it improve learning?
  ➢ Any anticipated challenges?
Practice Teaching

Use Backward Design

Learning Objectives

Classroom Assessment

Learning Activities

What teaching and learning activities will I use?

How will I check for understanding?

What do I want students to learn?
What We Worked On

- **Build rapport** and trust, while setting appropriate boundaries

- **Brainstorm how to handle challenging situations**

- **Provide effective feedback and coach learning**

- Communicate the **learning objectives, ask good questions and use active learning**
Teaching Engineering

Ask us questions
Classroom Assessment: Exit Ticket

Answer on Half-Sheet

1. Indicate your PRIMARY responsibility

2. Describe how you would apply the information from this session to your primary responsibility as an IA/GSI
Resources

Visit our website:
crlte.engin.umich.edu

- Contact an Engineering Teaching Consultant (ETC)
  -> Request a Service -> GSI & IA Request
What’s Next?

EIATO

- Practice Teaching Session