

Fall 2018

# CHE 210 - Chemical Process Calculations I

Piero Armenante

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**COURSE OUTLINE**  
**CHE 210 – Chemical Process Calculations I**  
**Fall 2018**

<b>Instructor:</b>	Piero M. Armenante, Ph.D. Distinguished Professor of Chemical Engineering New Jersey Institute of Technology Otto H. York Department of Chemical and Materials Engineering Newark, NJ 07102 Office: YCEES Building - Room 120 Telephone: (973) 596-3548; <b>Mobile: (908) 347-8734 (preferred)</b> Fax: (973) 596-8436 E-Mail Address: <a href="mailto:piero.armenante@njit.edu">piero.armenante@njit.edu</a>
<b>Time &amp; Venue of Class:</b>	Lectures: Monday and Wednesday, 1:00 - 2:20 pm, Central King Building (CKB), Room 204
<b>Office hours:</b>	Monday and Wednesday, 12:00 noon - 1:00 pm
<b>Course Prerequisites:</b>	Math 112, CHEM 126 (or CHEM 122)
<b>Corequisites:</b>	CS 115
<b>Course Description:</b>	Analysis of chemical processes is introduced, emphasizing steady and unsteady-state mass and species balances. This course uses primarily chemistry and algebra to determine, for a wide variety of processes and applications, the flow and concentrations of different chemical species.
<b>Textbook:</b>	Elementary Principles of Chemical Processes by R.M. Felder and R.W. Rousseau, 4th Edition (2015). ISBN: 978-0470616291. Handouts, lecture notes, and presentations will be available on Moodle.
<b>Communication:</b>	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.

**Course Objectives:**

- Perform basic engineering calculations and unit conversions
- Enable students to perform mass balance calculations on existing processes (involving single and multiple units)
- Enable students how to use basics of applied chemistry/ thermodynamics and unit conversion in material balance calculations
- Enable students to work effectively in problem-solving teams and assess the performance of teammates

## Grading Schemes:

Category	Score
Homework:	15%
Exam 1:	20%
Exam 2:	20%
Final Exam:	25%
In-class group activities:	10%
Final Project:	10%

The grades will be based on the following grading scale:

Weighted Score (%)	Letter Grade
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

## In-class group activities:

You will be assigned to work in teams and complete many in-class activities with your team. The performance of your team is part of your course grade.

## Homework and Quizzes:

- Weekly homework assignments will be posted on Moodle. Typically, it will mirror and extend the problems treated in the classroom to test understanding of concepts.
- Please write legibly and organize your homework so that it will be easy to understand and grade. You may also choose to type your work.
- A late homework will not be accepted and no extension will be granted unless there is a legitimate justification. A homework is considered late if received later after the deadline.
- Quizzes will be given in class throughout the semester. Students who do their assigned homework assigned and actively participate in in-class activities should be able to pass the quizzes

## Exams:

Exams will test materials treated in class and questions will range in difficulty from easy to challenging. The exams will be cumulative and will be taken during a class period. There will be no make-up exam for students who miss an exam unless there is a legitimate excuse.

## Reminders:

- 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
- In this course, each voice in the classroom has something of value to contribute. 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

**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.

**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.*

**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>.

**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:

- Call 973-596-2900, Monday - Friday 8 am - 7 pm.
- Go to Student Mall Room 48. Monday - Friday 8 am - 7 pm
- Log a Help Desk Service Request online – <https://ist.njit.edu/support/contactus.php>.

**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:

- Getting Started Using Moodle (Student Course):  
<http://njit.mrooms.net/course/view.php?id=6204>
- Student Moodle Tutorials: <http://moodle.njit.edu/tutorials/students/index.php>
- Student Moodle FAQs: <http://moodle.njit.edu/tutorials/students/faq.php>

**Schedule of classes and assignments:**

<b>Topic</b>	<b>Readings/HW</b>
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	
First Mid-Term	
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	
Second Mid-Term	
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
Homework 6	
Final Exam (Cumulative)	

*Note: The professor reserves the right to modify or change the syllabus as needed.*