

Chemistry 4015/6015
Separation in Biosciences Spring 2016 (MM1)
Langdale Hall 321 (Mon/Wed 5:30-8:15, Lectures)
Jan 11- Feb 27, 2016

Instructor: Office: Shahab A. Shamsi, Room 573 NSC,
 Phone (404)-413-5512; E-mail address: sshamsi@gsu.edu
 Monday and Wednesday
 Office Hours (immediately after the class till 9:15 P.M, or TBA by appointment)

Reference text and resources: (1) Lecture notes (to be provided in class);
 (2) Reference book (to be available in D2L), reference textbook in library

Course Objective: *To learn fundamentals of capillary electrophoresis
 * To learn basic principles of various modes of capillary electrophoresis
 *To learn to apply theoretical principles in order to develop a capillary electrophoresis method to achieve a particular separation/analysis of compounds or mixtures of compounds
 *To improve oral communication skills in scientific reading and data presentations

Tentative Lecture Content: (This schedule is a general guide and may be modified as needed)

Unit 1-The Basics of Capillary Electrophoresis (Total 3 lectures + lab tour)

Date	Reading	Module sub-topic
		Module I
Jan 11	Lecture Notes Reference books Module 1	Introduction and History of Capillary Electrophoresis (CE) Classification of CE Methods Basic Separation Mechanism and Fundamentals of CE Electroosmotic flow and how it is generated
		Module I (Contd)
	Lecture Notes Reference books Module 1	Concept of Effective and Apparent Mobility Efficiency and Resolution in CE (contd) Sources of Zone Broadening Capillary Electrophoresis Method Development
Jan 13	Lecture Notes	Module II -Capillary Electrophoresis (CE) Instrumentation Capillary Electrophoresis Method Development
Jan 18	Martin Luther King Holiday (No Class)	
Jan 20	Lecture Notes	Detection in CE, Capillary Zone Electrophoresis (CZE) Introduction, Mechanism of Separation, Buffer Systems Practical Considerations in CZE
Jan 25	Exam I	Module III Introduction to CIE

<u>Date</u>	<u>Reading</u>	<u>Module sub-topic</u>
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Unit 2-Modes of Capillary Electrophoresis (Total 5 lectures)

Module III

Jan 27	Lecture Notes Reference books	Capillary Ion Electrophoresis (CIE) Introduction, Mechanism of Separation, Buffer System Detection Modes, Application to Anions and Cations
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Feb 1	Lecture Notes Reference Boook	CIE (Contd) Module IV Micellar Electrokinetic Chromatography (MEKC) Introduction (Concept of Surfactants and Micelles)
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Feb 3	Lecture Notes Reference books	MEKC (contd) Mechanism of Separation, Capacity Factor, Elution Range In MEKC
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Feb 8	Lecture Notes Reference books	Module V Capillary Gel Electrophoresis (CGE) Mechanism of Separation, Theories of Migration of Macromolecules in Polymer Gels, Parameters affecting CGE separations, Applications
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Feb 10	Lecture Notes Reference books	Module VI Capillary Isoelectric Focusing (CIEF) Concept of Isoelectric point, CIEF procedures Types of Mobilization, Capillary isotachopheresis (CITP)
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Feb 15	Exam II Lecture Notes Reference books	Module VII Chiral Capillary Electrophoresis (CCE) Importance of Chirality, Chiral selectors, Principle and Separation Mechanism, Migration order in CCE, Applications
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Unit 4-Advances in Separation/Detection in Capillary Electrophoresis

<u>Date</u>	<u>Reading</u>	<u>Module sub-topic (1-lecture)</u>
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Feb 17	Lecture Notes Reference books	Module VIII CCE (contd) Capillary Electrochromatography (CEC) Fundamentals and Instrumentation in CEC Mechanism of Separation, Buffer Systems, Applications
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Module IX

Lecture Notes Capillary Electrophoresis-Mass Spectrometry,
Reference books CEC-MS, MEKC-MS, Capillary Array Electrophoresis

Feb 22 and Feb 24-Group Presentations (Module X)

Unit 5-Group Presentations

Feb 22 (three students)	Each 30 Min Session + 5 min Q&A
Feb 22 (three students)	Each 30 Min Session + 5 min Q &A
Feb-24 (three students)	Each 30 Min Session + 5 min Q &A
Feb-24 (three students)	Each 30 Min Session + 5 min Q &A

Exam III Wednesday Feb 24 (Based on Unit 5 (only) (Take Home))

Final Exam Friday Feb 26 at 4:15-5:45 P.M (Comprehensive)

GRADING CRITERIA

UNDERGRADUATE(4015)

Short exams 50%
(Exam 1 = 20%, Exam 2 = 30%)
Take Exam 3 = 15%
Presentations = 5%, Homeworks (5%)
Online Participation = 5%
*Final exam 20%

*GRADUATE (6015)

Short exams 50%
(Exam 1 = 20%, Exam 2 = 30%)
Take Home Exam 3 = 15%
Presentations =5%,Homeworks= 5%
Online Participation = 5%
*Final exam 20%

***Final exam will be 75% comprehensive and 25% will cover part of Model VII-IX**

***Student can take at least two final exams within 24 hours. However, if a student has more than two exams please let me know in writing at least 7 days before the final to reschedule. No special administration of final exams will be made if the above rule is not followed**

GRADING SCALE: The grading scale may be curved, but the most probable breakdown will be:

95-100	A ⁺
90-94	A
85-89	A ⁻
80-84	B ⁺
75-79	B
70-74	B ⁻
65-69	C ⁺
60-64	C
55-59	C ⁻
50-54	D ⁺
45-49	D
40-44	D ⁻
below 40	F

PLEASE READ THE IMPORTANT POLICIES AND PROCEDURES:

1. **No makeup exams will be given** (unless the situation is such that the whole class did poorly in the exam).
2. If a student misses one exam **without a legitimate excuse**, s(he) will receive a grade zero for that exam.
3. If a student misses one exam **with a legitimate excuse**, s(he) can either choose to receive a grade of zero for that exam or apply the grade to the final exam.
4. If you miss exam III there (with or without legitimate excuse) you will receive grade zero on that exam

*Legitimate reasons for excuse are the following:

Cause	Required
Due to illness	illness note from the doctor
Due to business	business note from the supervisor
Death in family	note of death from a family member
Other	On a case by case basis

* I must be informed **before the exam** to count as an excused absence. If you cannot reach me, leave a message on my answering machine at my office (Indicate the time and the day), or notify the departmental receptionist (Indicate the time and the day).

Please note that notifying me after the exam will result in a grade of zero for that exam.

5. Although I do not expect cheating in my classroom, the penalty is an **F for the course**. Plagiarism is also considered cheating, therefore, copying large sections of another author's material without paraphrasing and referencing it will result in grade F.
6. Attendance will be taken regularly. I strongly urge to attend class. Otherwise you may miss the pop quizzes and lecture part (that may not be there in your textbook).
7. Although I will try to maintain the class schedule and objectives, I may need to make adjustments.

Course Withdrawl Date

The last day to withdraw from the course and possibly receive a "W" is **Friday Jan 29**

Professional Behavior Guidelines:

1. **Tardiness:** Please arrive on time. If you are late please enter the class without disturbing your class mates and my concentration.
2. **Side Conversation:** Side conversations make it difficult for your class mates to actively listen and learn. If you have trouble reading the board please ask me without any hesitation.

3. **Sleeping:** Falling asleep in class (unless the course focuses on dysfunctional sleep behaviors) is not considered professional attitude.
4. **Lack of attention/Boredom:** Please do not read other books or newspapers or study for other courses during my class. It is not polite. If the material that you are taught is familiar to you please write down some specific questions in your notebook and discuss with me about the advances in this topic (**only after the class**).
5. If you cannot see me during my office hours please send me an e-mail (sshamsi@gsu.edu) for help any day.
6. You may audio tape my lectures.