



**Chemistry 641 – Advanced Organic Chemistry: Physical-Organic Chemistry (3 credit)  
Fall 2019**

**Course Meets:** MWF 12:05 – 12:55 pm, Room 121, Psychology

<b>Instructors:</b>	<b>Prof. Robert J. McMahon</b>	<b>Prof. Jeffrey D. Martell</b>
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**Office Hours:**

By appointment, please contact via email.

**Course catalog description:** Topics in physical organic chemistry

**Additional course information:**

Chemistry 641 is a one-semester, survey course in physical-organic chemistry. It will provide background concepts and information regarding a wide variety of topics. It will not completely cover all of physical-organic chemistry, which is much broader and deeper than a single semester of study. The course is divided into two segments taught by two different instructors. In many ways the halves of the course are distinct but should complement one another. Bob will teach the first half of course focusing on structure, bonding, orbitals, stereochemistry and stereoelectronic effects, and photochemistry. Jeff will teach the second half of the course focusing on the kinetics and thermodynamics of organic reactions.

Because this is a graduate level-course, there is a high expectation of independent learning and motivation by the student. This course is placed at the start of the graduate school sequence in which you are transitioning from a master learner to an independent scientist.

**Catalog requisites:** none

**Recommended requisites:** Graduate student standing or CHEM 345 and CHEM 562

**Course design and attributes:** Advanced level, physical science breadth, counts as L&S credit

**How credit hours are met:** This class meets for three 50-minute class periods each week over the fall semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

**Textbook:**

*Modern Physical Organic Chemistry* (978-1891389313)

Eric V. Anslyn and Dennis A. Dougherty

University Science Books: Sausalito, CA; 2006

*Student Solutions Manual to accompany Modern Physical Organic Chemistry* (978-1891389368)

Michael B. Sponsler, Eric V. Anslyn, and Dennis A. Dougherty

University Science Books: Sausalito, CA; 2006

**Learning Outcomes:**

Students in Chemistry 641 will:

1. Develop an understanding of modern computational quantum chemistry and its use in interpreting chemical bonding, analyzing potential energy surfaces, and rationalizing reactivity in organic chemistry.
2. Understand fundamental principles of stereochemistry, conformational analysis, and stereoelectronic effects and apply these principles to rationalize structure and reactivity.
3. Understand principles of thermodynamics, chemical equilibrium, and kinetics as applied to organic reaction mechanisms. Develop familiarity with bond energies, kinetic rate laws, catalysis, linear free energy relationships, kinetic isotope effects.
4. Develop familiarity with acidity / basicity of typical organic functional groups. Understand the effects of solvation on organic structure and reactivity.
5. Understand basic principles of photophysics and organic photochemistry.
6. Demonstrate growth as reflective, self-directed learners through assessing your work, identifying misconceptions, and critically evaluating information from a variety of sources.
7. Articulate the rationale behind experimental results and answers to conceptual problems in verbal communications and written assessments using scientifically appropriate language.

**Exams:**

The first half of the course will have two graded midterm exams.

Exam 1 (McMahon, 100 pts) Mon Sep 30, 7:15 pm

Exam 2 (McMahon, 100 pts) Mon Oct 21, 7:15 pm

Exams will last approximately 2 - 3 hours and are not intentionally cumulative.

During the second half of the course, there will be two exams (dates and times TBA).

**Homework:**

During the first half of the course, recommended homework problems will be assigned, but not collected or graded. During the second half of the course, there will be approximately three graded problem sets.

**Grades:**

Your final grade in this course will be an average of your performance in each half of the course and determined at the end of the semester:

First-half Exams	2 exams at 100 pts each
Second-half Exams	2 exams at 70 pts each
Second-half Homework	Approximately 3 problem sets for a total of 60 points
Total	400 pts

**Grading Errors:**

Any graded assignment may be submitted for regrading if you believe an error has been made. The request must be made within four school days of the date the work is returned. Do not mark on the graded exam or problem set if you plan to submit for regrading.

**Grading Scale:**

This course is graded as a graduate course. Graduate students are expected to maintain a GPA of at least 3.0 for satisfactory standing in the program. Your final grade for the course will be determined using the following scale, with the meaning of each grade paraphrased below:

A	Excellent performance shown consistently in all aspects of the course
AB	Good performance with high achievement in most of the course
B	Adequate performance reflecting a basic understanding of the material
BC	Adequate performance with some deficiencies
C	Minimal performance with serious deficiencies
D	Unsatisfactory performance
F	Very unsatisfactory performance

**Academic Policies****ACADEMIC INTEGRITY**

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to <https://conduct.students.wisc.edu/academic-integrity/>

## ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: “The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.” <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

## DIVERSITY & INCLUSION

Institutional statement on diversity: “Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>