

CHEM 751 - SEPARATION SCIENCES - Fall 2018

Lectures: Mon. & Wed. 7:00 - 7:50 pm GMCS-308

Instructor: Prof. Christopher R. Harrison

Office: GMCS-213E

Office hours: By appointment - <https://harrison-sdsu.youcanbook.me>

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Textbook: No specific textbook is required for this course, however several resources will be posted to Blackboard in the Course Documents section.

Course Description

The aim of this course is to develop a comprehensive understanding of high performance liquid chromatography (HPLC) and capillary electrophoresis (CE) separation techniques. Central to this will be the exploration of the fundamental aspects governing the physical instruments themselves, as well as the theories governing separations in both systems. The course will be inquiry driven, with the students influencing the pace and direction of the material investigated/covered.

The schedule below is a rough guide for the flow of the course material and is subject to change during the course of the semester.

Learning Outcomes

Upon completion of this course the students will be capable of the following:

- Identify and describe the function of the key parts of HPLC and CE instruments.
- Be capable of applying various retention theories to predict the elution of analytes from a given set of HPLC separation conditions.
- Be capable of identifying the pertinent interactions and conditions in a CE separation system, as to be able to predict the migration of various analytes.
- Predict the relative elution strength of HPLC mobile phases.
- Describe how the electroosmotic flow in a capillary is generated and how it can be modified.
- Develop feasible strategies for obtaining the separation of mixtures of compounds, employing either HPLC or CE techniques.

Course Materials

Electronic course materials will be made available through the course Blackboard page. These will consist of digital handbooks, academic papers, and web links relevant to the course material.

A shared study guide will be produced by the students, via shared Google Docs. All students are expected to contribute to the writing and editing of the guidebooks. These will become the principal sources of information for the course. Contribution to this document by all students is required (see grade scheme).

Grading

The distribution of grades will be as described in the table below, with exams being the principle source of evaluation of each student's understanding of the course materials.

Participation will be evaluated as a measure of individual contributions to in-class discussion, writing/editing/commenting in the group produced study guide. Periodic updates to approximate participation scores will be distributed (likely with the exams) to allow for individuals to assess their level of participation.

Percentage	
Exam 1	25%
Exam 2	25%
Final Exam	30%
Participation	10%
Assignments (2)	10%

Tentative Grading Scale

Letter	Cutoff
A	85%
A-	80%
B+	76%
B	73%
B-	70%
C+	66%
C	63%
C-	60%
D	53%
F	< 53%

Course Schedule

Week	Dates	Topics
1	8/27 - 8/29	Chemical Separations & HPLC Instrument
-	9/3	Labor Day (no class)
2	9/5	HPLC Instrumentation
3	9/10 - 9/12	HPLC - Fluid Flow, Pressure, Diffusion
4	9/17 - 9/19	HPLC - Columns
5	9/24 - 9/26	HPLC - Retention
6	10/1	Exam 1
6	10/5	HPLC - RP Separations
7	10/8 - 10/12	HPLC - NP & Ion Chromatography
8	10/15 - 10/19	HPLC - HILIC
9	10/22 - 10/26	HPLC - 2D Separations
10	10/29 - 11/2	CE - Instrumentation
11	11/5 - 11/9	CE - Electrophoresis & Electroosmotic Flow
-	Mon. 11/12	Veteran's Day (no class)
12	11/14	Exam 2
13	11/19	CE - Control of EOF
14	11/21 - 11/23	CE- Lab-on-a-Chip
-	11/26 - 11/28	Thanksgiving Break
15	12/3 - 12/5	CE - Separation Techniques
16	12/10 - 12/12	CE - Separation Techniques
	TBD	Final Exam Take Home Cumulative

Absence & Deadline Policies:

- All deadlines are firm and extensions will not be provided on an individual basis.
- Technology failures (e.g. webpages not loading, dog ate my computer, internet being down...) are likely to occur, do not leave the submission of homework or labs to the last minute. No extensions will be provided for such occurrences.

- Unexcused absences for an exam will be treated as a zero. If an excused absence is allowed (e.g. medical reason, conference schedule conflict...) the points value for the exam will be redistributed over the other exams.

Test Accommodations:

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Students who have made arrangements with SDS for test accommodations and require a signature from an instructor must make arrangements to meet the instructor outside of the class time to obtain a signature. Absolutely no forms will be signed immediately prior to, during, or after a lecture.