

CHEMISTRY 547 – FALL 2016
MWF 12:05–12:55pm, Room 1315 Chemistry

Instructor: Tehshik Yoon (tyoon@chem.wisc.edu) 5317 Chemistry
Office Hours: Mondays, 2:00–4:00pm

Course Description: Chem 547 is course in advanced organic chemistry appropriate for upper-level undergraduates and beginning graduate students. The learning objectives in this course are: (1) to familiarize you with the conceptual and mechanistic underpinnings of modern organic synthesis, (2) to advance your understanding of practical organic synthesis beyond the rudimentary level taught in introductory sophomore-level organic chemistry, and (3) to introduce you to the central issues in modern synthetic research.

Textbook: While there is no formal textbook for this course, I will suggest readings from Louden, the textbook used for Chem 343 and 345 at UW–Madison. Other materials will be handed out in class and posted to Learn@UW.

Additional Reading:

- Carey and Sundberg, *Advanced Organic Chemistry, Parts A and B*. These have been the go-to textbooks for third-semester organic chemistry for a long time. They are, however, somewhat out of date.
- J. March *Advanced Organic Chemistry, Reactions, Mechanisms and Structure*. An encyclopedic listing of organic reactions, along with general chapters covering bonding, stereochemistry, reactive intermediates, and photochemistry.
- K. C. Nicolaou, *Classics in Total Synthesis*. Excellent narrative coverage of 36 landmark syntheses with an analysis of the synthetic advances that made each possible. There are two more volumes, but I find this one the most useful for learning total synthesis.

Exams: Three midterm exams (100 pts each) covering each of three main units:
Exam 1: October 14(MO theory and pericyclic reactions)
Exam 2: November 11 (Carbonyl chemistry)
Exam 3: December 14 (Redox chemistry and transition metal catalysis)

Homework: Problem sets will be assigned weekly. These will not be collected, but your answers will be discussed in weekly problem sessions, to be held during normal lecture times.

Participation: You will receive 2 points of extra credit each time you work a problem at the board during discussion section, up to a maximum of 20 points for the semester. You will also receive participation credit for asking or answering questions during lecture.

Final Project: The final project for this course will be a ~10 page term paper analyzing a publication in the synthetic chemistry literature. Details on format and expectations will be distributed separately. I can either assign the subject of your project to you, or you can propose one for my approval. The final paper, worth 50 points, will be due on Dec 17.

Final Grades: This course will be scored out of 370 points maximum (3 x 100 pt midterm exams + 1 x 50 pt final project + 20 points participation credit). I will do my best to replicate the distribution from prior years. (Approximate distribution: 30% A, 15% AB, 20% B, 15% BC, 15% C).

Class conduct: Chem 547 is designed to be interactive and collaborative in nature. This will require us to agree to the following classroom conduct expectations:

1. Participate. Ask questions during lecture; you are unlikely to be the only one confused about the material. Volunteer to work problems in discussion section, even if you don't think you know the answer. My job is to help you learn how to figure it out.

2. Collaborate. While the exams and final project must be your own work alone, I encourage you to do homework in groups and to help one another with discussion problems. All interactions with your classmates should be respectful and professional; engage productively with your classmates of all races, national origins, sexual orientations, genders and gender identities, religious backgrounds, and political perspectives.

3. Academic integrity. By this point in your education, you should all understand how critical academic integrity is to your training as a scientist, professional, and citizen. Please feel free to contact me if you have questions about what academic integrity entails for this course, and refer to the webpage below for the Dean of Students Office's policies of academic integrity:

<http://www.students.wisc.edu/doso/academic-integrity/>

McBurney Visas: Accommodations for McBurney visas are gladly made. Please meet with me in the first few weeks of the semester to help me make plans for you.

Tentative Course Outline (topics subject to change, with notice)

	<u>Sep 7</u> Introduction	<u>9</u> Arrow pushing
<u>12</u> MO Theory	<u>14</u> MO Theory	<u>16</u> Discussion
<u>19</u> Cycloadditions	<u>21</u> Cycloadditions	<u>23</u> Discussion
<u>26</u> Cycloaddition stereochemistry	<u>28</u> Other cycloadditions	<u>30</u> Discussion
<u>Oct 3</u> Sigmatropic rearrangements	<u>5</u> Nucleophiles and electrophiles	<u>7</u> Discussion
<u>10</u> Enolates	<u>12</u> Alkylations	<u>14</u> EXAM 1
<u>17</u> Conjugate additions	<u>19</u> Aldol reactions	<u>21</u> Discussion
<u>24</u> Aldol stereochemistry	<u>26</u> Chiral auxiliaries	<u>28</u> Discussion
<u>31</u> Claisen/Dieckmann	<u>Nov 2</u> Wittig/Horner–Wadsworth–Emmons	<u>4</u> Discussion
<u>7</u> Mannich/Enamine	<u>9</u> Redox reactions	<u>11</u> EXAM 2
<u>14</u> Reductions	<u>16</u> Oxidations	<u>18</u> Discussion
<u>21</u> Oxidations	<u>23</u> Organometallics	<u>25</u> <i>THANKSGIVING (no class)</i>
<u>28</u> Metathesis	<u>30</u> Metathesis	<u>Dec 2</u> Discussion
<u>5</u> Heck Reaction	<u>7</u> Suzuki/Stille	<u>9</u> Discussion
<u>12</u> Tsuji-Trost Reaction	<u>14</u> EXAM 3	<u>17 (Saturday)</u> Final Paper Due