

CHM 6154: Chemical Separations

Fall 2020

COURSE INFORMATION

Instructor:	Yong Zeng
Office:	CLB311C
Email:	zengy@ufl.edu
Lectures:	Mon, Wed, Fri, 11:45-12:35 AM, online through Zoom meeting
Course website:	E-learning (Canvas)
Office hours:	By appointments
Textbook:	<i>Unified Separation Science</i> by J. Calvin Giddings (1991, John Wiley & Sons, INC)
Reading:	<i>Principles and Practice of Modern Chromatographic Methods</i> by K. Robards, P.R. Haddad and P. E. Jackson (Academic Press) <i>Lecture notes and selected literature</i>
Prerequisite:	Strong background in thermodynamics and calculus

OBJECTIVES

This course is designed to provide students in-depth understanding of separation theories and processes, practical knowledge of method development to optimize the separation performance for specific chromatographic techniques, and familiarity with the state-of-the-art development in separation science and applications. The topics of this course include:

1. Theoretical Fundamentals of Separation Science
2. Gas and Liquid Chromatography
3. Electrophoresis
4. Other Separation Techniques
5. Overview of Method Development

EVALUATION

Evaluation of Grades

Assignment	Points	Final Grade
Quizzes	10 each	10%
Midterm Exam	100	30%
Final Exam	100	30%
Presentation	100	10%
Research Proposal	100	20%
Overall		100%

Grading. All grade calculations will be done on a percentage basis. The final grade will be a weighted average of all components. The letter grades will be assigned according to the following scale:

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

COURSE POLICIES

Attendance: Attendance is required. Each unexcused absence will result in a 3-point reduction in the final grade. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Problem Sets: Problem sets will be assigned as an aid in comprehending the course material. They are NOT graded but students are urged to master these problem sets. Answers to the problem sets will be discussed and all posted on the class E-learning website.

Quizzes and Exams: Pop quizzes will be given throughout the course to help review the course material constantly. **Two exams** will be given for the course. The midterm exam covers the first two topics of the course, and it will be a 2-hour exam. The final exam is a comprehensive exam with emphasis on the sections covered after the midterm exam.

Research Proposal & Presentation: The Research Proposal should describe the development and assessment of an innovative separation method/technique to address a specific application. This proposal should be structured as a NIH proposal, which includes one-page Specific Aims, followed by the Research Strategy. The Research Strategy part contains three sections: Significance, Innovation, and Approach. A separate document will be provided to give you details regarding the important due dates, proposal format, and oral presentation. The written proposal will be submitted with the final due date on December 11. Late submission will not be accepted.

Make-Up Policy: There is NO make-ups for quizzes. Once permitted by the Instructor, the grade for the missed quizzes will be replaced by the average grade of your other quizzes. A make-up midterm and final will be provided for students who miss either exam due to extreme, documented circumstances. Students should arrange with the instructor for makeup material, and the student will receive one week to prepare for any makeup assignment, if circumstances allow it.

University Honesty Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel.

For academic misconduct in this course, *at the very minimum, you will receive a grade of zero on any work in which you violate these integrity standards and all violations will be reported to the appropriate University officials.* The instructor reserves the right to retain copies of all submitted work.

Recording of lectures: Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor, are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor are prohibited. Upon request, the instructor will usually grant permission for students to make audio recordings of lectures, on the condition that such recordings are only used as a study aid by the individual student making the recording. Unless explicit permission is obtained from the instructor, such recordings may not be modified and must not be transferred or transmitted to any other person, whether or not that person is enrolled in the course.

TENTATIVE TIMELINE

Timeline	Topic	Chapters
Aug 31 -- Sep 16 (Sep 7- Labor day)	Fundamental Chromatography Theory and Techniques	Giddings: 1, 10, 11, 12 R.H.J.: 1, 2, 3, 5
Sep 18 -- Sep 25	Thermodynamics underlying Chromatography	Giddings: 2 R.H.J.: 2, 5
Sep 28 -- Oct 07	Mass Transport in Separation	Giddings: 3, 4
Oct 9 -- Oct 16	Bandbroadening and Separation Efficiency	Giddings: 5 R.H.J.: 6, 9
Oct 19 Oct 21	Review Midterm Exam	
Oct 23 --Nov 02	Other Chromatography Methods	Giddings: 7
Nov 4 -- Nov 16 (Nov 11-Veterans Day)	Electrophoresis theory and techniques	Giddings: 4.9, 8
Nov 18 -- Nov 23	Emerging Separation Technologies (microfluidics, particle sorting, etc)	Literatures
Nov 25 -- Nov 27	Thanksgiving No class	
Nov 30	Method Development	Giddings: 12 R.H.J.: 8, 9
Dec 2 – Dec 7	Research Presentations	
9-Dec	Review	
18-Dec	Final Exam, 12:30 PM - 2:30 PM	Cumulative