

## Spring 2018 Academic Calendar

January	15	Monday	Martin Luther King, Jr. Day
January	16	Tuesday	First Day of Classes
January	20	Saturday	Saturday Classes Begin
January	22	Monday	Last Day to Add/Drop Classes
January	22	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	23	Tuesday	W Grades Posted for Course Withdrawals
January	29	Monday	Last Day for 90% Refund of Tuition (no refund for fees), Full or Partial Withdrawal - no refund for partial withdrawal after this date
February	12	Monday	Last Day for 50% Refund of Tuition (no refund for fees), Full Withdrawal
March	5	Monday	Last day for 25% Refund of Tuition (no refund for fees), Full Withdrawal
March	11	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	18	Sunday	Spring Recess Ends
March	26	Monday	Last day to Withdraw
March	30	Friday	Good Friday - No Classes Scheduled - University Closed
May	1	Tuesday	Friday Classes Meet
May	1	Tuesday	Last Day of Classes
May	2	Wednesday	Reading Day
May	3	Thursday	Reading Day
May	4	Friday	Final Exams Begin
May	10	Thursday	Final Exams End
May	12	Saturday	Final Grades Due

**1. ChE 240 Chemical Process Calculation II  
Spring 2018**

Session	Time	Days	Where	Date Range	Schedule Type	Instructors
002	1:00 pm - 2:20 pm	WF	Central King Building 330	Jan 16, 2018 - May 10, 2018	Lecture	Xianqin Wang (P)
004	10:00 am - 11:20 am	MW	Central King Building 330	Jan 16, 2018 - May 10, 2018	Lecture	Xianqin Wang (P)

**2. Credits and contact hours**

(3-0-3) (Lecture hr/wk-lab hr/wk-course credits)

**3. Course coordinator/instructor/TA**

Dr. Xianqin Wang  
Tiernan 360 (office)  
596-5707 (phone)  
[xianqin@njit.edu](mailto:xianqin@njit.edu) (e-mail)

**Office Hours**

Wednesday 11:30AM-12:30PM

Friday 11:30AM - 12:30 PM

(note: you can always make appointment with me by email if the office hour time conflicts with your classes)

**ChE240W instructor: Guluzar Gorkem Buyukgoz, [gg275@njit.edu](mailto:gg275@njit.edu)**

Section #	Call #	Days / Times	Room	Status	Max	Now	Instructor	Credits
002	11188 <a href="#">View Book Info</a>	T:400PM - 455PM	TIER105	Open	39	17	<a href="#">Gorkem Buyukgoz</a>	0.00
004	11189 <a href="#">View Book Info</a>	T:230PM - 325PM	TIER114	Open	39	37	<a href="#">Gorkem Buyukgoz</a>	0.00

**ChE240 TA : Zhu He, [h3353@njit.edu](mailto:h3353@njit.edu)**

**Workshop Instructor and TA:** You can consult with me, or Workshop instructor regarding questions on the homework or course material. You can consult with TA on questions about the grading of a homework assignment or exam.

**4. Specific course information**

General:

Chemical Process Calculations II (ChE 240) is one of the fundamental chemical engineering courses along with ChE 210 and ChE 230 for the basic understanding of Chemical Engineering. ChE 240 prepares you to formulate and solve material and energy balances on chemical process systems and lays the foundation for subsequent courses in thermodynamics II, unit operations, kinetics, and process dynamics and control. More fundamentally, it introduces the engineering approach to problem solving: breaking

a process down into its components, establishing the relations between known and unknown process variables, assembling the information needed to solve for the unknowns, and finally obtaining the solution using appropriate computational methods.

Pre-requisites: ChE 210, ChE 230

Textbooks Felder, R. M., Rousseau, R. W., and Bullard, L. G., “Elementary Principles of Chemical Processes”, 4th Edition, John Wiley and Sons, New York, New York, 2016

Recommended – Reid, Robert C., Prausnitz, John M. and Poling, Bruce E. “The Properties of Gases and Liquids” 4th Edition McGraw – Hill Book Companies, Inc., New York, New York 1987

Required Software: Latest versions of Matlab, MS Office, Adobe Reader (all can be downloaded from NJIT IST webpage). Student Mall labs and ChE department PC lab have most of the software. Please see Highlander Pipeline for Matlab tutorial and example programs.

## 5. Specific course objectives

By the end of the course, you should be able to do the following things:

- **Basic engineering calculations.** Convert quantities from one set of units to another quickly and accurately; define, calculate, and estimate properties of process materials including fluid density, flow rate, chemical composition variables (mass and mole fractions, concentrations), fluid pressure, and temperature.
- **Material and energy balance calculations.** Draw and label process flowcharts from verbal process descriptions; carry out degree-of-freedom analyses; write and solve material and energy balance equations for single-unit and multiple-unit processes, processes with recycle and bypass, and reactive processes.
- **Applied physical chemistry.** Perform pressure-volume-temperature calculations for ideal and non-ideal gases. Perform vapor-liquid equilibrium calculations for systems containing one condensable component and for ideal multi-component solutions. Calculate internal energy and enthalpy changes for process fluids undergoing specified changes in temperature, pressure, phase, and chemical composition. Incorporate the results of these calculations into process material and energy calculations.
- **Computation.** Use spreadsheets (EXCEL or other software) to solve material and energy balance problems.
- **Safety** - Evaluate potential safety hazards in processes, in particular, chemical processes.
- **Team player.** An ability to function on teams; an understanding of professional and ethical responsibility

## 6. Grading

The final grade on a 1000 point basis as follows:

Homework (team work)	100 pts	(10%)
Quizzes (individual)	100 pts	(10%)
Class project (team work)	100 pts	(10%)
Mid-term exam (individual)	300 pts	(30%)
Final exam (individual)	400 "	(40%)

Letter grades will be awarded for the following totals:

A	850 and above
B+	800-849 "
B	750-799 "
C+	700-749 "
C	650-699 "
D	550-649 "
F	less than 550 "

Before the final exam, those students, who can get above 95% from all homework, all quizzes, all in-class activity, exam 1 and exam 2, can be exempted from final exam.

## 7. Policies on assignments/exams and classroom policy

**Homework policy:** Homework assignments will be collected and graded. Homework assignments are the responsibility of the students. You are strongly advised to work on the homework problems because you will NOT learn this material unless you get into the materials “Hands-on”.

**Quizzes** There will be quizzes occasionally at the beginning of the class. If you miss the class, you will miss the quiz that day. There will be no makeup quiz! Close book and close notes!

**In-class group activities policy:** Dates of group activities are not announced in advance. Students not being present in class when a group activity (which is to be graded) **starts**, get no credit (zero) for that activity. Each student will be asked at the end of the semester to confidentially rate his/her performance/effort as well as that of all his/her group-mates. This rating will reflect the performance when the members were actually present. Attached is the evaluation form. The completed evaluation form has to be submitted either as a hard copy in a sealed envelope or as a word-file attached to an e-mail to the instructor. Evaluation forms are due on May 2<sup>nd</sup> 2018. Submission of the form after May 2<sup>nd</sup> 2018 and before the final exam will result to the late submitter getting 75% of the credit that he/she would had received if the form was submitted timely. Submission of the form at the final exam will lead to a further 25% reduction of the credit. No student will be allowed to take the final exam without prior submission of the self & peer evaluation form.

**Exam policy:** There will one mid-term exam and a comprehensive final exam. All exams are open **textbook/ instructor lecture** notes. Graded homework problems **cannot** be used during exams. Additional personal notes on the course (or solutions to additional problems), copies of class notes, as well as copies of the instructor’s solutions to homework problems are also **not allowed** to be used during exams. Graded exams will be returned a week after they are taken.

**Policy on exams (other than final):** A student must have a compelling reason to miss an exam. Documentation of the reason (e.g., doctor’s note) is needed for the instructor to consider giving a make-up exam. A student who cannot make it to an exam needs to either e-mail or call and leave a voice message for the instructor **before** the exam is held. A single (comprehensive) make-up exam will be given on the reading day (May 2<sup>nd</sup> 2018) for those who have missed mid-term exam for documented/ legitimate reasons.

**Policy on final exam:** The final exam will be based on the entire course material. Students missing the final exam without a documented serious excuse fail the course. Students missing the final exam with a documented serious reason get an Incomplete. The Incomplete will be removed after students take the

final exam in Fall 2018 (grade to count towards 40% of the composite). If the course is not offered in Fall 2018, a special make-up final will be scheduled during the Fall 2018 finals week.

**Disputing a grade on tests/assignments:** 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.**

**Classroom policies:** Eating, drinking and the use of telecommunication devices (for any reason, including texting and use as a calculator) are not allowed during class.

**8. Course outcomes (Highlighted in yellow) (a-k ABET)**

- a) an ability to apply knowledge of mathematics, science and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- 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.
- d) an ability to function on multi-disciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills and modern engineering tools necessary for chemical engineering practice

2019-2020 Student Outcomes (1)-(7)	Current Student Outcomes (a)-(k)
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	a) an ability to apply knowledge of mathematics, science, and engineering. e) an ability to identify, formulate, and solve engineering problems k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	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. j) a knowledge of contemporary issues
3) an ability to communicate effectively with a range of audiences.	g) an ability to communicate effectively
4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts .	f) an understanding of professional and ethical responsibility h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	d) an ability to function on multidisciplinary teams.
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	b) an ability to design and conduct experiments, as well as to analyze and interpret data
7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	i) a recognition of the need for, and an ability to engage in life-long learning.

## 9. Tentative Schedule

ChE240-002				ChE240-004			
week	CKB330	1:00-2:25pm	Tentative TOPICS	week	CKB330	10:00-11:25AM	Tentative TOPICS
				1	1/15/2018	Monday	MLK holiday
1	1/17/2018	Wednesday	Introduction, review Ch.1-5		1/17/2018	Wednesday	Introduction, review Ch.1-5
	1/19/2018	Friday	Review Ch.5	2	1/22/2018	Monday	Review Ch.5
2	1/24/2018	Wednesday	Chapter 6		1/24/2018	Wednesday	Chapter 6
	1/26/2018	Friday	Chapter 6	3	1/29/2018	Monday	Chapter 6
3	1/31/2018	Wednesday	Chapter 6		1/31/2018	Wednesday	Chapter 6
	2/2/2018	Friday	Chapter 6	4	2/5/2018	Monday	Chapter 6
4	2/7/2018	Wednesday	Chapter 7		2/7/2018	Wednesday	Chapter 7
	2/9/2018	Friday	Chapter 7	5	2/12/2018	Monday	Chapter 7
5	2/14/2018	Wednesday	Chapter 7		2/14/2018	Wednesday	Chapter 7
	2/16/2018	Friday	Chapter 8	6	2/19/2018	Monday	Chapter 8
6	2/21/2018	Wednesday	Chapter 8		2/21/2018	Wednesday	Chapter 8
	2/23/2018	Friday	Chapter 8	7	2/26/2018	Monday	Chapter 8
7	2/28/2018	Wednesday	Chapter 8		2/28/2018	Wednesday	Chapter 8
	3/2/2018	Friday	Chapter 8	8	3/5/2018	Monday	Chapter 8
8	3/7/2018	Wednesday	mid-term		3/7/2018	Wednesday	mid-term
	3/9/2018	Friday	no class	9	3/12/2018	Monday	no class
9	3/14/2018	Wednesday	no class		3/14/2018	Wednesday	no class
	3/16/2018	Friday	Chapter 9	10	3/19/2018	Monday	Chapter 9
10	3/21/2018	Wednesday	Chapter 9		3/21/2018	Wednesday	Chapter 9
	3/23/2018	Friday	Chapter 9	11	3/26/2018	Monday	Chapter 9
11	3/28/2018	Wednesday	Chapter 9		3/28/2018	Wednesday	Chapter 9
	3/30/2018	Friday	no class	12	4/2/2018	Monday	class project
12	4/4/2018	Wednesday	class project		4/4/2018	Wednesday	class project
	4/6/2018	Friday	class project	13	4/9/2018	Monday	Chapter 9
13	4/11/2018	Wednesday	Chapter 9		4/11/2018	Wednesday	Chapter 10
	4/13/2018	Friday	Chapter 10	14	4/16/2018	Monday	Chapter 10
14	4/18/2018	Wednesday	Chapter 10		4/18/2018	Wednesday	Chapter 10
	4/20/2018	Friday	Chapter 10	15	4/23/2018	Monday	Chapter 10
15	4/25/2018	Wednesday	Chapter 10		4/25/2018	Wednesday	Chapter 10
	4/27/2018	Friday	Chapter 10	16	4/30/2018	Monday	Chapter 10, last lecture
16	5/1/2018	Tuesday (Friday schedule), last lecture day	Chapter 10, last lecture		5/1/2018		
	5/2, 5/3	reading days			5/2, 5/3	reading days	
	TBA	Final exam	final exam		TBA	Final exam	final exam

**10. HW problems**

<b>Chapter</b>	<b>HW problems</b>
Chapter 5	85,86,88
Chapter 6	3, 11, 14, 22, 27, 62, 71,76
Chapter 7	5, 7, 12, 15, 18, 24, 37, 45, 51, 59, 61, 65
Chapter 8	4,8,10,11,19,21, 27, 37,38, 52, 55, 56, 62, 66, 85, 86, 92, 97, 98, 99
Chapter 9	7, 8, 10, 16, 24, 26, 44, 48, 49, 57, 64, 66, 73, 74,83
Chapter 10	1,2,8,17,22,23,28,31