

A First Course on Kinetics and Reaction Engineering

Unit 22. Lesson Plan

Before Class

- Provide the redacted slides and the handouts to the students and tell them to bring them to class

During Class

- Introduce today's topic and where it fits in the course (Slides 1 and 2)
- Review of Unit 22 (5 to 10 minutes)
 - Slides 3 and 4: go over the key concepts on the slides
- Ask whether the students have any questions from their pre-class preparation and answer them
 - Slide 5
- Learning Activity 22.1 (~20 minutes)
 - Slide 6: Show the slide and give everyone time to read it. Then ask for a volunteer to go to the board and draw a schematic; have the class instruct the volunteer what to include in the schematic. Ask for a second volunteer to go to the board and write a mole balance on A; tell the class to help them, if needed. Repeat for the mole balance on B, repeat for the energy balance. (Point out that here the summation of molar heat capacities must be replaced with the overall volumetric heat capacity of the solution). Ask if anything else is needed, discuss energy balance on cooling water, noting that it isn't always needed. Next point out that there are four design equations and ask the class to identify the four corresponding unknowns. Next tell them that to solve the design equations, they need to calculate values for everything else in the design equations, given values of the unknowns. Go through the equations item by item explaining how to calculate it, pointing out that it is a given constant, etc.
 - Slide 7: Summarize the setup, then give them time to set up the solution using whatever software package your class uses. (They'll need a working version to complete the next activity.) Alternatively, give them the provided MATLAB solution or an equivalent, show them the critical portions of the file and have them run it.
- Learning Activity 22.2 (~20 minutes)
 - Slide 8: Read the first line and tell them to do what it says (they should already have code by now). They can modify their code to make a plot, or just use trial and error to get an approximate value. After ~5 minutes, read what they will do next (the rest of the slide)
 - Slide 9: Go over the optimum space time results, then have poll the class for each effect. Give them the rest of the class to run and confirm their predictions.
- Slide 10: Put the material covered in this class into the overall context of the course.

After Class

- Provide the complete slides and MATLAB files (or equivalent for the math software your students use) to the students.