CHE 404 Chemical Reactor Engineering

Instructor: Dr. Saeed M. Al-Zahrani
Pre Req(s): ChE 302
Contribution to professional component: Math and Basic science Cr: 0 Engineering Cr: 3 General Education Cr: 0

Catalog Data:
Application of the chemical kinetics of homogenous reactions to the design of chemical reactors

Textbook: H Scott Fogler, Elements of Chemical Reaction Engineering, 4th ed

Topics covered
1. Mole Balances, conversion and reactor sizing (9 classes)
2. Rate laws and stoichiometry (6 classes)
3. Isothermal reactor design (9 classes)
4. Collection and analysis of rate data (6 classes)
5. Multiple reactions (6 classes)
6. Steady-state nonisothermal reactor design (9 classes)

Objectives

<table>
<thead>
<tr>
<th>Number</th>
<th>Objective</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ability to design isothermal reactors for homogenous systems</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Ability to determine a rate law and reaction mechanism from laboratory data</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Ability to analyze multiple and nonisothermal homogenous reaction systems</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ability to work as a team to achieve laboratory and research project goals</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>A basis for incorporating safety into any reactor design.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Ability to apply knowledge of math, engineering, and science.
b. Ability to design and construct experiments.
c. Ability to design a system, component, or process.
d. Ability to function on multi-disciplinary teams.
e. Ability to identify, formulate, and solve engineering problems.
f. Understanding of professional and ethical responsibility.
g. Ability to communicate effectively.
h. …broad education … to understand the impact of eng. solutions in a global and societal context.
i. Recognition of the need for and ability to engage in life-long learning.

j. Knowledge of contemporary issues.

k. Ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

L. Quickly contribute in their focus area.

M. Team contributors.

Key: 3: strong 2: moderate 1: week