

**CHE 328: Advanced Organic Chemistry**  
**Syllabus for Block 8, April 11<sup>th</sup> – May 4<sup>th</sup>, 2016**  
**Please carefully read this document and keep it for reference**

**Course Instructor:** Jai A.P. Shanata, Ph.D. (call me Jai, or, if you prefer, Dr. Shanata)

**Office:** West Science 316A

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(email is the best way to reach me unless you need an instant response)

**Office hours:** West Science 316A: Unless I have a meeting, you can generally find me before or after morning and afternoon class each day. In addition, you can find me: M 11:00 am – noon; W 11:00 am – noon, F 7:15 – 8:15 am. *Extended office hours:* Many evenings (usually before exams and homework are due) we will meet in Zamora's or Cole library. To meet with me at other times check my office to see if I'm in or email me to make an appointment. If necessary, deviations from the listed office hours will be announced in class.

**Description from Catalog:**

328. Advanced Organic Chemistry

Selected advanced topics of reaction mechanisms or syntheses of organic compounds. Prerequisite: CHE 327. Not offered every year. (Laboratory Science)

**Course Overview and Goals**

An understanding of Organic Chemistry is fundamental to fields such as: biochemistry, psychology, pharmacology, neuroscience, cell biology, molecular biology, physiology, polymers/materials, food and agricultural chemistry, and much more! Although millions of organic compounds are known, several key arrangements of atoms with particular properties—termed functional groups—reoccur in these compounds. To avoid nearly endless memorization and be able to apply your knowledge of chemistry to molecules you've never seen before, learn to recognize functional groups, their mechanisms of reaction, and patterns therein.

In this course, we will expand our work with functional groups, their reactions, and, especially, their interactions. In particular, we will focus on drug structure as it relates to function—including discovery, drug receptors (activation, inhibition, and kinetic models), a bit on enzymes, and perhaps metabolism of drugs. We will also discuss the biophysics of cell membranes and do a case study using multiple papers regarding the electrophysiology (whole-cell and single-molecule recording) of the nicotinic acetylcholine receptor (or related work). We will do a few labs: one green synthesis (Wittig reaction by microwave), some work in my lab (electrophysiology on planar lipid bilayers), a synthesis and characterization of compounds binding to protein by NMR, and a computational lab using Spartan to model various molecules. Depending on time, we may also cover select special topics such as toxicology. Students will design a research project of interest to them and

**Specific Learning Objectives (Educational Outcomes and Priorities in brackets)**

Summary statement: As a whole, through this course, the following items from Cornell College's Educational Priorities and Outcomes will be emphasized: knowledge, reasoning, communication, ethical behavior, and vocation.

1. Students will be able to draw, visualize and describe in words the basic bonding motifs and types of interactions of organic molecules. [Knowledge]
2. Students will apply the fundamental reaction types of Organic Chemistry to synthesis of drug molecules and their action in biological systems, including interactions (and reactions). [Reasoning]
3. Students will be able to identify and suggest reagents, starting materials, and products for single- and multi-step syntheses of drug molecules. [Knowledge, Reasoning]
4. Students will learn to work on their own and in teams with other students to digest, understand, and solve applied problems on paper and in lab [Reasoning, Ethical Behavior, Communication]
5. Students will practice writing about scientific topics [Communication]

7. Students will gain exposure to possible careers in fields related to this material and reflect on the intersection of their long-term science interests with possible careers [Vocation]
8. Students will **learn to learn** effectively on their own in a college course (with guidance) by reading the textbook and other materials actively before class, then engaging with and discussing the material during class and lab sessions. In particular, students will approach lab with increasing independence and confidence. [Communication, Knowledge]

### **Required Course Materials**

1. Textbook: The Organic Chemistry of Drug Design and Drug Action, Second Edition, by Richard B. Silverman (ISBN: 0-12-643732-7). The Third Edition will work, too.
2. Learning Journal and Study Guide—I strongly recommend that you use a binder of papers so that you can add and rearrange as needed. Otherwise, a well-organized bound notebook with additional study materials inserted may be sufficient. A separate handout will provide additional details.
3. Lab notebook—reused from a previous course is fine
4. Goggles
5. Frequent access to the internet, including: email, Moodle, library resources, etc.

**Optional Course Material:** A model kit. Several options are available. One fairly affordable one is the HGS 1013A model kit. Whatever model kit you used in Organic Lecture/Lab is fine.

### **Class Meeting Schedule**

Monday through Friday: 9:00 am – 11:00 am and 12:30 pm – 3:00 pm. We will usually start in the mornings at 9:00, however please keep your schedules clear as labs and some other days may require an earlier start. Similarly, most afternoons we will start at 1:00 or 1:30 pm, but on lab days we may start at 12:30 pm.

Specific events to keep in mind:

- Saturday, April 16<sup>th</sup>: Student Symposium (all day, Thomas Commons)
- Day 10 (Friday, April 22<sup>nd</sup>): 1 hour online visit with Dr. Stephenson: polymer chemistry or similar
- Day 14 (Thursday, April 28<sup>th</sup>): SIG talk at 11:10 am in West 100 and ACS webinar: The Medicinal Chemist of Tomorrow (Drug Design Symposium) at 1:00 pm.

### **Your grade for the course will be determined as follows:**

<b><u>Point Distribution (some components may be scaled)*</u></b>		<b><u>Grading Cutoffs***</u></b>	
Literature Search, Paper, and Wikipedia Project	300	900 points	A-/B+
Lab Reports (and tutorials)	230	800 points	B-/C+
Midterm (April 22 <sup>nd</sup> )	120	700 points	C-/D+
Multi-part Final Exam (~day16/17)**	200	600 points	D-/F
Participation (including group work); quizzes; HW (+LJ)	150		
<b>Total</b>	<b>1,000</b>		

**\*You must complete ALL assignments in order to receive a passing grade. This is true even if the assignment is late and receives partial credit or no credit.**

**\*\*The exams may include group and/or take-home portions.**

**\*\*\*Cutoffs may be lower depending on the difficulty of the exams.**

### **Brief assignment explanations:**

- Quizzes and homework are NOT intended to be comprehensive. In order to be prepared for a strong performance in this course, at a minimum you should also fully understand the types of problems we discuss in class, all required and recommended problems. All additional worked problems should be put in your Learning Journal and Study Guide.
- Your Learning Journal and Study Guide will be collected on occasion (and at each exam); be sure to bring it each day so I can check to see if you are keeping up. I will not grade the individual problems

that you do, but rather will assign a completion grade. You are expected to complete them each night and ask me questions during office hours or before/after class.

- Each exam will be comprehensive (including an expectation that you understand and can correctly apply material from course prerequisites such as CHE 121 and CHE 122 (or CHE 161), CHE 225, CHE 326, and CHE 327, but will emphasize material covered since the previous exam.
- If your performance on any exam is unsatisfactory (less than 60%), you must make arrangements to discuss the exam and how to improve with me within 24 hours of the exam's return.
- My goal is for you to have ample time to complete each exam. However, a firm cut-off time for each exam will be announced in class. If you think that the time that I've allotted may be insufficient, make sure to request accommodations (see "Accommodations and Learning Styles", below).
- Daily participation and group work: Every day, pick up a note card when you come into lecture and write your name on it. These will be used for you to answer miscellaneous questions during lecture and **for you to write at least one question that you have about the material we covered that day.** If everything we covered that day is perfectly clear in your brain, then instead write me a brief note about what was most (or least) interesting to you and the pace of class. **When group work is assigned in class, I will be watching to make sure that everyone is contributing, but also listening.** In addition, you are strongly encouraged to actively participate in class by taking careful notes and asking conceptual questions related to the material at any time.
- Students requesting a 15 day drop (W) must have faithfully attended and participated in class and lab. This includes note cards, quizzes, group work, lab reports, exams, homework, and learning journals.

#### Course Policies and Resources

##### **Attendance**

**Attendance at all lectures, labs, exams, and quizzes is absolutely mandatory.** Some homework, quiz, and exam content will be based specifically on discussions in class. If you can't attend for any reason, you should notify me in advance. I expect that students will come **on time**, be prepared, and actively participate in all class meetings. Please show respect for your classmates and limit disruptions; do NOT use electronic devices such as cell phones, tablets and laptops during class time. I reserve the right to reduce the grade of students who have been repeatedly late or have unexcused absences from lecture, even if they have a number of points that would otherwise have earned them a higher grade based on the grading cutoffs.

##### **Late Work and Academic Support**

**You are expected to hand in all assignments on time**; this is part of being a responsible adult.

Moreover, being a day behind on the block plan may make it impossible for you to catch up. Unless arranged in advance, late work will receive a reduced grade as follows:

10 minutes – 12 hours late: -20%

12 hours – 36 hours late: -40%

36 hours – 72 hours late: -70%

>72 hours late: -100%

If you can't get a physical copy of an assignment to me, digitize it and send me an electronic version (picture, scan, etc.) by email—I will count it as submitted whenever I receive that email. Then, get the hardcopy to me as soon as possible. Also, note that you must hand in **all** late work, even if it is >72 hours late and receives an automatic 0.

Please contact me as soon as possible if you are having difficulty with the course or if a serious sickness/incident occurs during the block. Similarly, if you need to miss class, let me know ahead of time; at my discretion the assignment in question may be excused. In addition to the resources listed at the end of this syllabus (librarian, quantitative reasoning studio, writing studio), there are many other ways that I and others can help directly and indirectly, but you have to let me know! I reserve the right to reduce the final grade of students who have handed in multiple assignments late, even if they have a number of points that would otherwise have earned them a higher grade based on the grading cutoffs.

*NOTE: this is a block 8 class with seniors; grades for them are due the day after class ends. Therefore, any work handed in after noon on the 18<sup>th</sup> day of the term may receive a 0.*

### **Course Communication**

- For this course I require that you check your Cornell College email and Moodle accounts each at least once every day in the evening (sometime between 7:00 pm and 11:00 pm).
- The syllabus, selected handouts, list of required and recommended problems, and possibly select quizzes will be posted on our CHE 328 Moodle page
  - Login at <http://moodle.cornellcollege.edu/>

### **Responsible Scientific Conduct and Collaboration Policy**

As scholars, in this class and beyond you will be expected to explicitly acknowledge words, ideas, calculations, and data created by others. Failure to do so is a form of academic misconduct, and academic misconduct is an extreme form of disrespect towards your peers and mentors. Obvious examples include plagiarism (copying, paraphrasing, or stitching), cheating on exams, or writing something in your lab notebook that you didn't actually do; however, there are other examples of academic misconduct (and how to avoid them) that are outlined in your student handbook. Students engaging in academic dishonesty in this course will automatically fail the assignment and, at my discretion, may receive a failing grade for the course. Violations of Cornell College's policies on academic misconduct will also be referred to the Registrar and the Dean of the College and will be dealt with as described in the student handbook.

Unless otherwise specified, all work on exams and quizzes must be entirely your own—absolutely no collaboration is allowed. While you may choose to work with other students on the recommended problems, **all work that is graded in this course must be your own in that you must fully understand everything that you have written down—including in your Learning Journal and Study Guide.** In order to make sure that this is true, I will on occasion ask you to verbally explain to me a problem or assignment that you have handed in. For all of the recommended problems, I strongly encourage you to first read and attempt the problem on your own without using any external resources (classmates, internet, instructor, tutor, etc.). Then if you are stuck, start discussing with your classmates or come to office hours and talk to me or the chemistry tutor.

### **Additional Academic Honesty Expectations**

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

### **Accommodations and Learning Styles**

Cornell College is committed to providing equal educational opportunities to all students. If you have a documented learning disability and will need any accommodation in this course, you **must** request the accommodation(s) as early as possible and no later than the third day of the term. Additional information about the policies and procedures for accommodation of learning disabilities is available through the Disabilities Services section of Cornell's website.

Additionally, if you would like to discuss how you learn and how we can maximize your likelihood of success in the course, I welcome those conversations at any time.

### **Consulting Librarian for the Sciences**

Amy Gullen, Ph.D., is a good resource, especially for the writing assignment/research.  
Cole Library 305, Office: x4240  
[agullen@cornellcollege.edu](mailto:agullen@cornellcollege.edu)

**The instructor reserves the right to amend the schedule and the syllabus. You will be notified of any changes.**