

CHEM 750 - HPLC & CE Separations - Spring 2016

Lectures: Tues. & Thurs. 6:00 - 6:50 pm

Location: GMCS-325

Instructor: Prof. Christopher R. Harrison
Office: GMCS-213E
Hours: Mon. & Wed. 9:00 - 10:00 am, & by appointment
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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 a shared Dropbox folder. The folder can be found through: <http://bit.ly/1nq3MTD>

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.

Course Schedule

Week	Topics
1	HPLC - Instrumentation
2	HPLC - Instrumentation & Operation
3	HPLC - Fluid Flow, Pressure, Diffusion
4	HPLC - Columns
5	HPLC - Retention
Feb. 18th	Exam 1
6	HPLC - RP/NP Separations
7	HPLC - Ion Chromatography
8	HPLC - HILIC
9	HPLC - 2D Separations
10	CE - Instrumentation
Mar. 24	Exam 2
Mar. 28 - Apr. 1	Spring Break
11	CE - Electrophoresis & Electroosmotic Flow
12	CE - Control of EOF
13	CE- Lab-on-a-Chip
14	CE - Separation Techniques
15	CE - Separation Techniques
May 10	Final Exam 7:00 - 9:00 pm

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 guidebooks. 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	20%