Chem 104x General Organic and Biochemistry
Spring Session, 2017
A survey of Organic Chemistry and Biochemistry

Instructor: Dr. Lawrence Duffy
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Office hours: 4:30 Monday, Reich 194

Lecture: 201 Reichardt Building 3:30pm
Lab: Reichardt Bldg, TBA

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 Goals and Outcomes:

- Write organic molecular structures
- Identify functional groups
- Identify isomer types
- Describe functions of proteins, carbohydrates and lipids
- Define glycolysis, TCA cycle and oxidative phosphorylation
- Define nucleotide synthesis and DNA structure
- Understand the process of protein synthesis and enzyme function
- Observe the complexity of the biochemical and physiological systems and compare to other systems
- Understand the relationships between individual health and the environment to current issues in society

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. Nucleic Acids, Gene Expression & Protein Synthesis
VI. Catabolic Pathways and Energy Production
VII. Food Security and Society

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 General Education 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 food be taxed?

Course Policies:
Cell phones/Computers: Use of electronic devices that facilitate learning are permitted. Any other use is prohibited.

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: 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 scheduled finals day.

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

Laboratory Projects: Any projects are intended to explain a core research concept to the class. 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:

Lab	100 points
Exams (4)	400 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^+	95 - 100	567 – 600
A	90 – 94	543 – 566
A-	88 – 89	525 – 544
B^+	85 – 87	507 – 524
B	80– 84	483 – 506
B-	78 – 89	465 – 482
C^+	75 – 77	447 – 464
C	70 – 74	423 – 446
C-	68 – 69	405 – 422
D^+	65 – 67	387 – 404
D	60 – 64	363 – 386

Week	Chapter	Topic/Reading Assignment
1	10	Syllabus
1	10	Organic Chemistry-Structural formulas/ isomers
1	10	Organic Chemistry- Functional groups
2	11/12/13	Organic Chemistry- Alkanes, Alkenes, Alkynes, Benzenes
2/3	14/15	Alcohols, and stereoisomers
		Exam 1 (organic chemistry up to chirality)
4	16/18	Amines and Esters
5	20	Carbohydrates
6	21	Lipids
		Exam2 (Chapters 14/15/16/18)
7	22	Proteins – Structure & Function
8	23	Enzymes
		Exam 3
9	24	Chemical Communication
10	25	Nucleic Acids, Heredity
11	26	Gene Expression and Protein Synthesis
12	26	Mutations and epigenetics
		Exam 4
13	27	Metabolism
13	27	Bioenergetics/ATP production
13	28	Catabolic Pathways/Gluconeogenesis
14	18	Specific Pathways/ beta oxidation, ketone bodies, carbon skeletons
14	28	Urea cycle and processing of nitrogen
15	29	Biosynthetic pathways
15	29	Fatty Acid Biosynthesis
15	29	Essential Amino Acids and biosynthesis
15	30	Nutrition
16	25	Final Exam in MAY (EXAM 5)