

**IBS 602/BCH608: BIOMOLECULES AND MOLECULAR BIOLOGY
SYLLABUS**

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A. COURSE DESCRIPTION

IBS602/BCH608 is a 3 credit hour course designed to provide first year graduate students with the foundation of knowledge in molecular biology (concepts and techniques) necessary for advanced graduate courses and research in any of the five basic science departments of the UK College of Medicine. The course will be focused primarily on the molecular mechanisms that underlie the regulated expression of genes, including transcription and translation, as well as basic mechanisms of DNA replication/repair and recombination. In addition, genetic engineering and other experimental approaches that are critical to molecular biology research will be reviewed. Course material will be presented in a number of formats, consisting primarily of didactic lecture by expert faculty, but will also be reinforced by group discussions of selected readings and exercises.

Lectures will be given Monday, Wednesday, Friday from 12:00- 12:50 PM in room MN563 until 4/9/04. From 4/12/04 to the end of class, lectures will be in MN463.

Discussion/Problem Solving sessions will be held in small group format: special room assignments for small groups will be posted on the Blackboard course site (see below, section H).

B. COURSE OBJECTIVES

The primary objective of this course will be to provide advanced graduate students with a working knowledge of basic principles and the latest advances in selected areas of molecular biology.

C. TEXT

***Molecular Biology of the Cell, Fourth Edition*, Alberts, et al., Garland Science, NY, 2002.**

Additional readings from the scientific literature will also be provided, or will be readily accessible from on-line scientific journals (e.g. *J. Biol. Chem.*, *Proc. Natl. Acad. Sci.*, *Mol. Cell. Biol.*, etc.) and the course website. Last year's text, *Genes VII* by Lewin will be on reserve in the library as an additional reference.

D. PREREQUISITES

CHE 105 and 107, General College Chemistry I and II;
CHE 230 and 232, Organic Chemistry I and II
BIO 150 and 152, Principles of Biology I and II or equivalents.

E. GRADING

Students will be evaluated based on: 1) performance on four written examinations, 2) at least one homework assignment, and 3) participation in discussion/problem solving sessions (four total).

Each **exam** will last approximately two hours and each will account for **20% of the final grade**. Locations for exams will be announced in class and posted on the Blackboard course website (see below).

Another component of the final grade will be performance on study questions/exercises provided with the four discussion/problem solving sessions, as well as one homework assignment. The study questions/exercises are to be completed and submitted prior to the discussion/problem solving sessions. The average of these 5 assignments will comprise **20% of the final grade**. Room assignments for the discussion/problem solving sessions (i.e. small group formats) will be announced in class and posted on the Blackboard course website (see below). Unexcused absence from the session or failure to complete the assignment will result in a grade of zero.

The grading standards to be employed for the course are as follows:

- A: 90-100%
- B: 80- 89%
- C: 70- 79%
- D: 60- 69%
- E: below 60 %

Students who perform in these ranges will be guaranteed to receive the indicated grades, at a minimum. However, some adjustments (curving) of this scale are possible, depending on the performance of the class as a whole.

Evaluations can be submitted for a reevaluation if it is deemed that a mistake has been made in the original grading. Resubmissions must be accompanied by a written explanation of the perceived mistake. Upon resubmission, the entire examination will be subject to reevaluation and all questions therein will be regraded. Examinations for regrading must be submitted within one week (7 days) and to the course director only.

Graduate students will not receive a grade of "D" but instead will receive a failing mark for an average under 70%. All examinations must be taken at the scheduled time except when legitimate medical or personal circumstances make it impossible to do so. The course director must be notified of the circumstances of your absence prior to the examination. In these cases, either an oral or written make-up examination will be given. An "I" grade will not be assigned to students who simply miss an examination.

F. UNDERGRADUATE ENROLLMENT

Undergraduate students may enroll in the course with the permission of the course director and the Graduate School.

G. OFFICE HOURS

Course directors and instructors will be available for consultation. Students are encouraged to consult with participating faculty as needed. It is suggested to call or email faculty to set up an appointment as specific office hours are not established.

H. BLACKBOARD AND COURSE INFORMATION (IMPORTANT!)

Blackboard, a software program designed for facilitating course administration, will be used this semester in IBS602/BCH608. You must be able to access the Blackboard course site in order to view such items of importance as *posted lecture notes, assignments* (exercises, study questions, room assignments for discussion sessions and exams) and *other announcements*. You can reach and register with Blackboard from the IBS site (<http://www.mc.uky.edu/ibs/coursework.asp>). **Steve Evans** will be assisting the course director in maintenance and control of the Blackboard site for IBS602/BCH608. Any questions about use of Blackboard should be directed to Steve (phone: 323-2454; e-mail: steven.evans@uky.edu) .

I. DISCUSSION/PROBLEM SOLVING SESSIONS

Attendance at these sessions is required and all students will be expected to participate actively in discussions. All of the Discussion/Problem Solving Sessions will be administered this semester in small group format. Your room assignments will be posted at a later time on the Blackboard course website. Be prepared for these sessions by reading all materials in advance. Sessions are scheduled on regular class dates and regulations regarding class absence will apply. You will also be required to have completed a completed short quiz or exercise prior to attending the session. These are likely to be administered and/or announced through the Blackboard course website; details will be provided at a later date.

Important: Do not use the library for printing course materials!!!

J. SCHEDULE

#	Date	Topic	
1	W Jan 14	Introduction: DNA and gene expression	Peterson (PTH)
2	F 16	Organization of the genome and chromosomes	Spear (MI)
	M 19	Martin Luther King Jr. Day	
3	W 21	DNA structure and topology	Spielmann (BCH)
4	F 23	DNA replication	Rodgers (BCH)
5	M 26	DNA replication	Rodgers (BCH)
6	W 28	DNA repair and recombination I	Spielmann (BCH)
7	F 30	DNA repair and recombination II	Spielmann (BCH)
8	M Feb 2	Molecular biology techniques I: restriction endonucleases, cloning, recombinant DNA	Kraner (PHA)
9	W 4	Molecular biology techniques II: cDNA, genomic libraries, DNA sequencing, PCR	Kraner (PHA)
10	F 6	Molecular biology techniques III: blotting (northern, Southern, western), RT-PCR and RPA, in situ hybridization	Keller (ANA)
11	M 9	Molecular biology techniques IV: transfection, microinjection, 1- and 2-hybrid screening, EMSA, footprinting	Kraner (PHA)
12	M 9	Exam #1 (sessions 1- 10): 6- 8 PM, MN363/MN563	
13	W 11	Molecular biology techniques V: microarray analysis, proteomics and the human genome project	Keller (ANA)
14	F 13	Discussion/Problem solving #1	Spear (MI)
15	M 16	RNA transcription	Peterson (PTH)
16	W 18	RNA structure I	Spielmann (BCH)
17	F 20	RNA structure II	Peterson (PTH)
18	M 23	RNA processing	Peterson (PTH)
19	W 25	RNA processing and turnover	Peterson (PTH)
20	F 27	Catalytic RNA and RNA editing	Peterson (PTH)
21	M Mar 1	Discussion/Problem solving # 2	Peterson (PTH)
22	W 3	Transcriptional switch: prokaryotes vs eukaryotes	Park-Sarge (PGY)
23	Th 4	Exam #2 (sessions 11-21): 6- 8 PM, MN363/MN563	
24	M 8	cis-elements and trans-factors (DNA-binding motifs)	Park-Sarge (PGY)
25	W 10	Regulation of transactors with constitutive activity	Park-Sarge (PGY)
26	F 12	Regulation of transactors with inducible activity	Park-Sarge (PGY)
	15-19	Spring Break	
27	M 22	Nucleosomes and chromatin remodeling	Spear (MI)
28	W 24	DNA methylation and epigenetic inheritance	Spear (MI)
29	F 26	DNA methylation and epigenetic inheritance	Spear (MI)
30	M 29	Cell cycle and transcription	Kaetzel (PHA)
31	W 31	Gene transcription in cancer	Kaetzel (PHA)
32	F Apr 2	Discussion/Problem solving # 3	Kaetzel (PHA)
33	M 5	Exam # 3 (sessions 22-32): 6- 8 PM, MN363/MN563	
34	W 7	Integration of signaling pathways & transcription I	Estus (PGY)
35	F 9	Integration of signaling pathways & transcription II	Estus (PGY)
36	M 12	Protein synthesis and its regulation I	Dickson (BCH)
37	W 14	Protein synthesis and its regulation II	Dickson (BCH)
38	F 16	Protein synthesis and its regulation III	Dickson (BCH)
39	M 19	Protein synthesis and its regulation IV	Zimmer (MI)

40	W	21	Protein turnover	Zimmer (MI)
41	F	23	<i>Discussion/Problem solving # 4</i>	Zimmer (MI)
42	M	26	Gene therapy	Kraner (PHA)
43	W	28	Molecular Evolution	Davidson (MI)
44	F	30	Molecular Evolution	Davidson (MI)
	M	May 3	Final Exam (#4; sessions 34-44): 10:30AM, MN463, 563	