

## **CHEM 6281 Syllabus**

Mass Spectrometry, 3 credit hours

Fall 2026

### Instructor Information

**Instructor**

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### **General Course Information**

#### **Description**

Students attending this course will obtain a complete understanding of theories, instrumentation, and applications of modern mass spectrometry. We will discuss different ionization sources including Chemical Ionization (CI), Electron Ionization (EI), Photon Ionization (PI), Matrix Assisted Laser Desorption/Ionization (MALDI), and ElectroSpray Ionization (ESI). Various mass analyzers will also be covered, such as Time-Of-Flight (TOF), Quadrupole, Fourier-Transform Ion Cyclotron Resonance (FTICR), and 3D and Linear Quadrupole Ion Trap. Furthermore, we will also discuss ion detectors and data acquisition systems. Different tandem MS scan modes and LC-MS will be included together with their applications in proteomics, forensics, and drug discovery.

#### **Course Learning Outcomes**

- Understanding of important concepts in the mass spectrometry field
- In-depth knowledge of different ion sources, including Chemical Ionization (CI), Electron Ionization (EI), Photon Ionization (PI), Matrix Assisted Laser Desorption/Ionization (MALDI), and ElectroSpray Ionization (ESI)
- Deep understanding of all major mass analyzers in the field of mass spectrometry, including Time-Of-Flight (TOF), Quadrupole, Fourier-Transform Ion Cyclotron Resonance (FTICR), and 3D and Linear Quadrupole Ion Trap
- Being fully aware of limitations and strengths of each MS method
- Learning various applications of mass spectrometry from small molecules to macromolecules
- Enhancing critical-thinking and problem-solving capabilities especially on mass spectrometry-related research

## **Required Course Materials**

Recommended Textbook: "Introduction to Mass Spectrometry. Instrumentation, Applications and strategies for Data Interpretation" by J. Throck Watson and O. David Sparkman. Fourth edition (2007), ISBN=978-0470516348, John Wiley and Sons.

Other options include:

"Mass Spectrometry. A Textbook" by Jurgen Gross.

"Mass Spectrometry. Principles and Applications" by de Hoffmann and Stroobant.

## **Grading Policy**

Your final grade will be assigned as a letter grade according to the following scale:

A	85.0 – 100%
B	70.0 – 84.9%
C	60.0 – 69.9%
D	50.0 – 59.9%
F	Less than 50.0%

This will be done based on two mid-term exams (20% each), presentation (20%) and final exam (40%).

Regrading request should be submitted to the instructor within two working days after the scores are released each time.

## **Description of Graded Components**

For the mid-term and final exams, the contents covered in the classroom will be tested. For the first mid-term exam, the contents covered before the exam will be tested. For the second exam, the contents covered from the first mid-term exam to the second one will be tested. In the final exam, all the contents covered in the course will be tested. The exam questions will have an emphasis on understanding of the contents, rather than memorizing them.

Regarding the presentation, it normally consists of background/motivation, methods, results, discussion, and conclusions. Relevant references in the literature should be cited. The presentation is expected to be well organized and be presented clearly, and students can answer questions from other students in the class.

Any absence of exam must be justified, or you will receive a zero point for the exam. There are no scheduled makeup exams. Planned absences for exam dates that coincide with an Institute Approved activity must be informed to the instructor ASAP, and then an alternative exam on a different day is possible.

## **Attendance and/or Participation**

Students are expected to attend lectures and actively participate in activities in the classroom.

Comprehensive guidelines regarding class attendance and excused absences can be found in the Georgia Tech catalog. Please read through the policies in their entirety.

<http://www.catalog.gatech.edu/rules/4/>

<http://www.catalog.gatech.edu/policies/student-absence-regulations/>

Students who are absent because of participation in an Institute Approved activity and a particular religious observance will be permitted to make up the work missed during their absence with no late penalty, provided the student informs the course instructors of the upcoming absence, in writing, within the first two weeks of class, and provided that the student makes up the missed material within the time frame established by the course instructors. This also applies to exams.

## **Academic Integrity**

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

## **Accommodation for Students with Disabilities**

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

## **Student-Faculty Expectations Agreement**

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

### **Pre- &/or Co-Requisites**

Pre-requisites include CHEM 2216 and CHEM 3216 or relevant courses.

### **Campus Resources for Students**

#### **Graduate Student Academic and Professional Success Resources**

A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide;
- Professional Development such as the programming from the Career Center and other professional development resources and events.

### **Student Well-Being**

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)).