CHE 210 – Chemical Process Calculations 1   **Spring Semester 2018**

1. Logistics

Instructor:
Dr. Ezinwa Elele
387 Tiernan Hall
973-596-5729
eoe4@njit.edu

Class Time: Monday/Wednesday: 1:00 PM – 2:25 PM
Class Location: KUPF 209
Office Hours: Thursday: 3:00 – 5:00 P.M. Room 373, Tiernan Hall

Textbook: Elementary Principles of Chemical Processes by R.M. Felder and
R.W. Rousseau, 4th Edition (2015). ISBN 9780470616291
Handouts, lecture notes, and presentations will be available on Moodle
Communication: A Moodle website for the course provides assignments, required materials, and a schedule of lectures. Other than normal office hours, you can meet me anytime by appointment.

2. Course Information

Description: Analysis of chemical processes is introduced, emphasizing steady and unsteady-state mass and species balances. This course uses chemistry and algebra primarily to determine, for a wide variety of processes and applications, the flow and concentrations of different chemical species.

Course Objectives:
The anticipated knowledge, skills and/or attitude to be developed by the student are:
- Perform basic engineering calculations
- Perform mass balance calculations on existing processes (involving single and multiple units).
- Use basic, applied chemistry/ thermodynamics in material balance calculations.
- Work in teams.

Prerequisites: Undergraduate classwork in Chem 126 (or Chem 122).
Corequisites: Math 112 and CS 101

Besides the technical objectives (Instructional Objectives) that will be distributed weekly, the Learning Objectives of CHE 380 are as follows:

Outcomes	Assessed
Students will be able to define, calculate, and estimate fluid density, flow rate, chemical composition variables (mass and mole fractions, concentrations), fluid pressure, and temperature.	Homework and exams
Students will be able to convert fluid density, flow rate, chemical composition variables, fluid pressure, and temperature from one unit to another.	Homework and exams
Students will be able to draw and label the flowchart of a process described in words and involving a single unit or multiple units.	Homework and exams
Students will be able to analyze processes with and without chemical reactions using DOF	Homework and exams

Outcomes	Assessed
Students will be able to write and solve single- and multiple-unit processes, processes with recycling and bypass, and processes involving chemical reactions.	Homework and exams
Students will be able to use basic equations of state to calculate molar flow rates based on data for volumetric flow rate, temperature, and pressure. They will be able to calculate the partial pressure of a constituent of a gas mixture.	Homework and exams
Students will be able to work effectively in problem-solving teams and assess the performance of teammates.	Project and In-class group activities

Goals:
The course aims to fulfill several academic and professional goals.
- Perform basic engineering calculations
- Perform mass balance calculations on existing processes (involving single and multiple units)
- Use basic, applied chemistry/ thermodynamics in material balance calculations
- Address students' research needs and enhance team work
- Improve scientific communication. Cultivate critical thinking
- Allows students to understand, relate and appreciate the field of biotechnology.

3. Schedule of Classes, Assignments

Topic	Readings/HW
Introduction to course Chemical Process Calculation Systems of units, Force and weight, and Numerical calculation	Chapter 2.1 – 2.5
Dimensionless and data analysis; Mass/Volume/Flow/composition	Chapter 2.5 – 2.7 Chapter 3.1 – 3.3
Pressure and Temperature	Chapter 3.3 – 3.5
Homework 1	
Process flow sheets and Fundamental Mass balance and Calculation of Material balances	Chapter 4.1, 4.2. 4.3a to 4.3c
Calculation of Material balances	Chapter 4.3d to 4.3e
Homework 2	
Exam 1	
Multiple unit processes and Recycling and Bypass	Chapter 4.4 – 4.5
Reactive processes	Chapter 4.6 – 4.7
Homework 3	
Single phase systems and Non-ideal Gases	Chapter 5.1 – 5.4
Homework 4	
Exam 2	

Topic	Readings/HW
Introduction multiphase system and Fluid systems	Chapter 6.1 – 6.4
Applications multiphase system	Chapter 6.5 – 6.7
Homework 5	
Material balances on transient (unsteady state) processes	Chapter 10.1 -10.2
Final Exam (Cumulative)	

Note: The professor reserves the right to change the syllabus as needed. Where necessary, the reading from the book will be supplemented by class notes, reading assignments and other literature. The schedule is flexible and will change depending on the class performance and difficulties with understanding.

4. Class Expectations
- Attendance is important. There is a high correlation between failure and poor class attendance
- There will be no eating, drinking, use of cell phone, cameras or laptops in the class unless you are permitted by the instructor
- All class assignments are expected to be submitted timely
- You are expected to behave professionally and show respect to fellow students and the instructor. Exhibit a conduct that is attributable to a professional engineer

5. Course Policies
GRADING
Homework: 15%
Exam 1:   20%
Exam 2:   20%
Final Exam: 25%
Class Participation: 10%
Final Project: 10%

GRADES
The grades will be based on the following grading scale:
93.00 – 100.00% A
85.00 – 92.99% B+
75.00 – 84.99% B
65.00 – 74.99% C+
55.00 – 64.99% C
45.00 – 54.99% D
<45%   F

6. Statement of Academic Integrity
Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a violation may include academic sanctions from the instructor, including failing the course for any

violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

7. Plagiarism and Academic Integrity

The approved "University Code of Academic Integrity" is currently in effect for all courses. Should a student fail a course due to a violation of academic integrity, they will be assigned the grade of "XF" rather than the "F, " and this designation will remain permanently on their transcript.

All students are encouraged to look at the University Code of Academic Integrity and understand this document. Students are expected to uphold the integrity of this institution by reporting any violation of academic integrity to the Office of the Dean of Students.

The identity of the student filing the report will be kept anonymous. NJIT will continue to educate top tier students that are academically sound and are self-disciplined to uphold expected standards of professional integrity. *Academic dishonesty will not be tolerated at this institution.*

8. Student Disability Services

NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact Student Disability Services. Information on the self-identification, documentation and accommodation process can be found on the web page at http://www.njit.edu/counseling/services/disabilities.php.

9. Getting Help - General

The IST Helpdesk is the central hub for all information related to computing technologies at NJIT. This includes being the first point of contact for those with computing questions or problems. There are three ways to contact the Helpdesk:
1. Call 973-596-2900, Monday - Friday 8 am - 7 pm.
2. Go to Student Mall Room 48. Monday - Friday 8 am - 7 pm
3. Log a Help Desk Service Request online – https://ist.njit.edu/support/contactus.php.

10. Getting Help - Moodle

In addition to the Helpdesk, NJIT has a number of resources available to help you learn/use Moodle. Please be aware of the following:
1. Getting Started Using Moodle (Student Course):
   http://njit.mrooms.net/course/view.php?id=6204
2. Student Moodle Tutorials: http://moodle.njit.edu/tutorials/students/index.php
3. Student Moodle FAQs: http://moodle.njit.edu/tutorials/students/faq.php