

CHM 6159
MASS SPECTROMETRIC METHODS

Fall Semester 2014
3 Credits

Instructor: Rick Yost, C210 CLB, 392-0557, ryost@ufl.edu

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

Lectures: M W F - 4th Period (10:40 - 11:30 am) CSE E220 (CSE is “the other half” of the Marston Science Library, to the NW of the “French Fries” sculpture. The easiest entrance is from the north side, facing Turlington Hall and the Subway restaurant). Student participation and discussion will be encouraged in lectures. A tentative lecture schedule is attached, along with suggested back-up reading from the textbook that will parallel the lecture topics.

Office Hours: Drop by my office anytime, or see me after lecture, or call or email me to set a time to meet.

Text Book: “Introduction to Mass Spectrometry,” 4th ed., JT Watson and OD Sparkman, Wiley (2007). \$130 list, less as an eBook. Note that the 3rd edition is very different! The book is not required, but may a useful resource for students who want the back-up of a print textbook for review.

Web Site: A web site including this syllabus and course materials will (soon) be maintained on the UF E-learning (Sakai) system. You may log on at <http://lss.at.ufl.edu/> . Problem sets and keys, details about demonstration periods and student talks, useful resources and links, and exam and course grades will all appear there.

Exams: The midterm and final exams will cover material from lecture, related reading from the text and handouts, and problem sets. You may bring to each exam one help sheet (8½” x 11”, double sided) with any information you feel might be helpful on the exam.

Projects: Each student will either make a short oral presentation (25 min) in class or prepare a short (8-10 pp) paper on some aspect of modern mass spectrometry. The deadline for topic approval and selection of oral/written format is October 27. Papers will be due December 1. Talks will be scheduled December 1-10. Talks and papers will include a 2-page abstract, including key references and key figures/tables; a sample will be posted on the course webpage.

Grading: Grades will be based on the two exams and the project (1/3 each).

Problem Sets: Problem sets will be assigned during the semester to aid you in your assimilation of the course material. They will not be collected nor graded, but answer keys will be posted.

Demonstration Periods: The course may include demonstration periods at mass spec laboratories around campus. During these “field trips”, you will get to observe state-of-the-art mass spectrometric instrumentation and applications. Potential laboratories include:

Isotope Ratio MS – Geology
ESI/TOF, MALDI TOF/TOF, FTMS - Basso Lab
Fundamentals, IRMPD, Fourier Transform MS – Polfer Group
Metabolomics and LC/MS/MS, OrbiTrap – Metabolomics Center – Garrett Group
Ion Traps, MS/MS, Imaging, Ion Mobility – Yost Group

Course Policies: Attendance will not be recorded, but participation in lectures and demonstration periods is important in assimilating the course material. Any request for make-up exams should be made to Dr. Yost as far in advance as possible. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

UF grading policies for assigning grade points may be reviewed at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students with disabilities requesting classroom accommodation must first register with the Dean of Students Office; the Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

Students are expected to provide feedback on the quality of instruction in this course using the evaluations system at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester. Summary results of these assessments are available at <https://evaluations.ufl.edu/results>.

UF students are bound by The Honor Pledge: “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, available at <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/> specifies behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please see Dr. Yost.

Information on University counseling services and mental health services is available at: www.counseling.ufl.edu or 392-1575.

Tentative Lecture Schedule

<u>Date</u>	<u>Topic</u>	<u>Textbook</u>
M 08/25	Course Overview/Introduction to MS	Ch. 1
W 08/27	Mass Spectrometry - Principles and Instrumentation	Ch. 1, Ch.2 V and VI
F 08/29	Mass Spectrometry - Principles and Instrumentation	Ch. 1, Ch.2 V and VI
M 09/01	<i>No Lecture – Labor Day</i>	
W 09/03	Mass Spectrometry - Principles and Instrumentation	Ch. 1, Ch.2 V and VI
F 09/05	What is Mass? (<i>Dave Powell</i>)	
M 09/08	Ionization Techniques - Gas Phase (EI)	Ch. 6
W 09/10	Ionization Techniques - Gas Phase (EI)	Ch. 6, 5
F 09/12	Ionization Techniques - Gas Phase (CI, APCI)	Ch. 7
M 09/15	Ionization Techniques - Condensed Phase (MALDI) (<i>Kari Basso</i>)	Ch. 9
W 09/17	Ionization Techniques - Condensed Phase	Ch. 8
F 09/19	Ionization Techniques - Condensed Phase (ESI)	Ch. 8
M 09/22	Ionization Techniques - Condensed Phase (ESI)	Ch. 8
W 09/24	Ionization Techniques - Condensed Phase	Ch. 8
F 09/26	Mass Analyzers – Static	Ch. 2 III
M 09/29	High Resolution MS/Accurate Mass Assignment (<i>Kari Basso</i>)	Ch. 2 III
W 10/01	Mass Analyzers – Dynamic, Ion Traps	Ch. 2 III
F 10/03	Mass Analyzers – Ion Traps, FTMS (<i>Nick Polfer</i>)	Ch. 2 III
M 10/06	Mass Analyzers – Ion Traps	Ch. 2 III
W 10/08	Mass Analyzers – Ion Traps, FTMS, Orbitrap	Ch. 2 III
F 10/10	<i>No Lecture – Groundbreaking for new Chemistry Building</i>	
M 10/13	Trace Analysis by MS in Tandem with Chromatography or MS	
W 10/15	GC/MS	Ch. 10
F 10/17	<i>No Lecture – Homecoming</i>	
M 10/20	GC/MS	Ch. 10
W 10/22	Midterm Exam (covers through GC/MS) - in class	
F 10/24	LC/MS	Ch. 11
M 10/27	LC/MS, CE/MS-Bio Applications, Planar Chromatography/MS	Ch. 11
W 10/29	Metabolomics Applications of LC/MS (<i>Tim Garrett</i>)	
F 10/31	Tandem Mass Spectrometry (MS/MS) - Overview, Analytical Aspects	Ch. 3 I
M 11/03	Tandem Mass Spectrometry (MS/MS) - Overview, Analytical Aspects	Ch. 3 I, IV
W 11/05	MS/MS Instrumentation	Ch. 3 III
F 11/07	MS/MS - Fundamentals of Ion Activation and Alternatives	Ch. 3 II
M 11/10	MS/MS - Mixture Analysis and Structure Elucidation Applications	
W 11/12	Imaging Mass Spectrometry (<i>Tim Garrett</i>)	
F 11/14	Ion Mobility	Ch. 2 III 7
M 11/17	Isotope Ratio MS; Accelerator Mass Spectrometry	
W 11/19	Mass Spectrometry of Proteins (<i>Nick Polfer</i>)	Ch. 12
F 11/21	Elemental MS - GD/MS (<i>Will Harrison</i>)	
M 11/24	Elemental MS - ICP/MS (<i>Ben Smith</i>)	Ch. 4 V
W 11/26	<i>No Lecture - Thanksgiving</i>	
F 11/28	<i>No Lecture - Thanksgiving</i>	
M 12/01	Student Talks; papers and abstracts due	
W 12/03	Student Talks	
F 12/05	Student Talks	
M 12/08	Student Talks	
W 12/10	Student Talks	
Th 12/18	Final Exam <u>Scheduled</u> 12:30 PM – 2:30 PM – CSE E220	