

## CHEM 6281 [REDACTED]: Mass Spectrometry

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**Lectures:** Tuesdays & Thursdays 9:30am~11:00 am. Molecular Science and Engineering (MoSE) room 1224.

**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.

**Requirements:** All the students enrolled in CHEM 6281 are expected to conform to the Honor Code.

### **Course Description/Learning Objectives:**

Students attending this course will obtain a complete understanding of the inner functioning of a modern mass spectrometer, and of modern MS techniques. We will explore the functioning of different mass analyzers, complemented by live ion-trajectory simulations. We will also focus on studying ion detectors and data acquisition systems. Special emphasis will be placed on the understanding of different tandem MS scan modes and their application in proteomics, forensics and drug discovery. Modern ionization methods such as MALDI and ESI will then be explained.

### **Grading system:**

Students will be given one midterm and one final exam. Each exam will be graded in a 100-point scale and will account for 1/2 of the grade.

The final grade will be converted to a letter grade, based on the mean point grade, according to the following scale:

**A (100 – 81 points); B (80 – 61 points); C (60 – 40 points); D (39 – 21 points); F (below 20 points).**

### Tentative Lecture Timeline:

Week	Tuesday
Jan 10 and 12	Syllabus discussion. Intro to MS. Terminology. Example Applications (Chapter 1). Basic strategies for spectral interpretation (pg. 267-302).
Jan 17 and 19	Basic strategies for spectral interpretation (cont'd). Isotopes
Jan 24 and 26	TOF Mass Analyzers. TOF data acquisition. Hadamard TOF. (pg 53-82) <b>SIMION TOF simulations.</b>
Jan 31 and Feb 2	3D and Linear Quadrupole Ion Trap Mass Analyzers. (pg 82-100) <b>SIMION QIT simulations.</b>
February 7 and 9	Orbitraps and Transmission Quadrupoles. (pg 103-115) Ion Guides. <b>SIMION Q simulations</b>
February 14 and 16	FTICR analyzers (pg 122-127). Ion Detectors. Vacuum Systems(pg 136-162) .
February 21 and 23	<b>Catch up week</b>
Feb 28 and March 1st	Ion Mobility Spectrometry, theory, instrumentation and applications (pg 128-135).
March 6 and 8	<b>March 6: Review, Q&amp;A.</b> <b>March 8: Midterm.</b>
March 13 and 15	Electrospray Ionization. Chemical Ionization. DESI/DART (Chapter 7-8).
March 20 and 22	<b>Spring Break</b>
March 27 and 29	MALDI. Instrumentation and Applications. MALDI Imaging (pg. 519-553).
April 3 and 5	Ion activation techniques. Instrumentation for MS/MS. (pg. 173-192).
April 10 and 12	Intro to spectral interpretation. Liquid Chromatography-Mass Spectrometry. (pg 639-676). Identification of unknowns based on accurate mass measurements.
April 17 and 19	Spectral Interpretation (pg. 302-342).
April 24 and 26	Intro to Proteomics (Chapter 12).
May 3	<b>Final Exam on 05/03/12 8:00am~10:50 am</b>
May 7th	Grades posted