

Molecular Foundations of Gene Expression

Chem 657

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Natural Science Facility, Annex I

Office Hours: please contact instructor via email or phone

Lecture: Tuesdays, Thursdays, 9:45 am – 11:15 am, REIC 203

Text: Review articles and primary research literature
Voet and Voet 3rd edition as a basic reference

Course:

This 3 credit course focuses on the molecular interactions and regulatory processes necessary for productive gene expression in the context of development and disease. Major topics include RNA polymerases, mediators and transcription factors, DNA flexibility, enhanceosome concept, chromatin remodeling. Principal concepts are addresses such as structure-function relations of protein-protein and protein-nucleic acid interactions, dynamics of surface chemistry, and synergism/cooperative/reciprocity in multi molecular interactions.

The suggested textbook serves as a basic reference. Course material is exclusively composed of review articles and primary research literature pertinent to the topics. All material will be distributed on a timely basis. Individual assignments will be distributed throughout the course of the semester.

Course Goals:

- Develop an understanding of the biochemical processes underlying gene expression
- Critical understanding of current research areas and problems
- signal transduction pathways linked to gene regulation
- Initiation of transcription
- Chromatin remodeling and gene expression

Learning Outcomes

- Structure-function relations and molecular constraints of protein-protein and protein-nucleic acid interactions
- Concept of synergism, cooperativity, and reciprocity
- Apply concepts to interpret experimental data, propose meaningful experimental approaches, and formulate hypotheses.
- Importance of epigenetic events

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*, essays, oral assignments, and exams.

Exams I and II:	40% (20% each)
Participation:	40%
Essay(s):	10%
Oral Assignment(s):	10%

- Participation will be calculated based on an average score per lecture topic assigned to each student, which includes reading of material (15%), ability to answer questions directly extracted from text (45%), understanding of methodology (15%), ability to answer questions resulting from text (25%)

Essay(s) and oral assignment(s) scoring:	Content:	30%
	Organization:	30%
	Presentation:	25%
	Quality of Discussion:	15%

Course Policies:

Attendance: Regular student attendance is expected to ensure consistent discussion activities and. Active student participation is necessary and will account for a large part 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 or topic reviews. 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).

Essays: discussion topics will be summarized in short essays and, depending on the topic, guided by a set of questions addressing specific problems.

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 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. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide accommodations for students with disabilities.