Chem 3B: Introductory Organic & Biochemistry

**Fall 2016 Section 51261**

**Lecture MWF (8:00 – 8:50) in PHY 82**

**Lab F (12:00 - 2:50) in PHY 77**

**Instructors:**      V. Cornel  (lecture) and Erik Rangel (lab)

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

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**Webpage:**       [**http://blackboard.reedleycollege.edu**](http://blackboard2.fresnocitycollege.edu/)

**Office Hours:**    PHY-78 MWF 10-11

**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, (ISBN 978-1-1331-0395-0) or 7th edition (978-1285853918)

2.      Timberlake, *Laboratory Manual for General, Organic & Biological Chemistry*, 6th or 7th edition, (ISBN 978-1-3050-8109-3). Wait until you have attended the first week of class before purchasing.

You will need safety glasses and a lab coat

**Lecture Notes:** Students should print out the fill-in notes and homework assignments off Blackboard 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 report, the efforts to reach the goal of the experiments, the accuracy of measurements and calculations, and the lab technique shown during the experiments.

**Homework:** Homework will be assigned every lecture. It is essential to your success in this class that you do all the assigned homework and read the relevant sections in your Textbook. All homework will be collected at the beginning of the following lecture and selected problems graded. This is to ensure that you work consistently and can apply what you learn to problems. There will be no make-up homework assignments, but I will allow you to drop two homework assignments.

**Drop Date:** The last day to drop this class is Friday October 14, 2016. After this date a grade will be assigned.

**Change to Pass/No Pass:** The last day to make this change is Friday, February 17, 2015

**Final Exam Date:** Monday, December 12 8:00-9:50am (two hours)

**Attendance:** Attendance in lecture and lab is mandatory. The student will be dropped automatically if she/he misses 4 classes without contacting the instructor. Always inform the instructor ahead of time if you know you have to miss an exam. If you miss a lecture you need to read and summarize 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 submit your homework answers via e-mail, but the e-mail must be sent before I go over the answers in class. If you miss a lab, fill in the lab report and worksheet as best you can for partial credit (maximum 50%). This will be due at the beginning of the next lecture. If you miss an exam, the final exam will count twice, once as the final exam and once as a make-up exam. Other than that there will be no make-up exams or make-up labs.

**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%): | **Laboratory Reports/Worksheets 12.5%** **Quizzes 12.5%** |
| 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 rules:

* Tardiness, leaving early, 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. DO NOT DO YOUR HOMEWORK WITH SOMEBODY ELSE. They can help you with some of the problems you are having difficulty with, but you will only learn by doing the problems for yourself.
* Lab reports are to be handed in before you leave the lab, or points will be deducted. No make-up labs will be held, but I will drop one lab assignment.
* No homework may be handed in after I have gone over it in class.  No alternative homework will be given. I will drop the lowest two homework assignments though.
* 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.

Lecture and Lab Schedule:

**CHEM 3B Fall 2016**

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| **Week** | **Date** | **Lectures**  | **Friday Lab**  |
| 1 | Aug 15-19 | 1. Alkanes  Cycloalkanes | Safety in the Laboratory. *Nomenclature Worksheet: Alkanes* |
| 2 | Aug 22-26 |  Alkyl Halides | *Lab 24: Properties of Saturated Hydrocarbons (Alkanes)* |
| 3 | Aug 29-Sep 2 | 2. Alkenes and Alkynes**Lecture Exam 1 (Fri)** | *Nomenclature Worksheet: Alkenes* |
|  | **Sept 2** | **Fri: Last Day to drop class at admissions to avoid a “W”** **(Mon: Sept 5 online on Webadvisor)** |
| 4 | **Sept 5-**Sept 9 | **Mon: Labor Day**3. Alcohols, Phenols, Ethers and Thiols | *Lab 25: Unsaturated Hydrocarbons (Alkenes and Alkynes)* |
| 5 | Sept 12-16 |   | *Lab 26: Alcohols, Phenols and Ethers* |
| 6 | Sept 19-**23** | 4. Aldehydes and Ketones | **Lab Quiz #1**  |
| 7 | Sept 26-30 | **Lecture Exam 2 (Mon)**2. Aromatics  | *Lab 32: Chromatography* |
| 8 | Oct 3-7 | 5. Carboxylic Acids   | *Lab 27: Aldehydes and Ketones* |
| 9 | Oct 10-14 |  | *Lab 28: Carboxylic Acids and Esters* |
|  | **Oct 14** | **Last Day to drop class (letter grades assigned after this date)** |
| 10 | Oct 17-21 | 5. Esters  | *Lab 29 Esterification: Synthesis of Aspirin and Oil of Wintergreen* |
| 11 | Oct 24-28 | **Lecture Exam 3 (Mon)**7. Carbohydrates | *Lab 33: Carbohydrates* |
| 12 | Oct 31-Nov 4 | 8. Lipids | *Lab 35: Lipids*  |
| 13 | Nov 7-**11** | 6. Amines, Amides **Fri: Veteran's Day** | *Lab 36: Soaps and Detergents* |
| 14 | Nov 14-18 | 9. Proteins**Lecture Exam 4 (Wed)** | *Lab 30: Amines and Amides*  |
| 15 | Nov 21-**25** | 10. Enzymes and Vitamins**Thurs/Fri: Thanksgiving** | *Lab 38: Properties of Proteins* |
| 16 | Nov 28-Dec 2 | 11. Nucleic Acids | *Lab 41: Enzyme Action: Lactase* |
| 17 | Dec 5-**9** | 11. Nucleic Acids and Protein Synthesis | **Lab Quiz #2**  |
| 18 | **Dec 12** | **Mon: Lecture Exam 5: 8:00-9:50 (Two hours)** |