

Chemistry 104: A survey of Organic Chemistry and Biochemistry
Spring Semester 2016

Instructor: Dr. Kriya L. Dunlap
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Lecture: REIC 202, TR 9:45 – 11:15 am
Lab: REIC 245
F01: R 2:45 pm – 5:45 pm
F02: R 6:00 – 9:00 pm
F03 R11:30 – 2:30
Office Hours: T 11:30 – 12:30 pm

Prerequisites: CHEM F103X, 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” 8th edition or higher (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 chemistry 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.

Specific Coverage:

- I. Introduction to Organic Chemistry
- 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 affect 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?

Blackboard: <https://classes.uaf.edu>. Course information, supporting documents, and exam scores for this course will be maintained on the UAF Blackboard website. Time sensitive information and reminders will be sent occasionally to all students enrolled in the course using blackboard, so it is important that you verify that your email address is correct and current.

Course Website: Our class website will provide a platform for discussing articles and posting class projects. You will also find important links, the syllabus, and even lecture notes. Please take a moment to check it out: <http://chem104.community.uaf.edu>

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).

Quizzes: After the completion of each chapter there will be a 10-minute graded quiz. There will be no make-up quizzes. Your lowest quiz grade will be dropped.

Exams: Two exams 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 week on May 6th, 8:00-10:00 am. It will be worth 100 points. The final exam will be cumulative.

Homework:

A) Success in Chem 104 requires practice working through problems and applying the knowledge you have acquired. Higher achievement on exams is usually a direct result of time spent doing homework assignments in their entirety. We will work example questions in class but you should work more problems at home. I will give you suggested homework that corresponds to each chapter we cover in the book. There may also be additional graded homework through blackboard.

B) Additional homework will include discussion on articles and links that will be posted on our class website: <http://chem104.community.uaf.edu>. Students are expected to participate in a discussion on each post. Most articles will be about nutrition, biomedicine or sustainability. These are graded assignments.

Examples of point allocation:

No participation (0 pts.)	Partial Participation (1 pt.)	Full Participation (2 pts.)
Does not post a comment or response	<ul style="list-style-type: none">- post is not original and only paraphrases what others have said.- Just says something like, "I agree..." or "good idea" in response to another student's comments	Your contribution does one of the following: <ul style="list-style-type: none">- Is original and contributes to class discussion.- is insightful, interesting or thought provoking.- summarizes an aspect of the article or link that is important to you and why it is.- Evokes question or concerns about the content.- offers a response that instills genuine interest or expands on another students post.

Final Projects: At the end of the class students will prepare and present group projects. These projects are intended to explain a core concept in the class, i.e. the citric acid cycle, beta oxidation, DNA transcription etc. A full list of available topics will be given well in advance so that groups and subjects can be allocated and to allow for proper preparation time. These projects are intended to spur your creativity. Innovative approaches are encouraged, such as, Claymation, music videos, etc. Your final project will be presented in class and posted on our website.

Laboratory: The purpose of the lab is to do hands-on investigation and to gain skills in scientific reasoning, experimental design, and use of chemicals and laboratory equipment. A teaching assistant who will also hold office hours leads the labs. Lab reports will be handed in each week to be graded and returned by the teaching assistant. Eleven graded experiments are scheduled for the semester. The laboratory portion of your grade (100 points) will be based upon the average of your best ten lab grades. There is no make-up labs scheduled and students must attend at least 8 graded labs in order to pass the course. Questions concerning the lab should be addressed to the lab TA or the laboratory coordinator, Emily Reiter (REIC, 192; 474-6748; e.reiter@alaska.edu).

Computer access: Currently Department of Computing and Communications (DCC) maintains two open labs on campus: the Bunnell Lab, and the Node (Rasmussen library). The Node has 24-hour access.

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 accommodations needed.

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:	Quizzes	100 pts
	Homework	100 pts
	Laboratory	100 pts (10 pts each)
	Exam (2)	200 pts (100 pts each)
	Final Project	100 pts
	<u>Final Exam</u>	<u>100 pts</u>
	Total	700 pts (max.)

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

Letter Grade	Percentage Grade	Total Points
A+	94.5 - 100	661.5 - 700
A	90.5 - 94.4	633.5 - 661.4
A-	87.5 - 90.4	612.5 - 633.4
B+	84.5 - 87.4	591.5 - 612.4
B	80.5 - 84.4	563.5 - 591.4
B-	77.5 - 80.4	542.5 - 563.4
C+	74.5 - 77.4	521.5 - 542.4
C	70.5 - 74.4	493.5 - 521.4
C-	67.5 - 70.4	472.5 - 493.4
D+	64.5 - 67.4	451.5 - 472.4
D	60.5 - 64.4	423.5 - 451.4
D-	57.5 - 60.4	402.5 - 423.4
F	57.4 or lower	401.8 or lower

Tentative Schedule

Lecture	Date	Topic	Lab
1	14-Jan	Syllabus, Intro, Website	NO LAB
2	19-Jan	Organic Chemistry – Structural formulas	NO LAB
3	21-Jan	Organic Chemistry – Functional groups	NO LAB
4	26-Jan	Organic Chemistry – Alkanes, Alkenes, Alkynes	Soap
5	28-Jan	Carbohydrates	Soap
6	2-Feb	Carbs/Lipids	Aspirin
7	4-Feb	Lipids	Aspirin
8	9-Feb	Proteins – Amino acids	Casein
9	11-Feb	Proteins: Structure & Function	Casein
10	16-Feb	Enzymes	Urease
11	18-Feb	Exam Review	Urease
12	23-Feb	Exam I	Augmented reality – mercury
13	25-Feb	Neurotransmitters and Hormones	Augmented reality – mercury
14	1-Mar	Nucleotides, Nucleic Acids, and Heredity	DNA from onion
15	3-Mar	Genes expression and Protein Synthesis	DNA from onion
16	8-Mar	Bioenergetics	Urinalysis
17	10-Mar	Catabolic Pathways	Urinalysis
	15-Mar	SPRING BREAK	NO LAB
	17-Mar	SPRING BREAK	NO LAB
18	22-Mar	Biosynthetic Pathways	ELISA
19	24-Mar	Nutrition	ELISA
20	29-Mar	Nutrition	Food recalls
21	31-Mar	Vitamins	Food recalls
22	5-Apr	Exam Review	Wild Craft Game
23	7-Apr	Exam II	Wild Craft Game
24	12-Apr	Immunochemistry	Your story - development
25	14-Apr	Final Presentations	Your story - development
26	19-Apr	Final Presentations	Your story - presentation
27	21-Apr	Final Presentations	Your Story - presentation
28	26-Apr	Review	NO LAB
29	28-May	Final Review	NO LAB
	6-May	Final Exam (8:00-10:00 am)	NO LAB

