Chem 3B: Introductory Organic & Biochemistry

**Spring 2017 Section 59988**

**Lecture TTh (11:00 – 12:15) in PHY 77**

**Lab T (1:40 - 4:30) in PHY 77**

**Instructors:**      V. Cornel  (lecture) and Kurtis Thiesen (lab)

**Email:**   veronica.cornel@reedleycollege.edu or kurtis.thiesen@reedleycollege.edu using “Chem3B” in subject line

**Canvas Webpage:**   [https://scccd.instructure.com](https://scccd.instructure.com/)

**Office Hours:**    PHY-78 Mon 8-9 and Wed 8-10

**Tutoring:** Free tutoring is available in the Tutorial Center in the Library building.

**Course Objectives**: Introduction to the basic concepts of organic and biological chemistry. A study of the structure and behavior of organic and biochemical compounds, including metabolism, and regulation. Topics such as bonding, saturated and unsaturated hydrocarbons, the chemistry of organic functional groups, and the properties of important biological compounds such as carbohydrates, fats, and proteins are covered. Primarily for students in health oriented professions.

**Course Prerequisites:** CHEM1A or CHEM3A or equivalent college course with a "C" or better

**Course Advisories:** ENGLISH 1A

**Text and Materials:**

1.    Stoker: *Organic and Biological Chemistry*, 6th edition, (978-1-133-10395-0) or 7th edition (978-1-305-08107-9). You may also purchase the Stoker: *General, Organic and Biological Chemistry* textbook 6th or 7th edition.

2. You will need safety glasses and a lab coat . The labs will be posted on Canvas for you.

**Lecture Notes:** Students should print out the fill-in notes and homework assignments off Canvas prior to coming to class. Studies have shown that 90% of the lecture material is retained if you review the lecture within 24 hours after class. If you wait a week you will only retain 35%.

## **Laboratory Work**: Lab work will follow as closely as possible the material discussed in the lectures. Your lab grade will include the average of the graded lab reports, the efforts to reach the goal of the experiments, the accuracy of measurements and calculations, and the lab technique shown during the experiments, and lab quizzes. Lab will count 25% of your total grade.

**Homework:** Homework questions are listed at the end of each set of fill-in notes. You must write out each question and the answer. It is essential to your success in this class that you do all the assigned homework and read the relevant sections in your Textbook. Most homework will be due at the beginning of the next lecture. This is to ensure that you work consistently and can apply what you learn to problems. There will be no dropped or make-up homework assignments. Late homework will have 10% deducted and will only be accepted until the homework assignments are given back to the rest of the class. Don't copy anyone's homework as I will halve the points for both the copier and the person who let them copy. 70% of the points are for attempting each problem, and the remaining 30% is for answering correctly. You only learn by attempting the homework yourself.

**Drop Date:** The last day to drop this class is Friday March 10, 2017. After this date a grade will be assigned.

**Final Exam Date:** Tuesday, May 16 11:00-12:50am (two hours)

**Attendance:** Attendance in lecture and lab is mandatory. The student will be dropped automatically if she/he misses the first day of class or 25% of the classes without contacting the instructor. If you miss a lecture you need to read the chapter in the textbook **before** meeting with the instructor to discuss any problems. The homework and laboratory worksheets will be on the internet notes so that you can do the homework and worksheets even if you missed the lecture/lab. If you know that you will miss a class you can give your homework in at switchboard, or email a photo of your homework and turn in the hard copy for grading the next class. If you miss an exam you will need to give me written proof that you had to be absent (doctor's note, etc) before a make-up exam will be given. You will only be allowed one make-up exam for the semester.

**Grading and Exams:**  There will be 3 exams covering the material of previous lectures and a final cumulative exam. These 4 exams will be equally weighted. The final grade is calculated as follows:

|  |  |
| --- | --- |
| Laboratory (25%): |  |
| Lecture Material (75%): | **Exams 65%**  **Homework Assignments 10%** |

The grading scale to be used is **A** 90-100%, **B** 80-89%, **C** 70-79%, **D** 60-69%, **F** 0-59%

**Student Learning Outcomes**: Upon completion of this course, students will be able to:

A. demonstrate structural formula--name conversions for less complex organic and biochemical compounds.

B. organize and illustrate the function and processes of enzymes and coenzymes in major metabolic pathways.

C. successfully employ the course material to complete courses requiring a basic knowledge of organic and biochemistry.

D. safely demonstrate laboratory experiments involving basic organic chemistry and biochemical themes.

**Course Outline:**

A. Introduction to organic chemistry

1. Sources of organic compounds
2. Structure of organic compounds
3. Hybrid orbitals

B. Saturated hydrocarbons

1. IUPAC nomenclature
2. Cycloalkanes
3. Physical and chemical properties
4. Functional groups

C. Unsaturated hydrocarbons

1. Nomenclature
2. Hybridization and geometry
3. Physical and chemical properties
4. Addition polymers

D. Aromatic hydrocarbons

1. Nomenclature
2. Reactions of aromatic compounds

E. Halogenated hydrocarbons

1. Nomenclature
2. Alkyl and aryl halides

F. Alcohols, ethers, thiols

1. Nomenclature
2. Physical and chemical properties
3. Important alcohols

G. Aldehydes and ketones

1. Nomenclature
2. Physical and chemical properties
3. Preparation by oxidation
4. Important aldehydes and ketones

H. Carboxylic acids and esters

1. Nomenclature
2. Physical and chemical properties
3. Preparation and acidity of carboxylic acids
4. Hydrolysis of carboxylic esters

I. Amines and amides

1. Nomenclature
2. Physical and chemical properties
3. Preparation, hydrolysis and basicity of amines and quarternary salts

J. Stereoisomerism

K. Carbohydrates

1. Enantiomers and chirality
2. Saccharides

L. Lipids

1. Structure and properties of fats
2. Complex lipids and membranes
3. Cholesterol and hormones

M. Proteins

1. Amino acids
2. Zwitterions
3. Peptides and proteins
4. Primary, secondary and tertiary structure
5. Denaturation

N. Enzymes

1. Nomenclature, common terms and classification of enzymes
2. Factor affecting activity
3. Mechanisms
4. Enzyme regulation

O. Vitamins, hormones

P. Nucleic acids

1. Components of nucleic acids
2. Structure of DNA and RNA
3. DNA replication
4. RNA
5. Transcription of information
6. Genetic code

Please be aware of the following policies:

* Tardiness, leaving early, talking, texting and sleeping during lecture or lab sessions are considered disruptive behavior and will result in a partial or full absence being recorded.
* Fraudulent behavior during exams is graded with a (0) zero.
* Copying of homework, experimental data, and lab reports is considered fraudulent behavior for both the copier and the originator. A friend or tutor can help you with some of the problems you are having difficulty with, but you will only learn by doing the problems for yourself.
* No homework may be handed in after I have given it back or gone over it in class.  No alternative homework will be given.
* No extra credit is given in this course. YOU NEED TO WORK CONSISTENTLY FROM THE BEGINNING.
* Dangerous behavior in the lab will result in the student being asked to leave the lab.
* Please turn your cell phones onto “silent buzzer” mode during lectures so as not to disturb the class. No cell phones or i-pods will be allowed during exams.
* In the lab:

        Safety glasses need to be worn whenever somebody near you is conducting an experiment.

        No experiments may be conducted without the instructor or teaching assistant present

        No horseplay or unauthorized experiments. Do not taste any chemical or smell any chemical directly.

        No visitors inside the lab. You need to go outside to meet with them.

        No food or drinks allowed.

        Backpacks should not be left on the floor where others can trip over them.

        Shoes must be worn in the lab at all times.

        Long hair should be tied back so it will not fall into chemicals or flames.

        If any accident occurs in the lab, inform your instructor and follow safety procedures. (To be discussed during first lab period)

        Clean up any spills promptly (Clean-up procedures will be discussed during first lab period)

        Do not point the open end of a test tube towards anybody

        Turn off flames when working with organic solvents. Dispose of them in waste bottles in the fume hood, not down the sink.

        At the beginning of each lab your instructor will inform you of any special safety precautions and how to dispose of used chemicals. You need to be on time for the lab so that you hear these instructions.

        Do not dispose of matches, paper or solid chemicals in the sink. Use the large evaporating dishes for spent matches.

        Put broken glassware in the “broken glassware bucket”, not with the trash.

        Before leaving the lab, wipe the desktop and wash your hands with soap and water.

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

With this statement on my course syllabus, I am **referring** each of my enrolled students in need of academic support to **tutorial services**. Referral reason: Mastering the content, study skills, and basic skills of this course is aided by the use of trained peer tutors

Lecture and Lab Schedule:

**CHEM 3B Spring 2017**

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| --- | --- | --- | --- |
| **Week** | **Date** | **Lectures** | **Tuesday Lab** |
| 1 | Jan 9-13 | 1. Alkanes    Cycloalkanes | Safety in the Laboratory. *Molecular Modeling + structural formulas* |
| 2 | Jan 16-20 | Alkyl Halides | *Nomenclature Worksheet: Alkanes* |
| 3 | Jan 23-27 | 2. Alkenes and Alkynes  *2. Aromatics*  **Lecture Exam 1 (Thur)** | *Nomenclature Worksheet: Alkenes + Alkynes* |
|  | Jan 27 | **Fri: Last Day to drop class at admissions to avoid a “W”** | |
| 4 | Jan 30-Feb 3 | 3. Alcohols, Phenols, Ethers and Thiols | *Lab 24: Properties of Saturated Hydrocarbons (Alkanes)* |
| 5 | Feb 6-10 |  | *Lab 25: Unsaturated Hydrocarbons (Alkenes and Alkynes)* |
| 6 | Feb 13-17 | 4. Aldehydes and Ketones | **Lab Quiz #1** |
| 7 | Feb 20-24 | **Lecture Exam 2 (Wed)** | *Lab 26: Alcohols, Phenols and Ethers* |
| 8 | Feb 27 -  Mar 3 | 5. Carboxylic Acids | *Lab 32: Chromatography* |
| 9 | Mar 6-10 | 5. Esters | *Lab 27: Aldehydes and Ketones* |
|  | **Mar 10** | **Last Day to drop class (letter grades assigned after this date)** | |
| 10 | Mar 13-17 | 7. Chirality | *Lab 29 Esterification: Synthesis of Aspirin and Oil of Wintergreen* |
| 11 | Mar 20-24 | **Lecture Exam 3 (Mon)**  7. Carbohydrates | **Lab Quiz #2** |
| 12 | Mar 27-31 | 8. Lipids | *Lab 33: Carbohydrates* |
| 13 | Apr 3-7 | 6. Amines, Amides | *Lab 36: Soaps and Detergents* |
|  | **Apr 10-14** | **Spring Break** |  |
| 14 | Apr 17-21 | 9. Proteins  **Lecture Exam 4 (Wed)** | *Lab 30: Amines and Amides* |
| 15 | Apr 24-28 | 10. Enzymes and Vitamins | *Lab 41: Enzyme Action: Lactase* |
| 16 | May 1-5 | 11. Nucleic Acids | *Lab 42: Urinalysis* |
| 17 | May 8-12 | 11. Nucleic Acids and Protein Synthesis | **Lab Quiz #3** |
| 18 | **May 15** | **Tue: Lecture Exam 5: 11-12:50pm (Two hours)** | |