CHE 331 Molecular Science II

Sample Syllabus for Spring 2014

Course Objective: To learn and apply the fundamentals of Molecular Science.

Course Description (from Bulletin): The second course in a three semester tightly integrated sequence of courses (also including CHE 151 and 332) that with previous mastery of the fundamentals cover the topics covered in the four semester CHE 131-132 General Chemistry and CHE 321-322 Organic Chemistry sequence. Topics will include the structural, mechanistic and synthetic aspects of organic chemistry, transition metal chemistry, catalysis, supramolecular chemistry, and polymer chemistry. Three lecture hours and one 80-minute workshop per week. May not be taken for credit in addition to CHE 321.

Staff: Professor Nancy Goroff will give the lectures and write the examinations. The workshops will be hosted by a group of talented chemistry graduate Teaching Assistants assisted by a group of enthusiastic undergraduate Learning Assistants who did well when they studied organic chemistry.

Prerequisites: A grade of C or better in CHE 151.


Lectures: Lectures will be given in Lecture Hall XX in the XX Building on Monday, Wednesday, Friday at X:00-X:00 AM. There will be an assigned reading and a homework problem set posted before each lecture. Lecture slides will be posted on the web site after the lecture.

Workshops: Each of you is registered for a weekly recitation workshop. You must attend the workshop for which you have registered. A portion of your course grade is based upon your workshop participation. At the workshop you will work on a new set of problems that you have not seen before.

Course Web Site: The course web site should be checked on a regular basis. The reading and homework assignments, course announcements, lecture slides and various other course materials can be found there.

Homework Assignments: Regular homework assignments will be made on the web site for each chapter of the book. The assigned problems are very important and you must do them on a regular basis.

Office Hours: Professor Goroff will have an office hour on Someday from X:00-X:00pm and on Another day from X:00-X:00pm in Chemistry Room XXX. The Graduate TAs and the Undergraduate Learning Assistants will hold office hours on in the Chemistry Learning Center. The hours will be posted on the course web page.

Clicker Quizzes: There will be regular daily quizzes in the lecture. We will use turning Turning Technologies Response Cards to record your in class responses. It is your responsibility to acquire a clicker from the bookstore and to register it with the company through the class Blackboard site.

Exams: There will be 3 midterms and one final exam. Exams will be based on the content of lectures, the workshops and the textbook chapters, and modeled after the problem sets, workshops, and clicker quizzes. The exams will be scheduled in the evening at time listed on the University Class Schedule.
If one of these exams is missed a zero will be assigned. Exceptions to this policy will only be granted if the student immediately submits an acceptable excuse. If an excuse is accepted then the performance on the final will be substituted for the missed exam. **There are no make-up exams for the mid-term exams.** All students must take a final exam. If a student misses the final exam and has an acceptable excuse then the student will be allowed to take the make-up final exam. Any student missing the final exam must notify the instructor within 48 hours in order to be eligible for the make-up exam.

**Grades:** Each of the three midterm exams will be worth 100 points. The final exam will be worth 200 points. There will be a clicker quiz at most lectures. They will be worth 50 points total. The workshops will also be graded and worth 50 points. Thus there will be 600 total possible points the course as a whole. Letter grades will be assigned based upon your point total. There is no fixed curve. Everyone who performs well can get a good grade.

**Extra Help:** We provide considerable help to all students taking the course. You should attend all three lectures each week and your assigned workshop. You should also take full advantage of the TA’s office hours. If you take advantage of all of these opportunities and if you complete all the reading and homework assignments you should do fine on the exams.

**Responsibilities:** Each student is responsible for knowing all procedures and course expectations detailed in this document, in other handouts, on the course web site or those announced in lecture. Failure to attend a lecture is not an excuse for not knowing what was presented or announced. If you miss a lecture it is your responsibility to find out what transpired from a fellow student, or from your lecturer.

**Disability Support Services (DSS)** If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

**Academic Integrity.** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at [http://www.stonybrook.edu/uaa/academicjudiciary/](http://www.stonybrook.edu/uaa/academicjudiciary/)

Each student must take each exam independently with no assistance from any other student and without the aid of any unauthorized materials or electronic devices. Deviations from this standard will result in a course grade of F and a report to the Academic Judiciary.

**Critical Incident Management.** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.
**Learning Outcomes:** It is important for students (and the instructors) to have a firm understanding of the intended learning outcomes of a course. A student successfully completing CHE 331 Molecular Science II should be able to carry out the following tasks.

A) Demonstrate an understanding of the structure of molecules by applying the basic ideas of quantum chemistry, Lewis structures, hybridization, molecular orbital theory and spectroscopy.

B) Demonstrate an understanding of molecular conformations and stereochemistry by explaining and predicting the strictures of molecules.

C) Demonstrate an understanding of supramolecular chemistry by applying the concept to explain and predict intermolecular interactions and physical properties of molecules.

D) Demonstrate knowledge of reactions by applying predicting and analyzing the products of a wide variety of organic molecules including those with the major functional groups.

E) Demonstrate an understanding of reactions and reaction mechanisms by applying the concepts to predict and analyze the reactivity of individual molecules, the mechanisms of individual reactions, the use of curved arrows and the ability to apply the concepts of thermodynamics and kinetics to reactions.

F) Demonstrate knowledge of synthesis and retrosynthetic analysis by applying the concepts to analyze and design syntheses of simple and complex molecules.

G) Demonstrate an understanding of transition metals by applying the concept to analyze the electronic and molecular structure of transition metal and organometallic compounds and the use of such species in synthesis and catalysis.

H) Demonstrate an understanding of radicals by applying the concept to predict the stability and reactivity of radical compounds.

I) Demonstrate a knowledge of polymers by apply the concepts to analyze and predict the structures, properties and syntheses of a variety of polymeric materials.

J) Demonstrate recognition of the role the molecular sciences have played and will play in society.

K) Demonstrate the ability to work as a member of a team to solve problems.

L) And most important of all, demonstrate problem solving and critical thinking skills by solving and analyzing problems taken from all topics of the course.
Possible Schedule of Topics

Week 1-4  Molecular conformations and stereochemistry, supramolecular properties, acid-base chemistry, introduction to synthesis followed by Exam 1

Week 5-8  Reactions and mechanisms, and kinetics (emphasis on substitution and elimination reactions, alkyl halides, alkenes, alkynes, alcohols and ethers) followed by Exam 2.

Week 9-12 Main group organometallics and hydrides, carbonyl reactions, transition metals compounds and Catalysis followed by Exam 3.

Week 13-14 Radical chemistry and Polymers

Comprehensive Final Exam