Fall 2018

CHE 370 - Heat and Mass Transfer

Boris Khusid

Syllabus
ChE 370 Heat and Mass Transfer
Fall 2018

Otto H. York Department of Chemical & Materials Engineering
New Jersey Institute of Technology

Fall 2018 Academic Calendar

September	3	Monday	Labor Day
September	4	Tuesday	First Day of Classes
September	8	Saturday	Saturday Classes Begin
September	10	Monday	Last Day to Add/Drop a Class
September	10	Monday	Monday Classes Meet
September	10	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
September	11	Tuesday	W Grades Posted for Course Withdrawals
September	17	Monday	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
October	1	Monday	Last Day for 50% Refund, Full Withdrawal
October	22	Monday	Last Day for 25% Refund, Full Withdrawal
November	12	Monday	Last Day to Withdraw
November	20	Tuesday	Thursday Classes Meet
November	21	Wednesday	Friday Classes Meet
November	22	Thursday	Thanksgiving Recess Begins
November	25	Sunday	Thanksgiving Recess Ends
December	12	Wednesday	Last Day of Classes
December	13	Thursday	Reading Day 1
December	14	Friday	Reading Day 2
December	15	Saturday	Final Exams Begin
December	21	Friday	Final Exams End
TBA			Final Grades Due

General course information

CHE 370 - HEAT AND MASS TRANSFER (4 credits). The principles of heat and mass transfer in chemical engineering systems are covered. Steady and unsteady heat transfer is examined, with emphasis on the heat exchanger design. Mass transfer by steady and unsteady molecular diffusion, and turbulent convective mass transfer is studied.

Days/ Times: Tuesday: 11:30AM – 12:20PM, Tuesday & Thursday: 4:00PM – 5:20PM

Pre-requisites: Chemical Process Calculations II (ChE 240), Fluid Flow (ChE 260), Differential Equations (Math 222)

Credits and contact hours
(4-0-4) (4 credits, 4 contact hours)

Course coordinator/instructor
Dr. Boris Khusid
Faculty Memorial Hall 215 (office); 973-596-5707 (phone); khusid@njit.edu (e-mail)
http://chemicaleng.njit.edu/people/khusid.php (website)

Office Hours Tuesday: 9:30AM – 11:30AM
Note: you can always schedule an appointment by email if the office hour time conflicts with your classes

Specific course information
Textbooks: **Required** - Yunus Cengel and Afshin Ghajar, Heat and Mass Transfer: Fundamentals and Applications, 5th Ed, McGraw-Hill, 2015
https://www.mheducation.com/highered/product/M0073398187.html

Recommended –1) J.R. Welty, G.L. Rorrer, D.G. Foster, Fundamentals of Momentum, Heat and Mass Transfer, 6th Edition, Wiley, 2014
http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118804279.html
2) R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot, Transport Phenomena, Revised 2nd Edition, Wiley, 2009
https://www.wiley.com/en-us/Transport+Phenomena%2C+Revised+2nd+Edition-p-9780470508633

Other learning material: The lecture notes to be posted on the Moodle website give a summary of the material. Please print and bring them along with your textbook, laptop, and calculator to the class. You will make additional notes during the lectures.

Required software: Latest versions of 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.

Course objectives
1: Provide students with knowledge of fundamental concepts of heat & mass transfer and skills for design of heat & mass transfer components and systems
2: Teach students how to develop mathematical models of heat & mass transfer and use them in analysis of practical examples
3: Develop skills to work in a team to acquire new knowledge on specific heat & mass transfer applications and communicate it in written & verbal form

Grading
Your performance will be graded on an absolute scale, so your grade is not affected by how others do. Final letter grades will be awarded based on your weighted average score as follows:

Homework (individual)	10%
Quizzes (individual)	10%
Group project (team work)	25%
Mid-exam (individual)	20%
Final exam (individual)	35%

Letter grades will be assigned automatically by an Excel code based on the following totals:

A (Superior)	85% and above
B+ (Excellent)	80%-84.9%
B (Very Good)	75%-79.9%
C+ (Good)	70%-74.9%
C (Acceptable)	65%-69.9%
D (Minimum)	55%-64.9%
F (Inadequate)	Less than 55%

For success, you are strongly advised to

Review/work on the material of the previous lecture before the next class.
Read the lecture notes and covered sections of the required textbook,
Bring the printed lecture notes to class along with the computer and calculator,
Take additional notes during the lectures
Work out all derivations and examples in the lecture notes and in-class examples on your own after each lecture.
In case of questions, please see the instructor during Office Hours or raise questions in the class. Do not delay this to the exam week.

Policies on assignments/exams and classroom policy
Homework is an integral part of the course:

- Homework is collected at the beginning of the class.
- Late homework will not be accepted for grading; if you cannot attend the class you have send the solution to the instructor before the class.
- Feedback on the homework will be provided during lectures, solutions will be discussed and posted on the MOODLE website; graded homework will be returned
- Each problem will be graded individually

You are allowed to discuss HW problems with peer students, but cannot copy the solution.

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.

Group project assignment

Students will work as a team by cooperating in a group (up to 3) to carry out a short project on specific applications of heat & mass transfer process, prepare and post the progress/final reports & slides on the MOODLE website, and give an oral presentation at the class. **Guidelines** for preparing a project, topics & abstracts of projects presented in the 2018 Spring Semester and **detailed criteria for grading** the project report and oral presentation are posted on the MOODLE website. Topics presented in the 2018 Spring Semester serve as examples, **but cannot be copied**!

In-class project/group activities policy:

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-members. The evaluation form is listed in the syllabus. 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 December 12, 2018.
- Submission of the form after December 12, 2018 and before the final exam will lead to 25% reduction of the credit for project.
- Submission of the form at the final exam will lead to a further 25% reduction of the credit for the project.
- A student **will not be allowed** to take the final exam without prior submission of the self & peer evaluation form.

Exam policy:

There will be one midterm and one final exams; both are open book & lecture notes, computer and calculators can be used. However, the use of the Internet, emails, and cell phones is not allowed to prevent any communication with the outside people.

- Exact date of the midterm exam will be announced a week before.
- The comprehensive final exam during Finals' week will cover the course materials and the topics of students' projects.
- The midterm and final exams must be completed individually, in accordance with the NJIT Honor Code.
- Each exam problem will be graded independently.
- A missed midterm exam will be averaged into the final grade as zero, unless an excuse is obtained. Excuses are granted only for very serious circumstances attested to by the NJIT Dean of Student Office. A student who has been excused will be required to take a makeup exam.
- A students missing the final exam without a documented reason will get an Incomplete.

Disputing a grade on tests/assignments:

If a student has questions about the grade received for an exam, homework, or project, 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.

Course delivery: Face-to-Face

Accommodations due to disability:

If you need accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs.

A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

Course outcomes (1-7 ABET):

1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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
3) An ability to communicate effectively with a range of audiences.
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 .
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
6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Tentative weekly listing of topics (15-week schedule)

Week	Book Chapters
1	Chapter 1
2	Chapter 1/2
3	Chapter 2
4	Chapter 2/3
5	Chapter 4
6	Chapter 4/6
7	Chapter 7/8
8	Chapter 8/9
9	Chapter 9/10 Midterm exam
10	Chapter 11
11	Chapter 11/12
12	Chapter 12
13	Chapter 12/14
14	Chapter 14
15	Chapter 14/Project presentation

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Self and Peer Rating of Project Team Members

Name **Group #:**

Please write the names of all of your team members, INCLUDING YOURSELF, and rate the degree to which each member fulfilled his/her responsibilities in completing the project assignment. The possible ratings are as follows:

Excellent	Consistently went above and beyond (tutored teammates, carried more than his/her fair share of the load)
Very good	Consistently did what he/she was supposed to do, very well prepared and cooperative
Satisfactory	Usually did what he/she was supposed to do, acceptably prepared and cooperative
Ordinary	Often did what he/she was supposed to do, minimally prepared and cooperative
Marginal	Sometimes failed to show up or complete assignments, rarely prepared
Deficient	Often failed to show up or complete assignments, rarely prepared
Unsatisfactory	Consistently failed to show up or complete assignments, unprepared
Superficial	Practically no participation
No show	No participation at all

These ratings should reflect each individual's level of participation, effort, and sense of responsibility, NOT his or her academic ability.

NAME OF TEAM MEMBER	**RATING**

Your signature: Date :