

Chem 450 CRN 73267
Information Storage and Transfer - Molecules and Pathways
Fall 2018

Instructor: Thomas Kuhn, Murie 223 D, 474-5752, tbkuhn@alaska.edu

Office Hours: Monday and Friday following lectures. However students are encouraged to contact the instructor by phone or email at any time

Lecture: Monday, Wednesday, Friday 11:45-12:45 AM, REIC 202
8-28-2017 to 12/9/2017 (not including final)

Textbook: *Principals of Biochemistry* (2008) 5th Edition
David L. Nelson and Michael M. Cox
W. H. Freeman and Company, NY
ISBN-10: 0-7167-7108-X

Most general biochemistry books provide adequate reading material with minimal difference in detail and depth on most topics.

Course

This 3 credit course will focus on the biochemistry (structure and dynamics) of cellular information storage and transfer linking the three principal macromolecules DNA, RNA, and Proteins including nucleotide metabolism, DNA structure and topology, DNA Replication/Repair/ Recombination, Cell Cycle Regulation, RNA transcription and processing, Gene Expression, Translation, and Protein Metabolism. Biomedical relevance and contemporary techniques will be addressed when appropriate.

Paper Discussions

Research paper(s) pertinent to topics addressed in lectures will be discussed with respect to rationale, hypothesis, research data, and analysis. Papers will be distributed **one week prior** to discussion. Individual students or group of students are randomly asked to detail and explain sections and/or figures of papers to their classmates. These discussions are important to translate science knowledge into understanding i.e. the application of science.

Course Goals:

- Develop an understanding of the biochemical processes underlying structure, function, regulation, and dynamics of DNA, RNA, and Proteins.
- Fundamentals include but are not limited to structure-function relations of protein/DNA interactions, regulation and synchronization of complex macromolecular processes, and protein quality control. All topics are discussed in the context of developmental processes and/or pathologies.
- Use of concepts to formulate hypotheses and interpret experimental data to benefit the understanding of current research through paper discussion.

Learning Outcomes

1. Understand structure-function relation ship determining macromolecular interactions
2. Aspects of synergism, cooperativity, and reciprocity relevant to macromolecular dynamics
3. Gene regulation – interplay among macromolecules and expression of phenotypes
4. Biomedical/disease-related aspects of topics
5. Critical reading of primary research literature
6. Understanding of principal methods and techniques

Instructional Methods:

The teaching methods employed in this course will consist of powerpoint lectures and “chalk-talk” by the instructor. Primary research papers allow to explore distinct topics more in depth through discussions and to translate science knowledge. Blackboard will be utilized as a platform to distribute papers, other assignments, lecture material, exams, and other announcements regarding the course. It is imperative that reading (see schedule) of sections should be done **in advance** and **notes are taken** during lecture.

Students will assemble a course portfolio composed of summary write-ups on sets of lectures pertinent to each topic. Summaries are guided by a set of questions provided by the instructor. Outcomes of paper discussions will also be infused into the portfolio. Three times during the semester (listed in course schedule) the portfolio will be subject to grading by the instructor.

Grading

Exams: There will be four (4) exams (100 points each) over the course period (listed in course schedule). These exams will be a combination of multiple choice/short answer and essay questions (take home).

Papers: **Six paper** discussions over the term of the semester account for 100 points (20 points each paper, 5 out of 6 papers will be accounted for). Students are expected to contribute to these discussions with explanations and arguments. One constructive contribution is sufficient to receive full points.

Participation: **Class participation** will be included in the final grade (25 points). This entails an active involvement into the regular lecture materials discussed.

Portfolio: written assignments will be used to generate summaries of key topics discussed. Summaries will be guided by questions given by the instructor. There will be one midterm evaluation and one final evaluation.

Class Participation	25 Points
Portfolio	75 Points
Paper Discussion	100 Points
Term Exam I	100 Points
Term Exam II	100 Points
Term Exam III	100 Points
<u>Final Exam</u>	<u>100 Points</u>
Total	600 Points

Course Policies

- Attendance:** Regular student attendance is expected to ensure consistent group activities and discussions.
- Exams:** Four exams will be given. Although exams are NOT cumulative, with the progression of the course a cumulative character is unavoidable. Makeup exams will only be allowed with pre-approval of the instructor or with an acceptable, documented reason such as unexpected illness, family emergencies or other unavoidable events.
- Papers:** Students will receive adequate preparation time (1 week). **Emphasis** is put on an understanding of sections such as rationale, hypothesis, data/experimental design, results, and critical analysis. Students or groups of students will be randomly called upon to answer questions.
- Participation:** Class participation is expected and entails an active interest aside from paper discussion/presentations. This includes but is not limited to answering questions during lectures, asking for clarifications, or contributing to ad hoc discussions.

Ethical Considerations: The Chemistry “Department Policy on Cheating” is as follows: “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.”

Plagiarism Policy

Plagiarism is defined as the use of “other” intellectual property without proper reference to the original author. Intellectual property includes all electronic (**Internet**), spoken or print media. Students are expected to cite all sources used in oral and written presentations. Cases of plagiarism will be taken seriously with a grade 0 for the particular assignment. Severe cases may be referred to the Department Chair or Dean or class failing considered.

Support Services

Support services will be provided by 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

Students with a physical or learning disability are required to identify themselves to Mary Matthews in the Office of Disabilities Services (208 Whitaker, 474-5655, uaf-disability-services@alaska.edu, <http://www.uaf.edu/disability/>) located in the Center for Health and Counseling in order to receive special accommodations. The student must provide documentation of the disability. Disability Services will then notify me of special arrangements for taking tests, working homework assignments, and doing lab work.

Special Dates pertinent to the course

See academic calendar for details at <http://catalog.uaf.edu/calendar/>.