

CHEM755
Mass Spectrometry
Spring Term 2014

Instructor: Dr. Kevin Owens

Class Meetings: Mon 7:30-8:50pm
Wed 6:00-7:20pm

Office: Stratton 415

Class Room: Curtis 452

Tel: 215-895-2621

Office Hours: Wed 4:00-6:00 pm

Fax: 215-895-1265

e-mail: kevin.owens@drexel.edu

Textbook (required):

J. Throck Watson, O. David Sparkman, Introduction to Mass Spectrometry, 4th ed., Chichester, England: John Wiley & Sons, Ltd., 2007, ISBN-13: 978-0-470-51634-8.

Course Objectives:

- to develop basic mass spectral interpretation skills
- to obtain a basic understanding of mass spectrometer characteristics and performance
- to gain an understanding of mass spectral ionization methods
- to appreciate the application of mass spectral analysis techniques in chemistry and biology

List of Topics:

Introduction

See <http://www.asms.org/about/what-is-mass-spectrometry> for a brief introduction to MS. The SpectroscopyNow.com Base Peak website also has links for several tutorials at <http://www.spectroscopynow.com/ms>.

Interpretation of mass spectra

interpretation strategies
isotope cluster analysis
electron impact fragmentation pathways/mechanisms

Instrumentation

vacuum systems (types of pumps, limitations)
basic ion optics (including computer visualization using SIMION v8.0)
ion separation (electric and magnetic sectors, quadrupoles, time-of-flight, ion cyclotron resonance, ion traps)
tandem mass spectrometry techniques
ion detection (electron multipliers, photon-based detectors, microchannel plates)

Methodology

survey of ion formation methods, including electron impact, chemical ionization, particle methods (FAB and SIMS), matrix-assisted laser desorption/ionization (MALDI), electrospray ionization (ESI), laserspray (and related others)

Biological Analysis by Mass Spectrometry

Proposed Schedule:

May 7	EXAM I (possibly including take-home section)
May 26	No class, Memorial Day Holiday
June 9	Group Project Presentations
Finals Week	EXAM II (possibly including take-home section)

Course Grading: 2 Exams (30% each for a total of 60%)
Group presentation (25%)
Problem sets/quizzes (several of which will total 15%)

Group Presentations:

The class will be broken into several small groups each of which will choose a unique area of interest in mass spectrometry. The group will be responsible for researching their area and creating a ½ hour presentation for the class. Each group must produce a 250 word abstract for the presentation by May 15 which will be posted on Bb Learn. Handouts should be prepared that includes the material shown during the presentation; in addition, an annotated bibliography of the area **must** be included. Each presentation will receive two grades; one for content and one for presentation. Each group is responsible for equitably breaking down the workload; each member of the group will receive the same presentation grade.

Delaware Valley Mass Spectrometry Discussion Group Meetings:

There are two meetings of the Delaware Valley Mass Spectrometry Discussion Group (DVMSDG) that are scheduled for Monday nights during this quarter (4/14 and 5/12). The topics of the speakers are relevant to the course- and you are encouraged to attend. Further information will be posted on the course calendar on Bb Learn or can be found directly at <http://www.dvmsdg.org>.

Additional Texts:

Jürgen H. Gross, Mass Spectrometry: A Textbook, 1st ed., Berlin, Germany: Springer-Verlag, 2004, ISBN-10: 3-540-40739-1.

F.W. McLafferty, F. Turecek, Interpretation of Mass Spectra, 4th ed., Sausalito, CA: University Science Books, 1993, ISBN-10: 0935702253.

J.H. Moore, C.C. Davis, M.A. Coplan, Building Scientific Apparatus, 3rd ed.(paperback), New York: Westview Press, 2002, ISBN-10: 0813340063. A fourth edition is scheduled for release 12/08

Web Resources

See the weblinks page on Bb Learn for links to a variety of mass spectrometry resources.

Recorded Lectures

The lectures for this class will be recorded; the screencasts will be made available on the *Lecture Archive* page available on the course homepage on Bb Learn. Every effort will be made to have the screencasts posted within 48 hours of the class. They will be available in both Shockwave (Flash) and zipped Ipad (*.m4v) format. In some cases additional material will be assigned as recorded lectures only. You are responsible for the material presented in those lectures as well.

Bb Learn

We will be using Bb Learn 9, Drexel's on-line Course Management System, extensively to enhance communication in CHEM755. The instructions below tell you how to log on and begin using Bb Learn:

- 1) Login through DrexelOne at <http://one.drexel.edu>.
- 2) Enter your Drexel domain ID and password, click on **Login**.
- 3) Click on the **Students** Tab.
- 4) Click on the **My Courses** link.

or

- 1) Enter the Drexel Bb Learn website directly at <https://learn.dcollege.net/>.
- 2) Enter your Drexel domain ID and password, click on **OK**.

If you enter these correctly you will now be on your Bb Learn dashboard. Select **CHEM755 Mass Spectrometry** from the list of courses in the center pane of the screen under the heading **My Courses**. You will now be on the course homepage. Please note that **ALL** of your homework assignments will be posted as assignments on the homepage. The *Announcements* page will be used for assignment and exam reminders, etc.

Communication

It is assumed that all students have a Drexel computer account for email and easy access to the Internet and to the Drexel University network.

Academic Integrity

As you are working towards becoming a chemical professional, you are expected to maintain the highest degree of integrity in your work, as reflected by the Ethical & Professional Guidelines as published by the American Chemical Society (available at the ACS website under Careers, Professional Development, Ethics and Professional Guidelines). Your efforts as a student here at Drexel are covered by the academic dishonesty policy found at http://www.drexel.edu/provost/policies/academic_dishonesty.asp.

Course Drop/Withdrawal

Courses may only be dropped during the "drop period" lasting from the beginning of the enrollment period through the end of the second week of the quarter. Dropping a course results in the course being removed from the student's academic record without a "W" appearing on the transcript; i.e., neither the course nor the grade of "W" appears on the student's transcript. Students may withdraw

from a course during the “withdrawal period” lasting from the beginning of the third week through the end of the seventh week of the quarter. Withdrawing from a course causes both the name of the course and the grade of “W” to appear on the student’s transcript. Before withdrawing from a course, students should consult with the instructor. You should consult the information found on the Provost’s office website http://www.drexel.edu/provost/policies/academic_transactions.asp for complete details.

Disability Services

Students with disabilities who wish to request accommodations and services at Drexel University need to present a current accommodation verification letter (“AVL”) to the instructor before accommodations can be made. AVL's are issued by the Office of Disability Resources, which is based in the Office of Equality & Diversity (see <http://www.drexel.edu/oed/disabilityResources/>).

Syllabus Modification

I reserve the right to modify the syllabus, including the course schedule and list of topics, at anytime during the course. I will announce any changes both in lecture and by posting on Bb Learn.

Rev. 3-29-14 kgo