

# **A First Course on Kinetics and Reaction Engineering**

## **Unit 12. Lesson Plan**

### **Before Class**

- Provide the redacted slides to the students and tell them to bring them to class
- Make arrangements so the students can run the simulators from Unit 12 in class (i. e. have them bring laptops or hold class in a computer lab where this is possible)

### **During Class**

- Introduce today's topic and where it fits in the course (Slides 1 and 2)
- Review of Unit 11 (5 to 10 minutes)
  - Slides 3 through 5
- Ask whether the students have any questions from their pre-class preparation and answer them
  - Slide 6
- Learning Activity 12.1 (~15 minutes)
  - Slide 7: Put up the slide, tell them what they are going to do, and have them begin. Allow about 10 minutes then call on a few to show (if projection is available) or describe their work
  - Slide 8: After a few student presentations, use this slide to highlight key points, adding detail for items that were not presented by the students (It is likely that student presentations will emphasize how to do the tests, but if not, briefly explain)
- Learning Activity 12.2 (~25 minutes) - the objectives of this activity are to give the students some feel for the process by which kinetics data are generated, to have them engage in qualitative analysis of reactors and to provide some groundwork for the concepts of integral and differential data analysis that will arise in subsequent Units.
  - Slides 9 - 10: Go over the activity, make sure they know how to run the simulators and what they will be doing; emphasize the rationale for the two sets of CSTR data points
  - Slide 11 - Display this slide (it summarizes what they should do, repeating info from slides 9 and 10) and give them ~10 minutes to complete the listed tasks (note, the simulators introduce some simulated experimental noise, so the outlet CSTR temperature will sometimes be a degree or two high or low; discuss if it comes up)
  - Slide 12: Have them work in groups on the points listed here. you can either have them work point by point, discussing answers after each point, or let them work on all, and then discuss.
  - Slides 13 -16 - Use these slides to summarize their discussion or to make points they didn't notice. There is one slide per item on slide 12, so the slides will work either point by point or all at once.
- Slide 18: show them what's next and how it relates to what's already been covered

**After Class**

- Provide the complete slides to the students.
- Provide the completed handout from activity 12.2 to the students; their answers will be different.