

**Chem F675**  
**Cellular Signaling**  
**“Biochemistry of Signal Transduction and Regulation”**

**Instructor:** Thomas Kuhn, 474-5752, [tbkuhn@alaska.edu](mailto:tbkuhn@alaska.edu)  
Department of Chemistry and Biochemistry  
Murie Building 223 D

**Office Hours:** please contact via phone or email

**Lecture:** Tuesdays, Thursdays, 11:30 am – 01:00 am, Murie 230

**Text:** *Cellular Signal Processing*  
Marks F, Klingmueller U, Mueller-Decker K  
1<sup>st</sup> Edition, Garland Science 2009  
ISBN 978-0-8153-4215-1

**Course:**

This 3 credit course will concentrate on cellular signal transduction and regulation vital to any complex biomolecular systems such as development, physiology, and pathology and a principal target for most pharmacological interventions in research and medicine. The course extends the concept of structure-function to signal transduction as an expression of information nanoprocessing. A strong focus is put on principals of information processing with heterotrimeric G protein-coupled receptor systems and receptor tyrosine kinase receptor systems as the best-studied examples to go into sufficient depth of cellular signaling. Course material is exclusively composed of review articles and primary research literature pertinent to the topics and the textbook serves as a reference. All material will be distributed on a timely basis. Individual assignments will be distributed throughout the course of the semester.

**Course Goals:**

This course provides 1) an understanding of the basic molecular principles of intra- and intercellular signaling (nanoprocessing, amplification, specificity, structure/function changes), and 2) a perspective of signaling process in the context of major cellular processes and their relation to diseases such as cancer. The underlying theme of structure-function relationships of proteins strongly emphasizes these aspects in the context of signaling.

**Learning Outcomes**

- Understand nanoprocessing as an integration of structure/function relations
- Signal specificity and amplification
- Signaling pathways in context of biological responses
- Apply concepts to interpret experimental data, propose meaningful experimental approaches, and formulate hypotheses.
- Critical understanding of current research areas and problems

**Instructional Methods:**

The course is composed of lectures (approx. 15%), group discussion (approx. 70%), and individual oral presentations (approx 15%) depending on topic. Some course topic will be introduced through lectures by the Instructor and further explored in detail through discussions of primary literature and/or individual oral presentation from students. One aspect of discussions is to identify “missing knowledge” in our understanding of the molecular regulation of gene expression.

Blackboard will be utilized as a central communication platform for announcements, posting of lectures and reading material, and distribution/collection of exams.

**Grading:**

Students will be evaluated on the basis of their class *participation*, presentations, and exams and grading scale A (100%-90%), B(89%-80%), C (79%-70%), D (69%-60%), F (59% or less).

Participation reflects a compilation of active involvement in discussions scored based on material read (15%), understanding of methodology (15%), ability to answer questions directly to text (45%), ability to answer questions extending the scope of text (25%). A rubric will be used and disclosed to the student.

Presentations are scored on Content (30%), Organization (30%), Presentation (25%), and Quality of Discussion (15%). A rubric will be used and disclosed to the student.

Overall course grade will be composed as follows:

Exams I (Midterm):	120 pts or	30%
Exam II (Final):	120 pts or	30%
Participation:	80 pts or	20%
Presentations:	80 pts or	20%
	400 pts or	100%

Your instructor follows the University of Alaska Fairbanks Incomplete Grade Policy: “The letter “I” (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of work in a course but for personal reasons beyond the student’s control, such as sickness, has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an “I” grade.”

**Course Policies:**

*Attendance:* Regular student attendance is expected to ensure consistent discussion activities and. Active student participation is vital and will account for a large part (60%) of the final grade.

*Exams:* Two exams will be given, one midterm and one final exam. These exams will be a combination of essay questions related to topics discussed and application of knowledge to research data. 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.

*Presentations:* Students will receive adequate preparation time for all assignments. Content and organization of topics are the primary concern, however presentation and discussion are also subject to score (scoring sheet).

**Ethical Considerations:**

The Chemistry Department's policy of 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, spoken or print media ***thus any information taken of the web is included under this statement***. 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.

**Services –Support, Disabilities:**

Support services are 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. We will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide accommodations for students with disabilities.

Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc. to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: [www.uaf.edu/handbook/](http://www.uaf.edu/handbook/).

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: <https://alaska.edu/nondiscrimination/>.

Students who have difficulties with oral presentations and/or writing are strongly encouraged to get help from the UAF Department of Communication's Speaking Center (907-474-5470, [speak@uaf.edu](mailto:speak@uaf.edu)) and the UAF English's Department's Writing Center (907-474-5314, Gruening 8th floor), and/or CTC's Learning Center (604 Barnette Street, 907-455- 2860).