

Molecular Foundations of Gene Expression

Chem 657

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Department of Chemistry and Biochemistry
Murie Building Room 223D

Office Hours: arrange meeting time by email or phone

Lecture: Tuesdays, Thursdays, 11:45 am – 1:15 pm, Murie 230
(bring your lunch!!!)

Text: Review articles and primary research literature
Epigenetics, C. David Allis et al., 1st Ed, 2007
Cold Spring Harbor Laboratory Press
ISBN-10: 0879698756

Course:

This 3-credit course focuses on the molecular interactions and regulatory processes necessary to achieve productive gene expression. Two principal aspect will focus on the essential concept of (i) how RNA polymerase properly recognizes the gene coding start and (ii) regulation of access to genes for the transcription machinery. Major topics discussed will include the initiation of RNA synthesis, enhanceosome concept, chromatin remodeling, and the fundamental importance of chromatin modifications as the heart of the epigenetic regulation of gene expression.

Course Goals:

- Structure-function relations of protein-protein and protein-nucleic acid interactions
- Develop an understanding of the biochemical complexity underlying gene expression
- Chromatin remodeling and gene expression
- Histone modification and its epigenetic impact

Learning Outcomes

- Concepts of synergism, cooperativity, and reciprocity
- Epigenetics and its impact on human development, health, and disease progression
- Apply concepts to interpret experimental data
- Propose meaningful experimental approaches and formulate hypotheses.
- Critical understanding of current research areas and problems

Instructional Methods:

Course material is exclusively composed of review articles and primary research literature pertinent to the topics. The suggested textbook serves as a basic reference. The course is composed of class discussion (approx. 60%), individual/group presentations (approx 30%), and lectures (10%), which serve solely to introduce topics.

Blackboard will be utilized as a central communication platform for announcements, posting of lectures and reading material, and distribution/collection of exams. It is assumed that every student is frequently visiting blackboard to check for announcements as well as email notifications.

Course Policies:

- Attendance:* Regular student attendance is expected to ensure consistency in discussions and presentations. Active student participation is essential and will be accounted for in the final grade.
- Participation:* active participation in paper discussion is vital (35% of final grade) is the pillar of scholarly activity in class. Paper are distributed with ample time and participation entails both comments prior to class (Perusall) and during class. Specifics of paper assignments will be specified if necessary.
- Exams:* Two exams will be given, one midterm and one final exam (50 % of final grade). 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, 10% of final grade).
- Essays:* discussion/presentation topics will be summarized as short essays further guided by questions ultimately generating a topic portfolio of the course. Sufficient time for writing will be provided (5% of final grade).

Grading:

Students will be evaluated in four basic areas: *participation in class*, written assignments, oral assignments, and knowledge (exams).

| Activity | % of final grade | Points |
|---------------------|------------------|------------|
| Midterm exam | 20 % | 100 |
| Final exam | 20 % | 100 |
| Class Participation | 40 % | 200 |
| Writing Assignments | 10 % | 50 |
| Oral Assignments | 10 % | 50 |
| Total | 100 % | 500 |

- Participation will be assessed as contributions to in class discussions of papers (50%).
- Oral assignment will be scored according to a rubric scoring sheet and will be provided after completion of assignments (see hand out)

- Writing assignment will be scored according to a rubric scoring sheet and will be provided after completion of assignments (see hand out)

| Grade: | Percentage: |
|---------------|--------------------|
| A+ | 97-100 |
| A | 90-96 |
| A- | 88-89 |
| B+ | 86-87 |
| B | 80-85 |
| B- | 78-79 |
| C+ | 76-77 |
| C | 70-75 |
| C- | 68-69 |
| D+ | 66-67 |
| D | 60-65 |
| D- | 58-59 |
| F | 0-57 |

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