

SYLLABUS
MCDB 3500 – Molecular Biology Spring, 2010

MCDB 3500 defines the molecules in cells, and describes the major molecular processes that lie behind most biological events (replication of DNA, transcription and processing of RNA, translation of genetic information into proteins), and emphasizes the techniques and experiments that lead to this information.

Class hours: 12:00 – 12:50, Monday, Wednesday, Friday in Chem 140. The lectures are your most specific guide to what is important. Never hesitate to ask questions to clarify what is said during the lectures.

Lecturer: Michael Stowell, Email: Michael.Stowell@colorado.edu.
Office hours: Wednesday 13:00 – 15:00, or by appointment, in MCDB B231.

Teaching fellow: Michelle Smith, Email: Michelle.K.Smith@Colorado.EDU.

TA: Jonathan Langberg, Email: jonathan.langberg@colorado.edu
TA hours : Monday 16:00 & Thursday 10:00 both in MCDB A350

Clickers: We will use clickers for rapid feedback and to foster interactive learning in a large classroom setting. It will account for 5% of the final grade (see below). Please register your clicker by January 19th at <http://www.colorado.edu/its/cuclickers/students/register.html>. In order for you to get your clicker points, you must register your clicker!!

Homework: On-line homework will be due every Friday Morning at 11 AM, except for the first week and on exam weeks. Homework will count for 10% of the final grade.

Textbook: Robert F. Weaver, Molecular Biology 4th Edition, McGraw-Hill, 2007 is required. This is a relatively new book; the 1st edition was used for the first time here in 1999. It is particularly strong on experimental detail. In my opinion, it might be sensible to share a copy with another student, but it will be a distinct disadvantage if you don't have easy continuous access to the text. We will look at most of this text and it is a reasonable and clear reference to own if you will continue in the biomedical sciences. In any case, it will give you another view of the material treated in lecture. The subjects treated in lecture are the materials you will be tested on, though the particular question may be formulated using material from the book. Reading the same topics in the book explains the selection of topics a second time, sometimes in greater depth. Some nice animations and other helpful material related to the book can be found at <http://www.mhhe.com/weaver4>. The 3rd Edition is a reasonable substitute but not a complete substitute as the texts have organization and informational differences.

Powerpoint lectures: Before each lecture is given, a copy of the powerpoint lecture (in pdf format) will be uploaded on the course website. You can

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download and print out the lecture so that you can follow the lecture by taking notes on it. They comprise a skeletal record of what happens in the lecture, and will also free your understanding from dependence on the lecturer's limited artistic talent. However, you may find these lectures unintelligible without your own written notes. Therefore, don't think of them as a second, independent "book" you can read but instead as a interactive record of the lecture that you will create.

Clicker questions and practice exams: For most lectures, 1-3 clicker questions will be given covering the material of the current or previous lectures. Answers will be discussed right away. These are intended to make you think about the material that has just been covered and to give the lecturer an opportunity to observe whether the class in general understands the covered material. Clicker usage, but NOT whether you answer right or wrong, is part of your grade (see below). In addition to clicker questions, before each regular term exam, a copy of a previous comparable MCDB 3500 exam will be given out for use as practice and preparation. Finally, the "Solved Problems" at the end of each *Weaver* Chapter are often useful.

Review sessions: Before each exam during the regular term, there will be a 60-minute review session. These are usually held either during class or at 5-6 PM, a few days before the exam, but may vary because of room availability. In any case, they will be announced in lecture and are intended to provide for last-minute clarification of any still-obscure points.

Exams & grading: Your grade in MCDB 3500 is based on your final score relative to the other students in the class. Your final score (0-100 points) will be calculated the following way:

Clicker use (5%). This is based entirely on clicker use, NOT on whether you get the answers right. To get credit for the whole semester, make sure that your clicker is registered with the class at the beginning of the semester!

Homework (10%). This is based on your performance on the weekly on-line homework and surveys.

Exams 1-3 (20% each). The 3 regular exams during the term are given in class time, and cover only the material between the exams (i.e. not cumulative). These term exams each make up 20% of your score. NO term exam can be dropped and make up exams will only be given for extenuating circumstances.

Final Exam (25%). The final exam will cover i) the lectures between the third term exam and the final, as well as ii) the concepts (as opposed to the details) of the material covered in term exams 1-3.

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Our advice is: MCDB 3500 (like many other university courses) is complex enough to reward the student who gives some thought to how to take it. The most important trick is to keep up. The pace is unrelenting because MCDB 3500 must sometimes move rapidly using only ≈40 lectures to cover the field of molecular biology, which is a rapidly expanding field due to very intense research.

To prepare for exams:

1. Make sure you understand all topics covered in lecture, homework and the clicker questions.
2. Read Weaver – preferably before the lectures - and note well topics where reading and lecture overlap.
3. Do the practice exams.
4. Read through Weaver's "Solved Problems". At this point, you should be ready.

Lectures & Reading – The short notes below are to help you find the text in *Weaver* relevant to subjects as they arise in lecture. The order may vary a bit from that shown and there may be minor changes during the semester. Also, please look at the learning goals on the course website. They will give you an idea about what we expect you to be able to do in this course.

Weaver - Molecular Biology, 4th edition.

1st term: Jan. 11 – Feb. 10, 2010

Ch 2, p. 12-30, DNA structure and chemistry.

Ch 4, p. 51-78; Ch 5, p. 84,86,88-91,93-94(top),97-101,104-106, Molecular cloning.

Ch 3, p. 38–42; Ch 6, p. 126-171; Ch 5, p. 116-119, Bacterial transcription.

Ch 7, p.172-188, 192-200; Ch 8, p. 202-224, Transcriptional regulation in bacteria/phages.

Exam #1. Wednesday, Feb. 10 (Covers material from Jan 11 to Feb 8).

2nd term: Feb. 11 – Mar 8, 2010

Ch 10, p. 250-261, 266-279, Eukaryotic transcription.

Ch 11, p. 280-318; Ch. 5, p 106-119, General transcription factors in eukaryotes.

Ch 9, p. 241-243, Protein-DNA interactions.

Ch 12, p. 321-357, Eukaryotic transcription activators.

Ch 13, p. 359-397, Chromatin.

Exam #2. Monday, Mar 8 (Covers material from Feb 11 to Mar 6).

3rd term:

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Mar 10 – Apr 12, 2010:

Ch 20, p. 639-660, DNA replication.

Ch 14, p. 399-442, RNA splicing via spliceosomes, other ways.

Ch 15, p. 444-479, mRNA capping and cleavage/polyadenylation.

Ch 16, p. 480-487, rRNA and tRNA processing.
p. 487-494, Trans-splicing and RNA editing.

Exam #3. Monday, Apr 12 (Covers material from Mar 10 to Apr 9).

4th term:

Apr. 12 – April 30, 2009:

Ch 3, p. 42-46, Introduction to translation.

Ch 19, p. 621-633, Ribosomes, tRNA.

Ch 17, p. 521-555, Translation initiation.

Ch 18, p. 564-606, Coding, elongation, and termination.

Ch 16, p. 494-519; Ch 17, p. 556-562, Post-transcriptional control of gene expression (Iron response regulation, miRNA/siRNA regulation).

Final Exam – Saturday May 1 - 7:30 PM to 10:00 PM (Covers material from Apr 12 to Apr 30 in depth, as well as the general concepts of the material covered throughout the semester).

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Disabilities: If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and <http://www.Colorado.EDU/disabilityservices>

If you have a temporary medical condition or injury, see guidelines at <http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html>

Religious observances: Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance.

In this class, please let me know within the first week of the class if an exam is scheduled in conflict with a religious obligation so that your needs can be addressed.

See full details at http://www.colorado.edu/policies/fac_relig.html

Classroom behavior: Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

See policies at <http://www.colorado.edu/policies/classbehavior.html> and at <http://www.colorado.edu/studentaffairs/judicialaffairs/code.html> - student code

Sexual Harassment: The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>

Honor code: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of

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academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>