Cell Biology
Biol4004 section 003

Course Information

Lecture Time and Room
8:00 am – 8:50 am Monday, Wednesday, Friday
3-120 MCB, Minneapolis Campus

Instructors:
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Office Hours:
D. Koepp: Tuesdays 4:00 pm - 5:30 pm, 4-126 MCB or by appointment
S. Conner: Mondays 3:00 pm – 4:30 pm, 4-116 MCB or by appointment
D. Strandjord: Wednesdays 9:00 am – 10:00 am, 7-118 MCB or by appointment
If no one arrives at the TA office hours within the first 30 minutes, they may be canceled. Please contact the TA prior to office hours if you are unable to arrive within that time period.

In-Class Exams:
Wednesday, February 8
Friday, March 2
Wednesday, April 4
Friday, April 27

Final Exam Period: May 11, 1:30-3:30 pm (Presentations)

Prerequisites:
Undergraduate course in Biochemistry: Biol3021 or BioC3021 or BioC4331
Undergraduate course in Genetics: Biol4003 or BioC4332

Required Text:
Molecular Biology of the Cell (Fifth Edition), Alberts et al., Garland Science 2007.
Includes a DVD with all text figures, additional chapters and helpful movies. Note to Macintosh users: Due to a change in Flash, you may be unable to open some movie files on the DVD. We have posted updated files on the course website within the Study Guides and Assignment section. For further information and/or request a new DVD, see the

following publisher link:
http://www.garlandscience.com/textbooks/0815341059.asp?type=resources

Website

The class website can be found at http://www.cbs.umn.edu/courses/biol4004-3/. You can also navigate to the class website via your MyU page. The site includes course information, class schedule, old exams, supplemental material, study questions and links to other relevant information. Macintosh users: Please avoid using Internet Explorer as your browser when navigating the course website. Good alternatives include Safari and Firefox.

Cancellation dates

January 24 – Last day to cancel course and receive 100% refund
January 30 – Last day to cancel course without a W on the transcript
March 12 – Last day to cancel course without approval of college scholastic committee

Course Description

Content

This course is part of a core curriculum required for graduation in a number of biological science majors in the College of Biological Sciences. The material covered is also applicable to basic studies in other areas of science and technology. The course provides an intense introduction to the fundamentals of cellular systems, focusing on dynamic cellular activities at the molecular level. Significant emphasis is placed on understanding the experimental basis of our current knowledge of cellular processes.

The material covered in this course builds directly upon material covered in the prerequisite courses of Biochemistry and Genetics. Students entering the course should know basic structures of biological macromolecules (nucleic acids, amino acids, proteins, carbohydrates, lipids) and understand the fundamentals of gene structure, transcription, protein synthesis, bioenergetics, respiration, photosynthesis, mitosis and meiosis. Students should also be familiar with basic molecular biology techniques such as gene cloning, cDNA preparation, DNA sequencing, use of restriction enzymes and the polymerase chain reaction (PCR).

Objectives

Upon completion of this class, students will:

- Recognize and understand fundamental processes common to all types of cells as well as those processes unique to specialized or differentiated cells
- Be familiar with the mechanisms by which cells replicate and transcribe and translate their genetic information, secrete proteins, assemble organelles and transport molecules to them, move, respond to signals and divide
- Demonstrate critical thinking skills to address scientific problems
- Understand experimental strategies that researchers use to study cell biological problems

Classroom atmosphere

Our goal for the course is that the students find the classroom atmosphere relaxed, interesting and fun while also being intellectually challenging. We find that student attitudes are largely responsible for classroom atmosphere. Course material will be presented in a combined lecture and discussion format. We will ask the class questions throughout the class period and/or ask students to work in groups on a specific problem. We will not call on specific students, but we strongly encourage all students to actively participate in class discussions and to ask questions at any time during the class period. Please read the material before you come to class so that you are prepared to participate in discussions.

Strategies for Success

- ***Attend class***. Participation in class activities will enhance the learning experience. Information not available in the textbook will be discussed and presented during class and students will be responsible for this information during exams.

- ***Engage the material.*** Read the assigned pages before class. Use the study guide available on the class website, it will help you focus on the key material presented in class and found on the exams. Taking notes during class for later review is a highly effective learning tool. Use last year's exams as practice – they can be found on the class website.

- ***Focus on the figures.*** All figures shown in class are available on the class website and on the DVD that comes with the text. We will use figures to illustrate key concepts and will often make additional notes on them during class. Bring a copy of the figures with you to class to add your own notes. Reviewing figures and key concepts is a good way to prepare for exams.

- ***Study in groups.*** Many students find that working with regular study groups helps them stay on top of the material and understand it better. If you can explain a concept or figure to someone else without using your notes, you can do the same on an exam.

- ***Seek help early and often.*** Ask questions before, during or after class. Take advantage of office hours or schedule an appointment with one of the instructors or teaching assistant. Waiting until late in the semester severely limits a student's options as the material presented later in the course builds directly upon the material presented early in the course.

Evaluation and Grading

Exams

There will be four exams (100 points each). Exams will include questions in the format of multiple-choice, short answer, labeling and drawing diagrams and interpretation of experimental results. Examples of previous exams are available on the class website. Exams will cover material presented in class and assigned reading discussed in class. Books or study materials may NOT be used during the exam.

Students who miss an exam will receive 0 points on that exam. Make-up exams will be allowed only for legitimate excuses including verified illness, family emergencies or University-sponsored events. Students must notify the instructors in advance of the missed exam and provide documentation and justification of the absence. The instructors will determine whether the request is adequately justified.

Scholastic misconduct, including cheating on exams, will not be tolerated. A student found to be cheating will receive 0 points for that exam and will be reported to University authorities.

Homework

There will be a number of homework assignments during the semester to total 45 points. The due date for each assignment will be announced one week in advance during class. No late assignments will be accepted for grading.

Final Project

A final group project (55 points) designed to integrate information learned throughout the course will be assigned after the midpoint of the semester. This project is the equivalent of a comprehensive final exam and should be treated with the same level of importance. The final project will involve an in-class presentation during the final week of class as well as a written report. Information about the final projects will be presented in class on April 6th.

Note: For all assignments or exams, please write or print as clearly as possible. We will make our best effort to decipher handwriting, but in the event we cannot read what has been written, we will not give credit for the answer.

Attendance Bonus

As an incentive to attend class and take notes, bonus points will be made available using an attendance bonus question system. At the beginning of each class period (starting on January 23rd), a question related to the content for that class period will be posed. At the end of the class period, answers will be turned in and every correct answer will be worth 1 bonus point. Each bonus point will be added to your course total at the end of the semester, up to a maximum of 20 points. Thus, if you have the correct answer from more than 20 class periods, you will only receive 20 points. There will be 35 opportunities for extra points. This gives everyone a buffer for the occasional missed class period due to University-sponsored events or unexpected situations, such as illness. Any attempt to abuse this system (i.e., having someone else turn in an answer for you, showing up at the end of class to turn in an answer, etc.) will result in the loss of all bonus points.

Grading System

Final grades will be based on 500 points obtained from exams (400 points), homework assignments (45 points) and the Final Project (55 points).

The distribution shown below will be used to determine final grades. The uniform grading and transcript policy of the University will be followed. Each range includes plus and minus grades, which will be used in final grades. The precise percentages for plus and minus scores will not be determined until final grades are determined, but in general the plus and minus scores will not exceed 3 percentage points in their respective ranges. The overall grade distribution may be adjusted lower if we find that an exam was harder than expected. Please note that the final distribution is not negotiable, regardless of how close a score may be to the next grade range.

A range	90-100% (≥450 points)
B range	75-89% (375-449 points)
C range	60-74% (300-374 points)
D range	50-59% (250-299 points)
F	below 50% (<250 points)

A grade of "I" Incomplete will be given only in extraordinary circumstances when a significant number of class sessions or exams are missed due to health or medical reasons. With appropriate documentation, arrangements can be made to satisfy the incomplete grade in these rare circumstances.

Students who choose the S/N grading option will receive a grade of S for the equivalent of a C- or better and will receive a grade of N for the equivalent of anything below a C-.

Re-grade policy

Math errors in adding your total score on an exam or homework should be brought to our attention as soon as possible and will be appropriately changed in the grade book.

If you disagree with the amount of credit given for an answer on an exam or homework assignment, re-grade requests may be made in writing within one week of the exam/assignment being returned in class. In the request, please explain why you think your answer deserves more credit. The entire exam will be re-graded when it is submitted and compared to a photocopy of the exam, which may result in either an increased or decreased overall score. We will strictly adhere to the 1-week re-grade request deadline and will not look at individual assignments or exams after final grades have been determined.

Other Information

Students with disabilities and who need additional assistance with this course should notify the instructors at the beginning of the semester. Information about the Disability Services Office can be obtained at http://ds.umn.edu or by e-mailing ds@umn.edu.

Students will evaluate this course and the instructors during the last two weeks of the course.

Information about academic policies adopted by the University Senate can be found at:
http://www.policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

Class Schedule

Class	Date and Presenter	Topic and Assigned Reading
1	1/18 D. Koepp	Introduction to the course, universal features of cells, diversity of cells Chapter 1, pp. 1-41 Optional reading (this class period only!)
2	1/20 D. Koepp	The Central Dogma: Basics of Replication, Transcription, Translation Chapter 5, pp. 266-276; Chapter 6, pp. 332-343, 367, 373-378
3	1/23 D. Koepp	Molecular cellular biology methods Chapter 8, pp. 510-518 *Homework Assignment 1 handed out*
4	1/25 D. Koepp	Regulation of DNA Replication Chapter 5, pp. 281-293
5	1/27 D. Koepp	Regulation of Transcription Chapter 7, pp. 411-415, 426-432, 439-447, 462-465
6	1/30 D. Koepp	Regulation of RNA processing Chapter 6, pp. 346-351, 357-360; Chapter 7, pp. 477-486
7	2/1 D. Koepp	Regulation of Protein Synthesis Chapter 6, pp. 385-390; Chapter 7, pp. 488-497 *Homework Assignment 1 due*
8	2/3 D. Koepp	Post-translational modification and regulation Chapter 2, pp. 175-176, 186-187; Chapter 6, pp. 391-398
9	2/6 D. Koepp	Protein Localization Chapter 9, pp. 579-592
10	2/8	Exam 1 (Introduction – Localization)
11	2/10 D. Koepp	Intro to cytoskeleton Chapter 16, pp. 965-988
12	2/13 D. Strandjord	Regulation of Filament Assembly Chapter 16, pp. 992-1010
13	2/15 D. Koepp	Motor Proteins: Cilia, Flagella & the Mitotic Spindle Chapter 16, pp. 1010-1025, 1031-1035 *Homework Assignment 2 handed out*
14	2/17 D. Koepp	Myosin motor proteins Chapter 16, pp. 1025-1031
15	2/20 D. Koepp	Introduction to cell cycle control Chapter 17, pp. 1053-1066
16	2/22 D. Koepp	Major transitions of the cell cycle: S phase and Mitosis Chapter 17, pp. 1067-1086
17	2/24	Major transitions of the cell cycle: Mitosis and Cytokinesis

	D. Koepp	Chapter 17, pp. 1087-1090, 1093-1099 *Homework Assignment 2 Due*
18	2/27 S. Conner	Plasma membrane; lipid bilayer, membrane proteins Chapter 10, pp. 617-648
19	2/29 S. Conner	Membrane transport; carrier proteins Chapter 11, pp. 651-667
20	3/2	Exam 2 (Cytoskeleton – Membrane transport)
21	3/5 S. Conner	Membrane transport; ion channels; neuromuscular transmission Chapter 11, pp. 667-687
22	3/7 S. Conner	Overview of protein transport mechanisms, signal peptides Chapter 12, pp. 695-718
23	3/9 S. Conner	Endoplasmic reticulum, co-translational transport Chapter 12, pp. 723-745
	3/12-3/16	Spring Break
24	3/19 S. Conner	Intracellular vesicular transport Chapter 13, pp. 749-766 *Homework Assignment 3 handed out*
25	3/21 S. Conner	Transport from ER to Golgi, trans-Golgi to lysosomes Chapter 13, pp. 766-787
26	3/23 S. Conner	Endocytosis; exocytosis Chapter 13, pp. 787-809
27	3/26 S. Conner	Cellular Pathogens: Viruses and Prions Chapter 24 (DVD and website posted handout)
28	3/28 S. Conner	Cellular Pathogens: Bacteria Chapter 24 (DVD and website posted handout) *Homework Assignment 3 Due*
29	3/30 S. Conner	Overview of cell communication, nuclear receptors, signal cascades Chapter 15, pp. 879-904
30	4/2 S. Conner	Cell signaling, G protein-linked receptors Chapter 15, pp. 904-916
31	4/4	Exam 3 (Ion channels-Cell Communication overview)
32	4/6 S. Conner	Cell signaling, enzyme-linked surface receptors, kinase cascades Chapter 15, pp. 921-954 *Introduce Group Project*
33	4/9 S. Conner	Integration of signaling pathways, signaling in sensory cells Chapter 15, 917-921

34	4/11 S. Conner	Regulation of Cell Growth and Division Chapter 17, pp. 1100-1112
35	4/13 S. Conner	Apoptosis Chapter 18, pp. 1115-1127
36	4/16 S. Conner	Cell junctions Chapter 19, pp. 1131-1164
37	4/18 S. Conner	Extracellular matrix Chapter 19, pp. 1178-1202
38	4/20 S. Conner	Basal lamina and cell-matrix adhesion Chapter 19, pp. 1164-1178
39	4/23 D. Koepp	Cancer cells and tumorigenesis Chapter 20, pp. 1205-1230
40	4/25 D. Koepp	Cancer genetics Chapter 20, pp. 1230-1265
41	4/27	Exam 4 (G protein Receptors – Cancer)
42	4/30	Final Project Presentations & Course evaluations
43	5/2	Final Project Presentations
44	5/4	Final Project Presentations
Final exam period	5/11 1:30-3:30 pm 3-120 MCB	Final Project Presentations