

CHM 6159
MASS SPECTROMETRIC METHODS
Fall Semester 2018, 3 Credits

Instructor: Boone Prentice, CLB C210C, 352-392-0556,
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Lectures: M W F, 3:00-3:50PM (Period 8), FLI 0109

Office hours: Drop by my office anytime, see me after lecture, or e-mail me to set up an appointment.

Course objectives: To provide students with a solid understanding of modern mass spectrometry, including fundamentals, instrumentation and applications.

Textbook: "Mass Spectrometry: Principles and Applications," 3rd Edition, Edmond de Hoffman and Vincent Stroobant; \$76.00 (list), \$57.11 (Amazon, new), \$43.44 (Amazon, used). The book is not required, but may serve as a useful reference.

Grading: Grades will be based on problem sets (10%), an in-class critical review (30%), a mid-term exam (20%), and a final exam (40%).

Problem sets: Homework problem sets will be made available throughout the semester.

Critical review: Each student is expected to give a short oral presentation (10 min) on an area of mass spectrometry not covered in class. This "critical review" should focus on 1-3 research papers. The exercise will be graded based on the **ability of communicating and critiquing** the material. A choice on the topic of the presentation should be made by **November 6th** in consultation with Dr. Prentice.

Mid-term: The mid-term exam takes place in class on October 5th.

Final exam: The cumulative final exam takes place on December 10th at 10:00AM.

Information on current UF grading policies can be found online:
(<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>).

Course policies:

Attendance will not be recorded, but participation in lectures and demonstration periods is important for assimilating the course material. Any request for make-up exams should be made to Dr. Prentice as far in advance as possible.

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UF students are bound by The Honor Pledge which states: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class."

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

For counseling the following resources are available to students: **U Matter, We Care:** If you or a friend is in distress, please contact umatter@ufl.edu or 352-392- 1575. **Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc/Default.aspx>, 352-392-1575; the University Police Department: 352-392-1111 or 911 for emergencies. **Sexual Assault Recovery Services (SARS):** Student Health Care Center, 352-392-1161.

TENTATIVE LECTURE SCHEDULE

| <u>Date</u> | <u>Lecture</u> | <u>Topic</u> | <u>Textbook</u> |
|-------------|----------------|---|--------------------------------------|
| W 8/22 | 1 | Overview and brief history of MS | Introduction |
| F 8/24 | 2 | Measurements and figures of merit in MS | Introduction |
| M 8/27 | 3 | Ionization: EI | Ch. 1.1 |
| W 8/29 | 4 | Ionization: CI | Ch. 1.2 |
| F 8/31 | 5 | Ionization: API | Ch. 1.10, 1.12-1.13, 1.16-1.17 |
| M 9/3 | | <i>No class- Labor Day</i> | |
| W 9/5 | 6 | Ionization: ESI | Ch. 1.9,1.11 |
| F 9/7 | 7 | Ionization: DI | Ch. 1.3-1.10 |
| M 9/10 | 8 | Ion optics | Ch. 2.4 |
| W 9/12 | 9 | Mass analyzers: TOF | Ch. 2.4 |
| F 9/14 | 10 | Mass analyzers: Sectors | Ch. 2.5 |
| M 9/17 | 11 | Mass analyzers: Quadrupoles/ion traps | Ch. 2.1-2.2 |
| W 9/19 | 12 | Mass analyzers: Quadrupoles/ion traps | Ch. 2.1-2.2 |
| F 9/21 | 13 | Mass analyzers: Quadrupoles/ion traps | Ch. 2.1-2.2 |
| M 9/24 | 14 | Mass analyzers: FT-ICR | Ch. 2.6 |
| W 9/26 | 15 | Mass analyzers: Electrostatic traps | Ch. 2.6 |
| F 9/28 | 16 | Hybrid instruments & Ion detection | Ch. 2.7 |
| M 10/1 | | Exam Preparation | |
| W 10/3 | 17 | Vacuum technology & Instrumentation | Ch. 3 |
| F 10/5 | | Mid-term exam (up to 9/28) | |
| M 10/8 | 18 | Tandem mass spectrometry | Ch. 4.1-4.3 |
| W 10/10 | | Exam Review | |
| F 10/12 | 19 | Collisional activation | Ch. 4.1-4.3 |
| M 10/15 | 20 | RRKM Theory | Ch. 7.1-7.3 |
| W 10/17 | 21 | Ion/molecule and ion/electron reactions | Ch. 4.4-4.6 |
| F 10/19 | 22 | Ion/ion and ion/photon reactions | Ch. 4.4-4.6 |
| M 10/22 | 23 | Guest lecture: Alex Jacobs (Ion mobility) | |
| W 10/24 | 24 | Chromatography | Ch. 5 |
| F 10/26 | 25 | High resolution accurate mass | Ch. 6.1-6.3 |
| M 10/29 | 26 | Guest lecture: Rick Yost (History of QqQ) | Ch. 6.1-6.3 |
| W 10/31 | 27 | Native mass spectrometry | |
| F 11/2 | | <i>No class- UF Homecoming</i> | |
| M 11/5 | 28 | Guest lecture: Tim Garrett (Metabolomics) | |
| W 11/7 | 29 | In class article review | |
| F 11/9 | | <i>No class- BMP Out of Town</i> | |
| M 11/12 | | <i>No class- Veterans Day</i> | |
| W 11/14 | | Student presentations | |
| F 11/16 | | Student presentations | |
| M 11/19 | | Student presentations | |
| W 11/21 | | <i>No class- Thanksgiving</i> | |
| F 11/23 | | <i>No class- Thanksgiving</i> | |

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| M | 11/26 | | Student presentations |
| W | 11/28 | 30 | Imaging mass spectrometry |
| F | 11/30 | 31 | Guest Lecture: Kari Basso (Proteomics) |
| M | 12/3 | | Lab Tours |
| W | 12/5 | | Exam Preparation |
| F | 12/7 | | <i>No class- Reading Day</i> |