

Chemistry 4101: Modern Instrumental Analysis  
Spring 2017 – 3 Credits

*Syllabus and Course Information*

**Lectures:** Monday/Wednesday/Friday: 9:05-9:55, 1 Vincent Hall

**Instructor:** Michael Bowser  
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**Teaching Assistant:** Alex Johnson  
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**Office Hours:** Alex Johnson will hold a weekly office hour on Tuesdays at 10:00 AM in the 7<sup>th</sup> atrium of Nils Hasselmo Hall. Appointments can be made with Prof. Bowser through e-mail.

**Class Description:** CHEM 4101 covers major topics related to the design and operation of modern instrumentation used in chemical analysis. Topics covered will include experimental design, data analysis, spectroscopy, electrochemistry, mass spectrometry and separations.

**Text:** D. A. Skoog, F. J. Holler and S.R. Crouch "Principles of Instrumental Analysis", U of M custom ed.; D. C. Harcourt Brace, Orlando Florida, 2007. Lectures will closely follow the format of the text. Students are strongly encouraged to read relevant chapters before class. This will allow us to discuss topics more thoroughly and dig deeper into any questions students may have.

**Moodle Site:** Class notes and other course information will be posted to the Moodle site. Please check it frequently. You can access the Moodle site through the "Academics" tab on the myU portal (<http://myu.umn.edu>).

**Midterm Exams:** There will be two in-class tests (Feb. 20, Apr. 10). They will be 50 minutes long and will cover information covered in the lectures, readings and assignments. All tests will be closed book. Notes, mobile phones, laptops, PDA's, or translators will not be allowed during the exam period.

**Final Exam:** There will be a final exam from 10:30 - 12:30 p.m., Wednesday, May 10. The exam will be held in our regular classroom (1 Vincent Hall).

**Regrades:** If you disagree with your grade on any exam or assignment please provide the specific reason that you think your grade should be adjusted in writing.

**Make-up Tests:** Make-up tests will only be given in cases of doctor verified illness or other University approved reason. Please contact me as soon as possible if you need to make-up a midterm, preferably before the date of the exam.

**Student Conduct Code:** The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of

the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community. As a student at the University you are expected adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: [http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf). Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

***Scholastic Dishonesty:*** You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: [http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see:

<http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

***Students with Disabilities:*** The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations. If you are registered with DS and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

***Mental Health:*** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via [www.mentalhealth.umn.edu](http://www.mentalhealth.umn.edu).

***Academic Freedom and Responsibility:*** Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. (Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".) Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

***Sexual Harassment:*** "Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: <http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

The Aurora Center provides free and confidential services to students, faculty, staff, alumni, and family members or friends affiliated with the University of Minnesota Twin Cities campus who have experienced sexual harassment or sexual violence of any nature. You can reach them at any time on their 24-hour hotline at 612-626-9111. More information can be found at: <http://www1.umn.edu/aurora/>

***Equity, Diversity, Equal Opportunity, and Affirmative Action:*** The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: [http://regents.umn.edu/sites/default/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf).

*Final Grades:*

Midterm #1	20%
Midterm #2	20%
Assignments	20%
Final Exam	40%
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Total	100%

*Letter Grades:*

A = 90 – 100%

A- = 85 – 90%

B+ = 80 – 85%

B = 75 – 80%

B- = 70 – 75%

C+ = 65 – 70%

C = 60 – 65%

C- = 55 – 60%

D = 50 – 55%

F &lt; 50%

*Important Dates:*

Midterm #1:	February 20
Midterm #2:	April 10
Final Exam:	May 10 (10:30 AM - 12:30 PM)

### *Approximate Class Schedule:*

Chapter 1: Introduction (3 lectures: Jan 18 – 23)

Chapter 5: Signals and Noise (3 lectures: Jan. 25 – 30)

Chapter 7: Components of Optical Instruments (6 lectures: Feb. 1 – 13)

Chapter 10: Atomic Emission Spectroscopy (2 lectures: Feb. 15 – 17)

#### ***Midterm #1: Feb. 20***

Chapter 15: Molecular Luminescence Spectrometry (3 lectures: Feb. 22 – 27)

Chapter 11: Atomic Mass Spectrometry (5 lectures: Mar. 1 – 10)

#### ***Spring Break: Mar. 13 – 17***

#### ***No Class: Mar. 20***

Chapter 20: Molecular Mass Spectrometry (4 lectures: Mar. 22 – 29)

Chapter 25: Voltammetry (3 lectures: Mar. 31 – Apr. 5)

#### ***Midterm #2: Apr. 10***

Chapter 26: An Introduction to Chromatographic Separations (3 lectures, Apr. 5, 12 – 14)

Chapter 27: Gas Chromatography (3 lectures, Apr. 17 – 21)

Chapter 28: Liquid Chromatography (4 lectures, Apr. 24 – May 1)

Chapter 30: Capillary Electrophoresis (2 lectures: May 3 – 5)

#### ***Final Exam: May 10 (10:30-12:30)***