

Chem 104x General Organic and Biochemistry
FHS and II1 sections, CRNs 38613 and 39470
A survey of Organic Chemistry and Biochemistry

Instructor: Dr. Lawrence Duffy
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Office hours: 8:00 - 9:00 am

Lecture: reich/SAT
Lab: reich/ SAT

Prerequisites: Placement in ENGL F111X or higher, placement in DEVM F105 or higher, or permission of instructor

Required Course Material: **Text book**, *Introduction to General, Organic, and Biochemistry* 11th edition (authors Bettelheim, Brown, March). A **calculator** capable of scientific notation is also required for this course and should be brought to both class and lab.

Course Description: Fundamentals of organic chemistry and biochemistry as applied to biological systems. This course bridges the gap between a general chemistry course and biochemical concepts of health-related sciences. The course is recommended for health-science degree candidates and non-science majors interested in the central role of biochemistry in life.

Learning Outcomes:

- Write structural formulas
- Identify functional groups
- Identify isomer types
- Describe reactions of carbohydrates and lipids
- Define glycolysis and TCA cycle
- Define nucleotide synthesis and DNA structure
- Understand the process of protein synthesis

Specific Coverage:

- I. Introduction to Organic Chemistry and Functional Groups
- II. Carbohydrates
- III. Classification and Functional Roles of Lipids
- IV. Structure and Function of Proteins
- V. Neurotransmitters & Hormones
- VI. Nucleic Acids, Gene Expression & Protein Synthesis
- VII. Catabolic Pathways and Energy Production
- VIII. Nutrition & Immunology

Course Goals: *Structure is Function* is a recurrent theme in the course. Molecular shape determines function. Students who successfully complete this course will have an understanding of the structure and function of molecules that are the building blocks of living systems. Students will develop an

appreciation for the relationship between the unique physical and chemical properties of the major classes of biological macromolecules (proteins, lipids, carbohydrates and nucleic acids) and their particular functional roles. Armed with an understanding of the biochemical principles of living systems, students will be more informed consumers and be better prepared to contemplate the relationship between public science policy and human health.

Course Objectives: Chemistry 104 is part of the UAF Core Curriculum. "The overall goal of the Natural Sciences component of the Core Curriculum is to prepare students for lifelong learning in the natural sciences..." [Faculty Senate Guidelines, 1990]. To partially fulfill this objective, students will, in addition to the specific course coverage outlined above, receive specific instruction on the scientific method, the set of practices that scientists follow to establish cause and effect relationships between variables in a biological system. In addition, students will be given examples of the interplay between scientific knowledge and public policy throughout the course. The purpose of these examples is to encourage students to think about and comment on the impact of scientific knowledge on public policy. For example, how does the scientific literature concerning mercury in fish impact public health policy? Should cigarettes or french fries be taxed?

Course Policies:

Cell phones/Computers: Use of electronic devices that facilitate learning are permitted. Any other use is prohibited. **If you talk on the phone you will be asked to bring treats for everyone the next class.**

Preparation: It is strongly recommended that each student read the portion of the textbook that corresponds to the lecture, before the class begins (see course calendar).

Exams: 3 exams and a final will be given. Makeup exams will be allowed only with pre-approval of the instructor. Acceptable reasons for makeup exams include severe illness, family emergencies or other unavoidable events including dangerous weather conditions and car accidents. Exam format for makeup exams may be different from the original exam. If a make-up exam is approved it must be completed within 1 week of the original exam.

Final Exam: The final exam will be held during finals day.

Homework/Quizzes: Some homework and quizzes will be "take home".

Laboratory Projects: At the end of the class, students will prepare and present research projects. These projects are intended to explain a core research concept to the class. A full list of available topics will be given in the first half of the class so that groups and subjects can be allocated and to allow for proper preparation time. These projects are intended to spur your creativity. Your final project will be presented to the class.

UAF Attendance Policy:

You are expected to attend classes regularly; unexcused absences may result in a failing grade. You are responsible for conferring with your instructor concerning absences and the possibility of arranging to make up missed work.

Support Services: Support can be obtained through the University of Alaska Library System, online resources, and the instructor. Additional services are available through Student Support Services (<http://www.uaf.edu/sssp/>) at UAF.

Disabilities Services:

We will work with the Office of Disabilities Services (<http://www.uaf.edu/disability/>) to provide accommodations for students with disabilities. If you have a disability and require special assistance, please contact the instructor as soon as possible. Students with disabilities must provide a written statement indicating any needed accommodations.

Cheating/Academic Dishonesty: The Chemistry & Biochemistry Department Policy on Cheating is: “Any student caught cheating will be assigned a course grade of F. The student’s academic advisor will be notified of this failing grade and the student will not be allowed to drop the course.” The Department considers performing unauthorized “dry labs” as cheating. Partnering during the lab is acceptable but lab reports must show your own calculations and ideas.

Amending this Syllabus: The instructor may make changes to this syllabus. Any changes will be clearly communicated via email sent to your UAF e-mail account and posted on Blackboard.

Grading:

Homework/Quizzes	100 points
Laboratory Project	100 points
Exams (3)	300 points (100 points each)
Final Exam	100 points
Total	600 points

Course percent grade: (points earned/max total points) x 100

Letter Grade	Percentage Grade	Total Points
A ⁺	94.5 - 100	567 - 600
A	90.5 – 94.4	543 - 566
A-	87.5 – 90.4	525 - 544
B ⁺	84.5 – 87.4	507 - 524
B	80.5 – 84.4	483 - 506
B-	77.5 – 80.4	465 - 482
C ⁺	74.5 – 77.4	447 - 464
C	70.5 – 74.4	423 - 446
C-	67.5 – 70.4	405 - 422
D ⁺	64.5 – 67.4	387 - 404
D	60.5 – 64.4	363 - 386
D-	57.5 – 60.4	345 - 362
F	57.4 or lower	344 or lower

Lecture	Week	Topic/Reading Assignment
1	1	Syllabus
2	1	Organic Chemistry-Structural formulas
3	1	Organic Chemistry- Functional groups
4	1	Organic Chemistry- Alkanes, Alkenes, Alkynes
5	1	Alcohols, Carboic Acids, Aminos, Esters, Amides
		Exam 1
6	2	Carbohydrates
7	2	Lipids
8	2	Proteins-Amino acids
9	2	Proteins – Structure & Function
10	2	Enzymes
		Exam 2
11	3	Neurotransmitters
12	3	Hormones
13	3	Nucleotides
14	3	Nucleic Acids, Heredity
15	3	Gene expression and Protein Synthesis
		Exam 3
16	4	GMOs
17	4	Bioenergetics
18	4	Catabolic Pathways
19	4	Specific Pathways
20	4	Biosynthetic Pathways
21	5	Nutrition
22	5	Nutrition cont.
23	5	Immunochemistry
24	5	Immunochemistry, cont.
25	6	Final presentations
26	6	Final presentations
27	6	Final presentations
28	6	Review
29	6	Review
30	6	Final Exam