**CHEM 261: ORGANIC CHEMISTRY LECTURE SYLLABUS**

**Instructor:** Dr. Zachary Rodgers  
**Text:** Organic Chemistry (Daley & Daley)  
**Course webpage:** Desire2Learn  
**Prerequisites:** CHE 117: Principles of Chemistry  
**Contact Info:** (724)-946-6289  
**Class Info:** rodgerzl@westminster.edu  
**Class Time:** MWF 8:10 – 9:10 am  
**Lab Time:** W 2:00 – 5:00 pm

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### Course Overview

Organic chemistry, or the chemistry of carbon, is the examination of the fundamental chemical reactions that control life. Since its inception as a science in the 1820s when Friedrich Wöhler synthesized urine… uh, I mean urea… organic chemistry has exploded to encompass thousands of well-known reactions. This knowledge has provided us with many of today’s conveniences; everything from the medicine you might take to focus in a boring lecture to the comfy, foam dorm mattress where you pleasantly dream about chemistry exams. Therefore, whether you want to be a doctor, pharmacist, engineer, or chemist (gasp), you will require a basic knowledge of organic chemistry to have a successful career… or at least make it through biochemistry.

This course is the first part of a yearlong curriculum that will aim to provide you with only a small view of the fundamentals of organic reactions. By the end of this course you should be able to:

- Speak the basic vernacular of chemistry including the ability to name novel molecules  
- Visualize structures in three dimensional space and how their conformation affects reactions  
- Understand how the fundamental properties of atoms, such as electronegativity, affect their reactivity  
- Predict the reactivity modes and transformations of several simple organic functional groups  
- Design multi-step syntheses to construct molecules from simpler building blocks  
- Make connections between material to answer complex and multi-step problems

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### Grading

**Grading Weights**

- 10% In-Class Quizzes and Homework Assignments  
- 20% Laboratory Grade  
- 50% Exams (4 Tests)  
- 20% Final

**Grading Scale**

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90 - 100</td>
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<tr>
<td>B+</td>
<td>88 - 89</td>
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<tr>
<td>B</td>
<td>82 - 87</td>
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<td>B-</td>
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<td>C+</td>
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<tr>
<td>D</td>
<td>60 - 67</td>
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<td>F</td>
<td>&lt; 60</td>
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The scale set in this syllabus is **non-negotiable**.

**Laboratory Grade**: See the syllabus provided for the Lab.

**Quizzes (12 total)**: Short quizzes given at the start of classes will focus on the main points from recent lectures. Missed quizzes will count as a zero, but I understand absences are sometimes unavoidable. Therefore, the two lowest quiz scores will be dropped from your grades to allow for illness, unforeseen scheduling conflicts, or waking up on the wrong side of the bed. If you have an extended absence that may cause you to miss more than two quizzes, please notify me so that I may accommodate you.
**Homework Assignments:** The book sometimes does not provide you with adequate practice for the subjects we will be covering. Therefore, every week or two I will post online homework assignments through D2L with the due date clearly marked. These assignments are supposed to help you practice, so you are allowed to attempt them multiple times before the due date. I will take the highest score from all of your attempts to count toward your grade. I also encourage you to work together on problems as several of them will require critical thinking to solve (two brains are better than one, yada yada).

**Tests:** Tests will examine your deeper comprehension of the covered material. These exams may include multiple choice, short answer, mechanism schemes, and multi-step synthesis. These will be administered roughly once a month on the days indicated. Write the exam days down in your planners in super-permanent ink.

**Final:** This is a comprehensive final and will be structured as a longer test.

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**Additional Resources**

**Online Resources:** I will post additional resource material, such as mechanism videos, molecular models, and practice tests, on the course Desire2Learn website for you to review. I encourage all of you to suggest problems that you are struggling with so that I may tailor these resources for class needs.

**Office Hours:** I will provide the office hour times at the start of the semester. However, I am also available for office hours by email appointment (my brain needs it in writing) provided you allow for several days notice. Please bring specific questions or concerns to make these sessions more productive.

**Study Groups:** Science should exist as a community of collaborative learners. Students who work together can boost their peers’ learning as well as their own understanding of the course material by helping others. For students who are interested in studying together, I will try to help you find study partners to study for exams with or work on homework together.

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**Tips to Succeed**

**Read, read, READ:** The text for this course is open source and available online through D2L as an electronic PDF. If you want a hard copy for reading, you can order a print copy from Lulu for ~$70 ($33 dollars for part one and two each). In the schedule below, I have listed the relevant reading sections for each day of lecture. The suggested reading sections will prepare you for lecture so that you can absorb more of the information and gain a deeper understanding of the material.

**Join a study group:** As I have outlined above, I will help you find other students to study with. Making friends while aiding each other in learning will make the class more enjoyable and improve your collaboration skills.

**Practice and test your knowledge several times a week using the suggested problems:** Organic chemistry is a difficult subject, because of the pure volume of material. Therefore, cramming will not help you on tests. Set aside time each week (~3-4 hours) to read/practice and stay ahead of the material. If you do this, you will be able to quickly adapt to new material and have to devote less time (and loss of sleep) to studying during test week.

**Utilize the online resources and office hours:** During your study time each week, be sure to check out the online material for additional videos or problems. These will give you more practice and help you review material you may have missed in class. Also, do not hesitate to come to office hours with specific question or concepts you have struggled with.

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**Attendance**

Class attendance is not mandatory, but I would highly encourage you to attend class when possible so you do not miss anything. However, lab attendance is mandatory. Two unexcused lab absences will result in a F for the course. School sanctioned events (sports, class field trips, band, etc.) and illnesses are excused absences. Please inform me ahead of time about possible absences so that I can provide a make-up time for you.
Academic Honesty

All students must hold themselves to the highest standards of academic integrity while in the course.

Instances of cheating (attempting to gain an unfair advantage on an assignment without prior approval or permission), plagiarism (copying another person’s work), class disruption (creating a poor learning environment for other students), etc. deemed unacceptable by me will result in the following penalties:

First Offense: The assignment in which the infraction occurred will be scored at a 0%. No make-up assignment will be provided, and the offense will be reported to the proper departments and administrators at the school.

Second Offense: The student will receive an F in the course.
CHEM 261 Lecture Schedule

Before Aug 27: Students Guide to Success in Organic Chemistry
  *Suggested Reading*: Section 0-1 to 0-5 (pages 1 to 18)

Aug 27: Syllabus and General Chemistry Review
  *Suggested Reading*: Section 1-1 to 1-6 (20 pages to 34)

Aug 29: General Chemistry Review: Lewis Structures and Formal Charges
  *Suggested Reading*: Section 1-9 to 1-12 (pages 48 to 59)

Aug 31: Drawing Organic Structures and Resonance
  *Suggested Reading*: Section 1-13 to 2-3 (pages 59-79); Section 16-2 (713-720)

Sept 3: VSEPR and Orbital Hybridization in Organic Structures
  *Suggested Reading*: Section 1-7 to 1-8 (pages 34 to 48)

Sept 5: Organic Nomenclature: Alkane Nomenclature (Naming)
  *Suggested Reading*: Section 2-4 to 2-5 (page 79 to 87); IUPAC rules handout

Sept 7: Organic Nomenclature: Cycloalkanes, Alkyl Halides, Alkenes, and Alcohols
  *Suggested Reading*: Section 2-6 to 2-10 (pages 87 to 109); Section 2-12 to 2-13 (pages 112 to 117)

Sept 10: Conformations: Newman Projections and their Energy Diagrams
  *Suggested Reading*: Section 3-1 to 3-4 (pages 123 to 134)

Sept 12: Cycloalkanes Stability and Introduction to Cyclohexane Conformations
  *Suggested Reading*: Section 3-5 to 3-9 (pages 134 to 149)

Sept 14: Cyclohexane Conformations
  *Suggested Reading*: Section 3-10 to 3-11 (149 to 159)

Sept 17: Exam 1

Sept 19: Introduction to Stereochemistry: Chirality and R&S rotation
  *Suggested Reading*: Section 11-1 to 11-4 (pages 477 to 493)

Sept 21: Introduction to Stereochemistry: Naming and Stability Determination
  *Suggested Reading*: Section 11-6 to 11-7 (pages 498 to 509)

Sept 24: Acid-Base: Functional Groups and pKa
  *Suggested Reading*: Section 5-1 to 5-2 (pages 206 to 221);

Sept 26: Acid-Base: Structural Effects on pKa, Lewis Acid/Bases, Drawing a Simple Mechanism
  *Suggested Reading*: Section 5-5 to 5-6 (pages 230 to 237); Drawing a Mechanism Handout

Sept 28: Reaction Selectivity Based on Intermediate Stability
  *Suggested Reading*: Section 5-3 to 5-4 (pages 221 to 230); Section 6-1 to 6-6 (pages 246 to 268)

Oct 1: Nucleophilic Substitution: Nucleophile/Leaving Group Strengths and Mechanistic Variations
  *Suggested Reading*: Sections 6-7 to 6-8 (pages 268 to 271); Section 6-9 (pages 276 to 279); Sections 12-1 to 12-3 (pages 511-526)

Oct 3: Nucleophilic Substitution: Rearrangements & Stereochemistry
  *Suggested Reading*: Sections 12-4 to 12-13 (pages 526 – 568)
Oct 5: Nucleophilic Substitution: Alcohols

Oct 8: Review and Catch-up Day

Oct 10: Exam 2

Oct 12: Pi Bonds: Structure, Conjugation, and Stability via Hydrogenation
*Suggested Reading:* Sections 16-2 to 16-3 (pages 713 to 723); Section 14-7 (pages 649 – 654)

Oct 15: Pi Bonds: Elimination Reactions
*Suggested Reading:* Sections 13-1 to 13-3 (pages 577-591)

Oct 17: Pi Bonds: Comparing Elimination Mechanisms with Substitution
*Suggested Reading:* Sections 13-4 to 13-9 (pages 591 to 606)

Oct 19: Pi Bonds: Electrophilic Addition and Markovnikov Selectivity
*Suggested Reading:* Sections 14-1 to 14-3; Sections 14-14 to 14-16

Oct 22: Pi Bonds: Hydration Reactions (Acid Catalyzed and Mercuration)
*Suggested Reading:* Section 14-4 (pages 634 – 638)

Oct 24: Pi Bonds: Hydration Reactions (Hydroboration)
*Suggested Reading:* Section 14-5 (pages 638 – 644)

Oct 26: Pi Bonds: Bridged Intermediates (Halogenation, and Epoxidation)
*Suggested Reading:* Sections 14-6 (pages 644 to 649); Sections 14-9 (pages 658 to 662)

Oct 31: Pi Bonds: Oxidation (Dihydroxylation and Ozonolysis)
*Suggested Reading:* Sections 14-8 & Section 14-10 (pages 654 – 658 & pages 662 to 666)

Nov 2: Planning a Synthesis
*Suggested Reading:* Sections 15-1 to 15-2 (pages 669 to 678)

Nov 5: Catch-up and Review Day

Nov. 7: Exam 3

Nov 9: Carbonyl Compounds: General Features and Reactivity Trends
*Suggested Reading:* Sections 7-1 to 7-3 (pages 299 to 309)

Nov 12: Carbonyl Compounds: Reduction
*Suggested Reading:* Section 7-7 (pages 326 to 330); Section 8-5 (pages 382 to 391)

Nov 14: Carbonyl Compounds: Oxidation
*Suggested Reading:* Section 8-8 (pages 406 to 410); Section 13-12 (pages 616 to 623)

Nov 16: Carbonyl Compounds: Nucleophilic Additions
*Suggested Reading:* Sections 7-4 to 7-5 (pages 309 – 320)

Nov 19: Carbonyl Compounds: Nucleophilic Additions
*Suggested Reading:* Sections 7-6 (pages 320 to 326); Sections 7-9 to 7-10 (pages 339 to 348)

Nov 26: Carbonyl Compounds: Acyl Substitution Mechanism
*Suggested Reading:* Section 8-1 (pages 360 to 362)
Nov 28: Carbonyl Compounds: Fischer Esterification and Hydrolysis
   *Suggested Reading:* Sections 8-2 to 8-3 (pages 362 - 376)

Nov 30: Carbonyl Compounds: Amide Formation
   *Suggested Reading:* Sections 8-4 (pages 381 - 384)

Dec 3: Catch-up and Review Day

Dec 5: Exam 4

Dec 7: Final Exam Review

Dec. 11: **FINAL 11:30 – 2:00 pm**

Dec. 13: Final Grades Online and Christmas Break (You don’t have to go home but you can’t stay here).