

## Chemistry 4010/6010 LABORATORY Syllabus Fall 2020 – BLENDED LEARNING MODEL

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**Instructor:** Dr. Andrea Mezencevova

**Email:** amezencevova@gsu.edu

**Online Sessions:** iCollege

**F2F Sessions:** Thursday (CRN 83176) and Friday (CRN 84115, 84116, 95343) 9am-12:15pm, NSC-242

**Communication with Students:** **Email** (please check your email regularly for updates) and the Chem 4010/6010 course page on **iCollege** (<https://gastate.view.usg.edu/d2l/home/2129782>)

**Lab Course Material:** Lab lectures, videos and other supporting material will be posted on iCollege. Raw data to be processed by students will be sent to students' emails. Students are encouraged to use the course lectures and literature suggestions provided by Dr. Shamsi.

**Office hours:** Please email me with any questions you have. I check email regularly throughout the day, even on the weekend and you can expect to hear back from me within 24 hours.

**Midpoint:** October 13 (the last day to drop the class with a W)

**Please note that this syllabus reflects a plan for the semester. Deviations may become necessary as the semester progresses.**

### **Course Description:**

Chem 4010/6010 Lab is designed to teach the students various analytical separation methods used to separate mixtures into their pure components for identification and quantification. The techniques used include gas chromatography (GC), thin layer chromatography (TLC) and high-performance liquid chromatography (HPLC). The students employ these techniques to separate unknown mixtures and to identify and/or quantify their components using external standards.

### **Blended Learning Model (BLM):**

This type of course offers some lab sessions face-to-face (F2F) and other sessions online to reduce population density in classrooms and campus. This way the students have access to online instructional materials while experiencing the benefit of in-person interactions with their peers and instructors. Class groupings will be divided alphabetically by students' last names and their CRN.

### **Course Goals:**

1. Learn the principles of GC, TLC and HPLC and master operation of a gas chromatograph and an HPLC station. Learn how different parts of gas or liquid chromatographic instruments work to allow complete qualitative and quantitative analysis of mixtures of chemical compounds

2. Learn effective strategies on how to measure and calculate the separation parameters for a mixture of chemical compounds, perform qualitative and quantitative analysis
3. Learn to develop a chromatographic method(s) to achieve a separation and analysis of real-world sample representing a mixture of chemical compounds
4. Learn to write a proper formal laboratory report in an ACS style

### **Course Outcomes:**

1. Students will learn how to set experimental conditions and operate GC and HPLC instruments, how a proper injection technique should be performed, and how to collect the experimental data using chromatographic software.
2. Students will be able to process raw chromatographic data, to measure and calculate basic chromatographic parameters (e.g. retention time, peak area, retention volume, etc.) and use these parameters to identify unknown mixtures and calculate the concentration of their components. Students will learn how to read a chromatogram and be able to evaluate the quality of the mixture separation and suggest conditions that would improve this separation process.
3. Students will be able to analyze “real-world” samples (e.g. analgesics), evaluate case studies and apply to the analysis of samples using the cumulative knowledge and learning achieved under goal 1 and goal 2.
4. Students will learn to compose laboratory reports in a format of scientific paper in standard ACS style.

### **Class Sessions Design:**

- Each class will be divided into four groups (A-D). The groups with students’ names will be posted on iCollege.
- Each group will attend lab sessions on a “**1 week F2F and 3 weeks online**” basis. The Lab Schedule below provides information about the days on which the individual groups come to the F2F session.
- There will be no synchronized online sessions. Students can involve into class activities on their own time schedule; however, they need to keep the deadlines for assignments submissions. ***Attendance in an online class means checking email and completing assignments as indicated by the course modules*** (see the Schedule of Laboratory Sessions below). It is imperative for your success that you stay on schedule.
- Please note that deviations may become necessary as the semester progresses. Each change will be announced through email.

### **iCollege:**

This course uses iCollege for course material and communication. iCollege can be accessed from a link on the Georgia State University homepage. You are expected to have reliable access to a

computer with an internet connection. Please note that iCollege has maintenance periods on many weekends. Please adjust your study schedule as needed.

### **Laboratory Rules:**

During the F2F lab sessions students need to

- **wear proper attire:** long pants/skirts, tops with at least short sleeves, shoes covering whole feet (no shorts, tank tops, sandal or flip-flops, etc)
- **wear safety glasses**
- **wear an appropriate face covering** (Effective July 15, 2020, US institutions will require all faculty, staff, students, and visitors to wear an appropriate face covering while inside campus facilities/buildings and in campus outdoor settings where maintaining six-foot social distancing may not be possible. Face-covering use will be in addition to and is not a substitute for social distancing.)

### **Lab Course Design**

- This BLM lab course is divided into **10 Modules** – 1 Welcome module and 9 modules representing 9 experiments selected to cover the basics of three chromatographic techniques – GC, TLC and HPLC. The modules will take 1 or 2 weeks (see the schedule)
- The modules will contain instructional material (pre-lab lecture and videos) and will be posted on iCollege on Wednesdays along with the assignments for the individual experiments. The assignments will need to be completed and submitted on the Submission dates provided in the lab schedule.
- All groups will watch the prelab lecture and the videos to get familiar with the topic of the module
- The groups which come to the designated F2F sessions (see the schedule) will perform the experiment scheduled for that day. Experimental data collected during the F2F sessions will be shared with the other groups working “online”. These shared data may be processed and used for the assignments.

While you are working, I will also be working hard to give you quality feedback and grade your assignments in a timely manner.

### **Laboratory Assignments:**

Four formal laboratory reports and three worksheets will be required throughout the semester. The assignments will be posted on iCollege under the Assessments tab.

### **Lab Reports:**

Lab reports will be written on the following experiments: GC2-3, GC5-6, TLC and HPLC1. Criteria used in grading the lab reports are: (1) your understanding of the experiment as judged by your comments and answers to questions, (2) the quality of your data, (3) the completeness

and accuracy of your data analysis (including error analysis), (4) the report's clarity, organization, and quality of presentation. Lab report format should follow ACS guidelines.

Lab reports are **100 points each** and must be turned in on the due dates (see the Lab Schedule). Raw experimental data will be sent to students' emails. A detailed checklist for writing the lab report will be attached to the assignment folder. ***I suggest that you carefully follow the instructions in the checklist.***

After grading, the Lab Report #1 will be returned to the students with the instructor's comments and suggestions. Students will be allowed to revise, re-write, and re-submit the said paper within one week. The re-written paper should be submitted together with earlier submitted version. Lab Reports #2 and #3 can be submitted only once; without an option to re-submit.

***Worksheets:***

Worksheets will be completed on the following experiments: GC#1, GC#4 and HPLC2. These worksheets will be uploaded on iCollege in the appropriate module folder. Worksheets are **50 points each** and must be turned in on the due dates (see the Lab Schedule).

Students are required to write each lab report/worksheet independently, analyzing the raw data provided by the instructor and discussing accordingly. **IT IS NOT PERMITTED TO USE OTHER PEOPLE'S DATA/DISCUSSION IN THE REPORT WITHOUT A REFERENCE.** If this happens, it will be considered as plagiarism, and zero score will be given on this paper. Grammar check (use Grammarly) is required for submission of all papers.

***Late Assignments:***

Late assignments will be penalized 2 points each workday delay (max 10 pts per week). After 2 weeks from the due date lab reports will not be accepted, and student will receive 0 points on that report.

**Lab Course Grading:**

The maximum grade for this laboratory course is **550 points (100%)**:

- 400 pts for the Lab Reports (4×100pts),
- 150 pts for the Worksheets (3×50pts).

**Grade Breakdown:**

This is how (Chemistry) awards grades for courses:

Grade A+	95-100	Grade A	90-94	Grade A-	85-89
Grade B+	80-84	Grade B	75-79	Grade B-	70-74
Grade C+	65-69	Grade C	60-64	Grade C-	55-59
Grade D	50-54				

## Schedule of Laboratory Sessions:

Day <sup>1</sup>	F2F	Module (Experiment)	Assignment (Type)	Assignment Submission Date <sup>2</sup>
08/27 Th 08/28 Fr	--	Welcome + Syllabus	Roll Verification Activity	09/02
09/03 Th 09/04 Fr	A	GC1 - Injection Technique	Assignment 1 (Worksheet 1)	09/11
09/10 Th 09/11 Fr	B	GC2 – Qualitative Analysis	Assignment 2 (Lab Report 1)	9/25 1 <sup>st</sup> subm. 10/09 2 <sup>nd</sup> subm.
09/17 Th 09/18 Fr	C	GC3 - Quantitative Analysis		
09/24 Th 09/25 Fr	D	GC4 - HETP	Assignment 3 (Worksheet 2)	10/02
10/01 Th 10/02 Fr	A	GC5 - Temperature Programming	Assignment 4 (Lab Report 2)	10/16
10/08 Th 10/09 Fr	B	GC6 - Enthalpy Parameters		
10/15 Th 10/16 Fr	C, D	TLC	Assignment 5 (Lab Report 3)	10/23 (C,D) 10/30 (A,B)
10/22 Th 10/23 Fr	A, B	TLC		
10/29 Th 10/30 Fr	C	HPLC1 - Analgesics	Assignment 6 (Lab Report 4)	11/13
11/5 Th 11/6 Fr	D	HPLC1 – Analgesics		
11/12 Th 11/13 Fr	A	HPLC2 – Gradient Elutions	Assignment 7 (Worksheet 3)	11/27
11/19 Th 11/20 Fr	B	HPLC2 – Gradient Elutions		

<sup>1</sup> Day of the F2F lab session

<sup>2</sup> The last day for uploading the assignment on iCollege without being penalized

**Th** – Thursday section (CRN 83176), **Fr** – Friday section (CRN 84115, 84116)

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**Department of Chemistry Policy Statement Regarding Student Integrity:**

The Department of Chemistry follows the university policy on academic honesty published in the “Faculty Affairs handbook” and the “On Campus: The Undergraduate Co-Curricular Affairs handbook.” Any suspected offenses may be referred to the Department Chair for appropriate action.

- All tests taken must represent your individual, unaided efforts. To receive or offer information during an examination is cheating. The use of unauthorized supplementary materials during tests is also cheating.
- All laboratory work performed during this course must reflect your individual effort. Only original data obtained by your own laboratory experimentation are permitted to be used, except when specifically authorized by your laboratory professor.
- Data from supplementary sources (handbooks, reference literature, etc.) must be clearly referenced (title, author, volume, page(s), etc.). Falsification or destruction of data constitutes cheating.
- Plagiarism and cheating in any form will not be tolerated and will result in failure for the associated assignment and possibly the entire course. Plagiarism includes the quoting or paraphrasing another source’s work without citation. If you are unclear on what constitutes plagiarism, please feel free to speak with me in more detail.

**GSU Policy Prohibiting Students from Posting Instructor-Generated Materials on External Sites**

The selling, sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial purpose is strictly prohibited unless explicit written permission is granted in advance by the course instructor. This includes posting any materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu and other similar sites. Unauthorized sale or commercial distribution of such material is a violation of the instructor’s intellectual property and the privacy rights of students attending the class and is prohibited. (This policy was approved by the GSU Faculty Senate on August 21, 2020)

***Note: This also includes your assignments (lab reports, worksheets, etc) that you have produced during the course, and which contain data collected using GSU’s equipment and instrumentation during the lab sessions or provided by the instructor.***

**Special Needs:** Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

Students with special needs should then make an appointment with me during the first week of class to discuss any accommodations that need to be made.

**FERPA:** In keeping with USG and university policy, this course website will make every effort to maintain the privacy and accuracy of your personal information. Specifically, unless otherwise noted, it will not actively share personal information gathered from the site with anyone except university employees whose responsibilities require access to said records. However, some information collected from the site may be subject to the Georgia Open Records Act. This means that while we do not actively share information, in some cases we may be compelled by law to release information gathered from the

site. Also, the site will be managed in compliance with the Family Educational Rights and Privacy Act (FERPA), which prohibits the release of education records without student permission.

**Sexual Harassment:** In instances of sexual misconduct, the present instructor(s) and teaching assistants, are designated as Responsible Employees who are required to share with administrative officials all reports of sexual misconduct for university review. If you wish to disclose an incident of sexual misconduct confidentially, there are options on campus for you to do so. For more information on this policy, please refer to the Sexual Misconduct Policy which is included in the Georgia State University Student Code of Conduct.

**Basic Needs Statement:** Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable us to provide resources that we may possess. The Embark program at GSU provides resources for students facing homelessness.

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