Course Syllabus

CH5240 – Advanced Mass Spectrometry
Michigan Technological University
College of Science and Arts
Spring 2015

Instructor Information

Instructor: Lynn R. Mazzoleni, Ph.D., Associate Professor
Office Location: 402d Chemical Sciences Building
Telephone: (906) 487-1853
E-mail: lrmazzol@mtu.edu
Office Hours: TR 09:05 - 09:55 AM and by Appointment

Course Identification

Course Number: CH5240-0A
Course Name: Advanced Mass Spectrometry
Course Location: 215 Chemical Sciences Building
Class Times: MWF 11:05 – 11:55
Prerequisite: CH4212 or CH4222

Course Description/Overview

The focus of this course is advanced mass spectrometry (MS) methods. We will learn about a wide variety of mass analyzers including: quadrupole MS, time of flight MS, ion trap MS, ion cyclotron resonance MS. Since MS analysis can only be performed on ionized molecules, a variety of analyte introduction techniques will be presented. Molecular identification methods including the use of tandem mass spectrometric analysis (aka MS/MS) and exact mass analysis will be covered. Students will then apply the fundamentals of these topics to identify unknown natural compounds from mass spectra. Finally, the course will include discussion of complementary analytical methods and/or advanced MS instrument designs. As a prerequisite, students should have taken instrumental analysis or a similar course.

Course Learning Objectives

• Describe the theory of ionization and ion fragmentation.
• Compare and contrast the various ionization methods with respect to analyte structure and analytical application.
• Describe the strengths and weaknesses of several mass analyzers in terms of the elements of the instrument design and intended applications.
• Evaluate mass spectrometry data to elucidate molecular structures and/or qualitative empirical formulas and other metrics.
• Design and evaluate analytical methods, including tandem mass spectrometry methods, for various applications.
• Assimilate a literature review presentation of an advanced mass spectrometry method from the peer-reviewed literature.

Course Resources

Required Course Textbook

Supplemental Course Textbook

Note: This book is a Springer Book available through the library in PDF format.
See also http://link.springer.com/book/10.1007%2F978-3-642-10711-5

Grading

Grades will be maintained in the Canvas grade book. The following percentages will be applied.

| Problem Sets (n = 4) | 40% |
| Exams (n = 2) | 40% |
| Literature Review Presentation | 20% |

Late Assignments

No make-up exams will be given for unexcused absences. Official MTU excused absences are granted by the Office of Student Affairs (OSA). If you know that you will have an excusable absence on an exam day, you are required to make arrangements with me as soon as possible or at least 2 business days before hand to request an alternate exam date.

Late assignments will be penalized by 10% per day.

Educational Philosophy

Advanced study of the course materials is required for your success in this class and in your graduate research. It is expected that you will keep up with the course reading and participate in the lectures with questions and discussion of topics in a collegial manner. Students in this course come from a variety of academic disciplines with variable experiences. Please realize that an integration of the course material into your working knowledge is the goal for this class, not memorization of concepts like you’ve done in the lower-level courses.

Collaboration/Plagiarism

Standards of academic conduct are set forth in the MTU Academic Integrity Code http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html. When you registered for this course, you acknowledged your awareness of the Academic Integrity Code and you are obliged to become familiar with your rights and responsibilities as defined by this Code. Violations of the Code will result in
disciplinary actions. Examples of violations include plagiarism or receiving inappropriate assistance on homework, quizzes, and/or exams.

⚠️ **Plagiarism is an act of theft of intellectual property and thus is a serious offense of the Academic Integrity Code.** Using or closely imitating the ideas/concepts of others without proper citation is a form of plagiarism. Another often misunderstood but important form of plagiarism is the use or incorporation of many of the words or concepts from a source(s) that it/they make(s) up the majority of your work, whether or not it/they are cited.

**Cheating is a very serious academic offense.** Therefore, allegations of cheating will be referred to the Dean of Student Affairs for appropriate action. Please see me if you have any questions about academic violations as described in the Code or as they relate to particular requirements in this course.

⚠️ **Cell phones, Blackberries, iPods, PDAs, Laptops or any other electronic devices are NOT to be used in the classroom.** Information exchanges on these devices during class are also prohibited and violate the Academic Integrity Code of Michigan Tech.

**University Policies**

If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see me as soon as possible so that we can make appropriate arrangements. The Affirmative Action Office has asked that you be made aware of the following:

*Mic*higan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at 487-2212. For other concerns about discrimination, you may contact your advisor, department head or the Affirmative Action Office, at 487-3310

**Academic Integrity:**
http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html

**Affirmative Action:**
http://www.admin.mtu.edu/aa0/

**Disability Services:**
http://www.admin.mtu.edu/urel/studenthandbook/student_services.html#disability

**Equal Opportunity Statement:**