

BioMed 507 - Fall 2009

Course Information and Organization

Organizer: Scott A. Ness, Ph.D., Molecular Genetics & Microbiology
office/lab: CRF 121; e-mail: sness@salud.unm.edu; tel: 272-9883

Course Description

This course in advanced molecular biology is designed as a rigorous overview of the topics, terminology, techniques, methodologies and approaches of modern molecular biology. BioMed 507 is not an introductory course. Instead, it is assumed that students have already had an undergraduate education that includes biochemistry, molecular biology and genetics. The course has some lectures, but is focused on problem-based learning organized around the understanding and analysis of current scientific papers. Students will take an active role in their own education by helping to identify and design learning issues that will be resolved in small group and in-class discussions.

Goals and Objectives

- Help students transition from undergrad, lecture-style courses to graduate-style learning
- Introduce advanced molecular biology topics
- Explore important biomedical themes and subjects
- Emphasize cutting-edge research and topics
- Promote group interactions
- Use principles of problem-based learning

Grading

This course is taught in blocks by 5 instructors, each of whom is responsible for a fraction of the grade equivalent to the fraction of classes that they supervise. Grading will be based on in-class discussions and class participation, homework assignments, take-home problems and some exams. There are no cumulative exams and there is no final exam.

Expectations and Requirements

BioMed 507 is taught primarily as a discussion-based course, not as a typical lecture course. Participation in classroom discussions and student presentations is essential. Consequently, attendance is mandatory. There is no mechanism for making up discussion material or classes that are missed and students should not expect to get credit for classes that are missed or for assignments that are turned in late.

Be sure to inform your instructor as soon as possible if you must miss a class, or miss a class due to illness or other problem. The decision of whether or not to permit make-up work or to allow credit for missed classes is up to the individual block instructors and the course director.

Groups

Some assignments and class activities will be assigned to groups, which will be organized on the first day of class. Groups are meant to work together on group assignments, but all members of each group are responsible for all the material. Students are expected to do their own work on take-home assignments, quizzes and exams that are not expressly assigned to groups. Plagiarism is not allowed and any evidence of copying from someone else will be dealt with harshly.

Class Presentations

Group presentations in class should be informal (e.g. whiteboard not Powerpoint), but should cover the topics in sufficient detail to be meaningful. Handouts listing references (e.g. web sites, papers) are always welcome.

BioMed 507 - Fall 2009

Week 1 Outline and Overview

Goals:

- Introduce the structure and organization of BioMed 507
- Set up the study groups
- Introduce eukaryotic gene regulation
- Introduce this week's paper
- Identify learning issues
- Assign learning issues to groups

Monday, Aug 24

Introduction to Eukaryotic Gene Regulation:

- Types of expression patterns
 - Constitutive, Inducible
 - Regulated, Tissue-specific
- Measuring gene expression
 - Northern blot
 - Primer extension analysis
 - RT-PCR
 - QPCR
- Parts of a gene
 - Promoters: upstream, downstream, coding region, start site, core promoter
 - Enhancers
 - Introns, exons, splice junctions
- Consensus Sequence
- Reporter gene
 - Luciferase
- How to define a promoter
 - Deletions
 - Footprint assays
- Subcellular Localization
 - Cytoplasmic
 - Nuclear

Monday, Aug 24 (Continued)

Content Keywords and Learning Issues:

Major

- Coactivator complexes, Mediator
- Basal apparatus, TFIID, TBP, TAFs
- RNA interference (RNAi)
- Antibodies and Immunoprecipitation
- Chromatin IP (ChIP)
- FISH

Minor

- Protein subunits and interactions
- Metallothionein gene regulation
- Metal response element-binding transcription factor-1 (MTF-1)
- Promoter context
- Combinatorial control
- Promoter occupancy
- Transgenic

Paper for Discussion:

Genes & Dev. 2006 20: 1458-1469

Michael T. Marr, II, Yoh Isogai, Kevin J. Wright and Robert Tjian
Coactivator cross-talk specifies transcriptional output

Wednesday, Aug 26

Continue topics

Bring learning issues from assigned paper.

Discussion of learning issues

Friday, Aug 28

Homework # 1 due at beginning of class

Groups present figures from assigned paper

Discussion of hypotheses, results, conclusions and significance