NEW JERSEY INSTITUTE OF TECHNOLOGY – OTTO H. YORK DEPARTMENT OF CHEMICAL, BIOLOGICAL, AND PHARMACEUTICAL ENGINEERING

CHE 349 – Kinetics and Reactor Design

Fall 2017

Instructor: Dr. Alexandre Ermoline
Instructor Contact: alexandre.ermoline@njit.edu

Office Hours: By appointment
Class Meetings: M from 6:00 PM to 9:05 PM
Tiernan Hall 111

Required Textbook: Essentials of Chemical Reaction Engineering, H. S. Fogler -- Prentice Hall (2011). This book comes with a CD that includes the Polymath math solver package, as well as supplementary material.

Web-Based Resource: http://www.umich.edu/~essen/

Course Description: Derive and solve species and energy balances for single chemical reactors processing liquid and gaseous systems; chemical reactor process safety; multiple reaction applications; catalysis, including mechanisms, rates, reactor design.

Course Prerequisite: Chem 236, ChE 342, ChE 370, Math 222

Required Software: You must have access to and know how to use a math solver software package. Examples include Polymath, Maple, Matlab, Mathcad, and Mathematica. It will be needed for the term project and some homeworks. Polymath is available on dep't PCs in 411b-Tiernan, as is the license for program download onto your PC. A solver is NOT needed on quizzes.

Course Objectives

1. To provide students with the basic knowledge of how to design chemical reactors.
2. To inform students with an awareness of chemical reactor process safety.
3. To inspire students to approach reactor design with an ethical and environmental awareness through a research orientation.

Course outcomes (ABET)

a) an ability to apply knowledge of mathematics, science and engineering
c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

e) an ability to identify, formulate, and solve engineering problems
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
j) an introduction to contemporary issues in chemical engineering.
k) an ability to use the techniques, skills and modern engineering tools necessary for chemical engineering practice

Grading :

Homework	15%
Group Project	15%
Term Quizzes (3)	50%
Final Quiz	20%
Total	= 100 %

Letter Grades (Tentative – Subject to change): A 90 – 100% ; B+ 84 – 89%; B 78 -83%; C+ 72 – 77%; C 66 – 71%; D 60 – 65%; F 0 – 64%

Course Policy:

Homework will be posted Moodle: http://moodle.njit.edu – Please, check this site and your e-mail often. Most of the homework, problem solutions, lecture handouts, will be on this site.

Project - work in groups (you form). A Peer & Self Evaluation will be done at the conclusion of the project that will impact your grade; more details later.

All exams are Open Textbook unless otherwise specified.

Attendance will be taken. Students are expected to attend all classes and on time. Experience shows that students who do not regularly attend class typically perform poorly in the course. Students are responsible for all material covered in class.

The use of telecommunication devices (for any reason including texting and use as a calculator) is not allowed during class hours.

A letter grade is based on the weighted average score, a table of average score-letter grade categories. The scale converting numerical to letter grades may be changed.

If a student has questions about the grade he/she has received on an exam, homework, or group activity, he/she must talk to the instructor (or the teaching assistant where appropriate) no later than a week after

the graded activity has been returned to students. No grade change will be made after the one week period.

Academic Integrity

All Students should be aware that the Department of Chemical, Biological, and Pharmaceutical Engineering takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

Course Topics

Constant density (liquid) reactors – species balance
Variable density (gas) reactors – species balance
Simultaneous species and energy balances
Chemical reactor process safety
Multiple reaction systems
Catalysis – homogeneous and heterogeneous

Assigned Readings:

The semester schedule (separate posting) lists recommended readings in the Fogler text.