

**Chemistry 4010/6010**  
**Chromatography Fall 2015**  
**1:30-2:45 (Mon/Wed) Class Room South 528**  
**Office Hours (Mon/Wed 2:45- 4:00 P.M) in Room 573 Natural Science Center**  
**Lecture Instructor: Shahab A. Shamsi**  
**Room 573 Natural Science Center (NSC)**  
**Email: [sshamsi@gsu.edu](mailto:sshamsi@gsu.edu); Phone: 404-413-5512**

**Reference Textbook and Resources:** “Chromatographic Methods” written by A. Braithwaite and F. J. Smith (available in GSU Book Store); Lecture Notes (All notes will be provided via electronic e-mail).

**Appointment time: You can see me right after the class or set an appointment time by sending an e-mail. Please be courteous and do not request appointment 30 minutes before the lecture and come to my office to ask questions. This is the time I spend preparing for my lecture**

**Learning Objectives:**

- \*To learn basic principles governing separation techniques.
- \*To learn fundamentals of chromatographic techniques.
- \*To learn to apply basic principles, which may help develop a chromatographic method(s) to achieve a particular separation and analysis of real world chemical compounds

**\*Please note that I am not in charge of the laboratory section. Therefore, for any laboratory schedules, experimental issues are generally handled by the laboratory incharge personnel(s). If you have any questions related to experimental problems, instrument malfunctioning, lab write up and lab grades please contact them and cc to me accordingly. I will be happy to help the best way possible in any questions that you may have on lab and lecture teaching and learning as well as grading issues etc.**

**Tentative content and schedule: This is a tentative schedule and may be modified as needed.**

**Module I: The Basic Theory of Chromatography (Total 4-5 lectures)**

<b><u>Date</u></b>	<b><u>Suggested Readings</u></b>	<b><u>Sub-Topic</u></b>
Aug 24-26	Chapter 1, Lect Notes	Introduction, History and Type of Chromatography Plate Theory of Chromatography, Calculation of Zone Spreading, Calculation of Theoretical Plates Shortcomings of Plate Theory
Aug 31-Sep 2	Chapter 1, Lect Notes	Introduction to Chromatographic Parameters, (Retention, Capacity Factor, Resolution, Symmetry and Peak Capacity), Factors Affecting Resolution
Sep 9	Chapter 2 Lecture Notes	Rate Theory of Chromatography, Van Deemter Equation, Factors Affecting the Van Deemter Plot and Equation

**Sep 14 (Monday) Exam I (100 pts) (Maximum 2 hr allocation) 1:00-3:00**

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**Module II: Qualitative and Quantitative Analysis in Chromatography/Basic GC Instrumentation**

<u>Date</u>	<u>Suggested Readings</u>	<u>Sub-Topic</u>
Sep 16	Chapter 2, Lect Notes Chapter 2, Lect Notes	Qualitative Methods, Kovat Retention Index Quantitation Methods in Chromatography Temp Effects in Chromatography
Sep 21-23	Chapter 5, Lect Notes Chapter 5 Lecture Notes	Principles and Instrumentation in Chromatography Choice of Mobile Phases and Stationary Phases in Gas Chromatography, Carrier Gas and Injection Modes
Sep 28-30	Chapter 5 Lecture Notes	Detector Properties, Types of GC detectors

**Oct 5 (Monday) Exam II (100 pts (Maximum 2 hr allocation) 1:00-3:00)**

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**Module III: Principles and Methodologies in Liquid Chromatography**

<u>Date</u>	<u>Suggested Readings</u>	<u>Sub-Topic</u>
Oct 7	Lecture Notes	Thin Layer Chromatography (TLC)
Oct 12-14	Chapter 6, Lecture Notes	Instrumentation in HPLC Pump, Injector, Column and HPLC Detectors
Oct 19-21	Chapter 6, Lecture Notes	HPLC Detectors (Contd)

**Oct 26 (Monday) Exam III (100 pts (Maximum 2 hr allocation) 1:00-3:00)**

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Oct 28	Chapter 6, Lecture Notes	Normal Phase HPLC
Nov 2	Chapter 6, Lecture Notes	Reversed Phase HPLC
Nov 4	Chapter 6, Lecture Notes	Size Exclusion/Gradient Elution in HPLC Ion Exchange HPLC
Nov 9	Chapter 6, Lecture Notes	Ion Exchange HPLC and Ion Chromatography
Nov 11	Chapter 6, Lecture Notes	IC (Continued)
Nov 16,18		Chromatographic Analysis of Samples
Nov 30	Lecture Notes/HW Problems	Chromatographic Analysis of Samples

**\*Dec 2 (Wednesday) Exam IV (100 pts (Maximum 2 hr allocation) 1:00-3:00)**

Dec 7	Review
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**\*Dec 9 (Wednesday) Final Exam Comprehensive (200 Pts) (1:30-4:00)**

**Home Work Problems:** Assigned homework problems will also be given during the course of the semester; They can be discussed through electronic board as well. It should be noted that questions similar to home work problems may be asked in the exam. Hence, it should be reviewed carefully.

**Pop Quizzes:** Unannounced pop quizzes be given throughout the semester. They are mandatory and will contribute to your overall grade of the semester.

## GRADING CRITERIA

### GRADING POINT DISTRIBUTION

#### **UNDERGRADUATE (4010) (1000 pts)**

\*Lab reports 25% (250 points)  
Short exams 40% 10% each (400 pts)  
+Final exam 15% (150 pts)  
\*Electronic Board Discussion (50 pts)  
Pop Quizzes (10%) (100 pts)  
Homework ( 5%) ( 50 pts)

#### **GRADUATE (6010) (1000 pts)**

\*Lab reports 20% (200 pts)  
Short exams 40% (400 pts)  
+Final exam 15% (150 pts)  
\*Electronic Board Discussion (50 pts)  
Pop Quizzes (5%) (50 pts), Homework (5%)(50 pts)  
†Literature Project (10%) (100 pts)

**\*The laboratory instructors will grade their respective sections on laboratory reports. Therefore, student should collect graded report from the laboratory instructors. Dr. Shamsi may review the lab grading for any issues that students may have. OR Graded lab reports may be requested by Dr. Shamsi for review and to improve learning outcomes for final assessment.**

**+ Final exam will be comprehensive**

**≠ Extra question may be added to the short exams for graduate students only but the total points stays the same.**

**† Literature project will be due on the day of the Final exam and is required only by graduate students ---→ 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 by sending an e-mail at [sshamsi@gsu.edu](mailto:sshamsi@gsu.edu) at least 14 days before the final to reschedule.**

### GRADING SCALE

Grading may be curved (depending on the class performance), but the most probable break down will be as follows:

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

**PLEASE READ THE FOLLOWING IMPORTANT POLICIES AND PROCEDURES**

1. No make-up exam will be given unless the situation is such that the whole class did poorly in the exam.
2. If a student misses any exam (**without a legitimate excuse**), he/she will receive a grade zero for that exam.
3. If a student misses any exam (**with a legitimate excuse**), he/she can either choose to receive a grade zero for that exam or apply the grade to the following exam for the missed exam.
4. If a student misses **Exam IV (with a legitimate excuse)**, he/she can either choose to receive a grade zero for that exam or choose to receive INC as a semester grade.

\*Legitimate reasons for excuse are the following:

<b>Cause</b>	<b>Required</b>
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, send me an email ([sshamsi@gsu.edu](mailto:sshamsi@gsu.edu)) or leave a message on my answering machine at my office (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**

The last day to withdraw from the course and withdrawl policies should be checked by student from Registrar Office

### **Professional Behavior Guidelines:**

1. **Tardiness:** Please arrive on time. If you are late, please enter the class without disturbing your classmates 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 or any of my slide 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](mailto:sshamsi@gsu.edu)) for help any day.