

**THE BIOLOGY CORE CURRICULUM
UNIVERSITY OF WISCONSIN-MADISON
Biocore 383: Cellular Biology**

**Course Information
Spring, 2017**

Welcome to Cellular Biology, the second course in the four-semester Biology Core Curriculum. Prerequisites are Evolution, Ecology, and Genetics (Biocore 381), Organic Chemistry (Chemistry 343), and Calculus (Math 221). (Students with questions concerning prerequisites should check with the Biocore Associate Director, Janet Batzli, 363 Noland Hall, 263-1594.) Biocore courses are honors courses and no additional work is required for honors credit because each course is appropriately rigorous already.

Brief Description of Biocore 383: Cellular Biology Lecture

Biocore 383 deals with various aspects of life at the cellular and molecular levels. As is evident from the lecture schedule on pp. 6-7, we will be concerned with several major themes. In Unit 1, Dr. Jeff Hardin will provide an *introduction to cells and cell membranes* and will then discuss *macromolecules* and the *flow of energy in cells*, considering how cells obtain, store, and use energy. In Unit 2, Dr. Shelby O'Connor will take up the *flow of information* in prokaryotes and eukaryotes, including the storage, transmission, and expression of genetic information. The course then concludes with Unit 3 by Dr. Erik Dent on *signal transduction*, focusing especially on the importance of receptor-ligand interactions, cell signaling, cell motility, the regulation of the cell cycle, and cancer.

Dr. O'Connor is the Biocore 383 course chair and Dr. Hardin serves as the Faculty Director of Biocore. Drs. Hardin, O'Connor and Dent welcome your email and personal visits as they are very interested in your learning and are eager to get to know you. Dr. Janet Batzli is Biocore's undergraduate advisor, Associate Director, co-chair of Biocore 384 and is interested in talking to all Biocore students concerning general course/career planning or comments/suggestions on any aspect of the Biocore program. Dr. Michelle Harris is co-chair of Biocore 384 and Biocore's Minority Liaison and especially invites minority students to stop by and see her. Carol Borcharding is Biocore's program administrator (345 Noland) and is happy to help you with enrollment questions, section changes, and scheduling conflict exams. See page 7 of this handout for our contact information. Come and visit us!

Biocore 383 Scheduling and Enrollment

Biocore 383 meets at 8:50 AM MWF in 168 Noland Hall. In addition, each of you will attend a discussion section on Thursdays. Two evening exams are scheduled, as indicated on page 3; please try to avoid conflicts with these evenings. The third exam will be given on May 10, during final exam week. If you have any **questions regarding enrollment, changing sections, grade records or scheduling a conflict exam please contact Carol Borcharding (carol.borcharding@wisc.edu)**, Biocore's program administrator.

Section	Time	Place	TA
303	11:00 R	379 Noland	Jesse Wang
304	12:05 R	379 Noland	Jesse Wang
305	12:05 R	553 Noland	Christina Kuang
306	2:25 R	379 Noland	Jesse Wang
307	3:30 R	379 Noland	Christina Kuang

Unifying Concepts For Biocore 383

Our overall goal in 383 is to develop a genuine understanding of the most important concepts of cell biology, and to do so in ways that will equip you to use that understanding in whatever future context may turn out to be relevant for you. To assist in this endeavor, we have identified the following unifying concepts for 383, which we consider to be at the heart of the course as a whole and of each of the three units:

- *Specificity of macromolecular interactions:* Biological molecules recognize other molecules in much the same way that a lock recognizes a particular key or one piece of a jigsaw puzzle recognizes another.
- *Importance of cellular compartmentalization:* The various chemical activities of cells tend to be performed in very specific places in a cell. In eukaryotes, cells are divided into compartments by membranes, with each membrane-bounded compartment specializing in its own set of chemical processes.
- *Energy acquisition and use:* The activities we associate with life all consume energy. Cells produce and use energy using specific types of “energy currency” in the cell; such energy utilization involves specific chemical reactions.
- *Flow of genetic information between and within generations:* The ability of a cell to perform its complex chemistry depends on the information contained in its genes. Genes are made of DNA. DNA contains information that is transmitted from one generation to the next and also is used within cells to regulate cellular chemistry.
- *Signal transduction and cell-cell communication:* Receptor molecules on the surface of cells recognize (bind) specific substances in their environment. The binding of signal molecules induces changes in the receptors that initiate chemical reactions inside the cell. In this way cells can sense and react to changes in their environment.
- *Regulation of cellular processes:* Cells tightly regulate the myriad processes that occur within them. Such regulation can occur at many different levels, from transcription of DNA to the modification of protein shape or phosphorylation.
- *Experimental approach to cell biology:* Our knowledge of biology is only as good as the experimental evidence on which it is based. We must, therefore, constantly ask ourselves how we know what we know. What is the evidence? Remember that science is a human activity and that humans are fallible.

Required Biocore 383 Materials:

1. Hardin, J., Bertoni, G., & Kleinsmith., L., *Becker's World of the Cell*, 9e, (2016)
2. You will also need to purchase an iClicker (iClicker+) for this course

Most of the lecture content that is connected to the World of the Cell will incorporate material from the 9th edition. YOU are responsible for knowing the material in the 9th edition. We realize that some of you may have a copy of the 8th edition from past students who took the course, but we are only identifying readings from the 9th edition. Stating that a piece of text was absent from the 8th edition will not be an acceptable excuse for missing a question on an assignment. Even if you use an 8th edition book as your primary resource, YOU are responsible for ensuring that you understand the material written in the 9th edition.

A personal note from Dr. Hardin: *Becker's World of the Cell* was originally written by its founding author, Dr. Wayne Becker (professor emeritus, UW-Madison Botany department), specifically for teaching in Biocore 303 (previous course number for this course). The 9th edition continues this tradition, and you will find that many aspects of the lecture content will dovetail well with your text. We hope it helps you! I also hope that you'll help me. First, we count on you to find mistakes in the text! If you find one, please let me know, as it helps all of us and the *Becker's World of the Cell* author team. Second, in addition to factual issues or typographical errors, I'll be looking to you for suggestions for how to make the book better. I hope you'll take this opportunity to put all of the community-based learning that you've come to expect in Biocore to good use in 383, as we learn together.

Biocore 383 Unit Readings and Handouts

For each of the units in this course, the lecturer has prepared material available for download via

learn@UW (<http://learnuw.wisc.edu>). As in 381, you will be expected to download and print out the handouts for each week's lectures. The material for each unit will indicate appropriate reading assignments in the text. **You are expected to do the assigned reading before coming to lecture; not doing so will make it more difficult to follow the lecture presentations.** The readings are designed to reinforce lecture material. You will **not** be responsible for material not covered in lecture unless **explicitly** stated.

Biocore 383 Exams and Assignments

Your grade in this course will be determined by your performance on **3 exams** (2 x 100 + 1 x 120 = 320 points), the **best 10 of 11 problem sets** (10 x 10 points = 100 points), genomics module (10 points), **best 11 of 12 quizzes in discussion sections** (11 x 5 points = 55 points), and **active participation in lecture** (40 points) for a total of 525 points. Each exam will deal primarily with the subject matter of the specified lectures but is likely also to include questions that presume information and understanding from the preceding units.

Exam	Points	Date	Time	Emphasis of Exam
Exam 1	100	Feb. 21	7:15 PM	Unit 1 (lectures 1-14)
Exam 2	100	April 4	7:15 PM	Unit 2 (lectures 15-29)
Exam 3	120	May 10	10:05 AM	Unit 3 (lectures 30-43) and comprehensive

There will be a problem set each week except for weeks when an exam is given. Each is worth 10 points and must be turned into your TAs bin in the back of the lecture hall **before** the beginning of lecture on Friday. There will also be a quiz (worth 5 points) each week in discussion section except during the weeks we have an exam. We will handle illness and other extenuating circumstances by allowing you to drop your lowest score for the problem set and the quiz. If you miss one of these assignments, you will receive a 0 for it and that will be the score we drop, with the remaining 11 counting toward your final grade. Late assignments will **NOT** be accepted.

In-class lecture activities will help you learn the course material and give you practice in developing the “higher level thinking” skills needed to truly understand modern biology. These activities will reflect materials highlighted in lecture and allow you to test your understanding by using iClickers, followed by class discussion. These activities are designed to aid your learning in a ‘low stress’ setting. Bring your iClicker to lecture every day as you will be answering questions during lecture and will receive one point per lecture. To account for illness and other circumstances during the semester, we will allow you to drop four points for a total of 40 points out of 44 for active participation in lecture.

Here's how you need to register your iClicker:

1. Go to Biocore 383 in learn@UW. Click the Course Information section and you will find the link to register your iClicker.
2. Fill in iClicker remote ID number located on the back of your iClicker. If this number has rubbed off, you will be able to look up this number using this site's "Where do I find my remote ID" located to the right.
3. Be sure to check your iClicker for a low battery. There will be a light that turns on when the battery is good. The low battery light turns on if you will need batteries soon. We strongly recommend that you change your batteries now if you need to. If no light comes on at all when you turn it on, then you need to change the batteries.

If you need help, please contact Carol Borcharding (carol.borcharding@wisc.edu).

Your attendance in discussion section is mandatory. Your participation in discussion will be taken into consideration during assignment of final grades.

Biocore 383 Exam Policies

All students are expected to take the regular exams as scheduled. Students with academic conflicts for a particular evening exam may sign up with Carol Borcharding, the program administrator, for an early make-up exam to be given earlier on the same day as the evening exam. Permission to take an early make-up exam must be obtained in advance. No other exam arrangements are possible, except in case of personal hardship and then only by prior arrangement with Dr. O'Connor. Exams given after the regularly scheduled exam may be only at the discretion of the lecturer involved. No make-up exams will be given for exam 3 because that exam is scheduled during final exam week.

Policy for Submitting Regrade Requests

Submit written regrade requests on a separate piece of paper to Biocore main office (345 Noland Hall) within 1 week of the exam key being posted on Learn@UW. Include answers to the 2 questions below. Please do not write on the exam itself. Make sure that there are no notes or additional marks on the exam other than those you made during the exam time or those made by the grader. Unit instructors (not Carol or TAs) will review regrade requests and will decide if extra points are warranted. When exams are submitted for individual question regrade, unit instructors reserve the right to review the entire exam for regarding. Exam regrade requests should include the following information:

1. State which question(s) are you requesting be reviewed for a regrade.
2. Explain how your answer compares to the answer key and why your answer should earn additional credit.

Biocore 383 Grades

In Biocore, students do not compete with one another for grades, because neither the individual exams nor the overall grade distribution is "curved." The grade ranges are set in advance and we guarantee that you will not receive a lower letter grade than that specified below. ABs and BCs are determined at the discretion of the teaching staff at the end of the semester. No one would be more delighted than the instructional staff should it prove "necessary" (=possible) to give everyone A's, *provided* everyone earns an A! The only "competition" is therefore with our standards of expectation:

<u>Letter Grade</u>	<u>Total Points</u>
A	472.5-525 (90-100%)
B	420-472.4 (80-89%)
C	367.5-419.9 (70-79%)
D	315-367.4 (60-69%)
F	< 315 (< 60%)

Biocore 383 Course Policies

We will continue the practice from last semester of emailing you announcements (usually on Wednesday evenings) and posting information on the Learn@UW site (<http://learnuw.wisc.edu>). It is your responsibility to pay attention to these announcements since most of them will not be repeated in class. **Please be on time for class and please turn off your cell phones.** It is disruptive to your fellow students and rude to the lecturer.

We expect you to hand in assignments on time and appear for the regularly scheduled exams unless you have made specific alternative arrangements in advance. You will find us very willing to make whatever provisions we can to assist you in coping with illness, death in the family, observance of religious holidays or other extenuating circumstances, but you must let us know as soon as you are aware of the problem.

Preventing and Reporting Illness

If you need to miss class due to illness please contact your TA and Dr. Shelby O'Connor (slfeinberg@wisc.edu), especially if your absence is for more than one week. Under extenuating circumstances, we will work with you to complete course work within a reasonable time.

Student Board of Directors (BOD)

We are soliciting student representatives who would like to represent both Biocore 383 and Biocore 384 in the weekly staff meeting. These students will serve as representatives to let the faculty know of issues and concerns of all students in Biocore 383 and 384. The representatives are expected to write a short statement summarizing the meeting. This summary will be included in the weekly announcement by the TAs to all the Biocore 383 students. This is a good opportunity to contribute to course improvement and student advocacy. In addition, as a BOD member, you can get to know the course faculty instructors better. If you are interested in being a student representative, please contact Dr. Janet Batzli.

Biocore 383 Peer Mentored Study Groups

As we did in Biocore 381, we will be offering peer mentored study opportunities for Biocore 383 students this spring. Although we have evidence that consistent participation in a peer mentored study group improves overall performance, this activity is VOLUNTARY and will NOT be graded in any way. In this program, second year Biocore students or alums of the program (juniors & seniors) facilitate study sessions for groups of 5-10 Biocore 383 students. Peer mentors (PM) facilitate weekly study sessions related to the material you will be covering in Biocore 383. As a participant, it is important that you understand that PM are NOT expected to 'teach', lecture, or even to have the right answers to the questions you have. They are NOT TAs or instructors. Rather, they are peer learning guides, helping you think about how to approach problems to improve your study skills, navigate through material and help broaden your network. As a result we not only hope that you become more confident in your learning and understanding of cell biology, but that you establish a relationship with the larger Biocore learning community. Janet Batzli serves as the program advisor. To sign up, look for details coming soon in your course email.

Accommodations for Students With Disabilities

We want to make sure that students with disabilities are fully included in the lecture. If you need special accommodations in the instruction or assessment processes of this course, get in touch with Dr. O'Connor *within the first two weeks of the semester*.

Creating an Inclusive Classroom

In Biocore, we strive for the utmost equity for all students, TAs, and faculty/ staff, regardless of race, ethnicity, gender, sexual orientation, (dis)ability, socioeconomic status, country of origin, or religious affiliation. Our community and our science depend on engaging and embracing different perspectives and this starts with each of us understanding and recognizing our own biases. It takes a great deal of awareness and self-work to recognize bias. Most of us stumble at times, so we all need to practice.

- If you experience or notice bias: Share when you first experience or notice bias. If you are further offended and continue to experience bias, do not hesitate to bring this to your instructor's attention and/or report the case through UW Madison's [Bias Incident Reporting system](#)
- If you mistakenly say or do something you wish you hadn't: apologize, say 'I'm sorry' and take ownership when you have offended someone, even if it was unintentional.

Discrimination and bias are not OK. Saying nothing perpetuates inequality. Speaking up reminds us of our inclusive classroom goal. It takes everyone to create a safe, supportive and productive learning environment. If even one of us feels stifled or unaccepted, we all lose out.

Getting to Know You: Our Open-Door Policy

In this course, you will find the staff to be genuinely interested in interacting with students. Toward this end, you are invited to call upon any of us, lecturers and TAs alike, with questions, suggestions, or constructive criticism. Contact by telephone or e-mail is especially convenient. If you want to come in person, it is important to make an appointment in advance, or to stop by during the office hours posted for each instructor. Do not make the mistake of assuming that professors are "too busy to see students." In this course, at least, we find that to be one of the most rewarding times spent with students. Try it—you might like it!

BIOCORE 383: CELL BIOLOGY
Spring 2017 Lecture
Schedule

Lecture	Date	Lecturer	Lecture Topic
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UNIT 1: Cell structure, Bioenergetics and the Flow of Energy (Dr. Jeff Hardin)

1	1/18	Hardin	Introduction: The Cellular Revolution Imaging and Analyzing Cells (podcast)
2	1/20	Hardin	Cellular Chemistry
3	1/23	Hardin	Macromolecules
4	1/25	Hardin	Bioenergetics
5	1/27	Hardin	Enzyme catalysis
6	1/30	Hardin	Enzymes (cont.); Membranes
7	2/1	Hardin	Membranes (cont.); Transport
8	2/3	Hardin	Global energy currency: ATP
9	2/6	Hardin	Glycolysis & anaerobic respiration
10	2/8	Hardin	Aerobic respiration & the TCA cycle
11	2/10	Hardin	TCA (cont); electron transport
12	2/13	Hardin	Oxidative phosphorylation
13	2/15	Hardin	Photosynthesis: chloroplasts
14	2/17	Hardin	Photosynthesis: carbon metabolism

Review session: Monday, February 20 at 4:30 PM

Exam 1 (lectures 1-14): Tuesday February 21 at 7:15 PM

UNIT 2: Basic Genetics and the Flow of Information (Dr. Shelby O'Connor)

15	2/20	O'Connor	DNA - structure
16	2/22	O'Connor	DNA: Chromatin and Replication
17	2/24	O'Connor	DNA: Replication and Telomeres
18	2/27	O'Connor	Transcription
19	3/1	O'Connor	RNA Processing, microarray/transcriptomes, and RNAi
20	3/3	O'Connor	Translation
21	3/6	O'Connor	Genomics
22	3/8	O'Connor	Deep sequencing and how it can be used to understand genomics
23	3/10	O'Connor	Manipulation of DNA/Molecular tools for cell biologists
24	3/13	O'Connor	Prokaryotic Gene Regulation (podcast)
25	3/15	O'Connor	Eukaryotic Gene Regulation
26	3/17	O'Connor	Mutation and DNA repair

Spring Break (March 18-March 26)

27	3/27	O'Connor	Recombination and transposons
28	3/29	O'Connor	HIV & Molecular Immunology
29	3/31	O'Connor	Fragile X case study

Review session: Monday, April 3 at 4:30 pm

Exam 2 (lectures 15-29): Tuesday, April 4 at 7:15 PM

Lecture	Date	Lecturer	Lecture Topic
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Unit 3: Cell Signaling, Movement, and the Flow of Intracellular Messengers (Dr. Erik Dent)

30	4/3	Dent	Introduction to Cell Signaling and Cancer
31	4/5	Dent	Nuclear and Protein Trafficking
32	4/7	Dent	Vesicular Trafficking
33	4/10	Dent	G-protein Signaling and Second Messengers
34	4/12	Dent	Calcium and Hormonal Signals
35	4/14	Dent	Growth Factors, RPTKs and Steroid Signaling
36	4/17	Dent	The Cytoskeleton
37	4/19	Dent	Motors and Muscles I
38	4/21	Dent	Motors and Muscles II
39	4/24	Dent	Cell Adhesion and Movement
40	4/26	Dent	Cell Cycle Regulation
41	4/28	Dent	Cell Division and Apoptosis
42	5/1	Dent	Cancer I – Cell Proliferation and Spread
43	5/3	Dent	Cancer II – Oncogenes, Tumor Suppressors

Review session: To be announced

Exam 3 (lectures 30-43): Wednesday, May 10 at 10:05 AM

**BIOCORE 383 STAFF DIRECTORY
Spring 2017**

Lecturing Staff

Erik Dent	ewdent@wisc.edu	5431 WIMR (Bldg 2)	262-4672
Jeff Hardin	jdhardin@wisc.edu	327 Zoology Research	262-9634
Shelby O'Connor (Chair)	slfeinberg@wisc.edu	555 Science Drive	890-0843

Laboratory Staff

Janet Batzli (Co-Chair)	jbatzli@wisc.edu	363 Noland Hall	263-1594
Seth McGee	seth.mcgee@wisc.edu	339 Noland Hall	262-6189
Michelle Harris	maharris@wisc.edu	307 Noland Hall	262-7363

Lecture Teaching Assistants

Christina Kuang	mkwong2@wisc.edu	4110 Genetics-Biotech
Jesse Wang	jfwang2@wisc.edu	524 Noland Hall

Biocore Administration

Jeff Hardin (Director)	jdhardin@wisc.edu	327 Zoology Research	262-9634
Janet Batzli (Assoc. Dir)	jbatzli@wisc.edu	363 Noland Hall	263-1594
Carol Borcharding (Prog. Mgr.)	carol.borcharding@wisc.edu	345 Noland Hall	265-2870

BIOCORE STATEMENT OF ACADEMIC INTEGRITY

What is academic integrity and why are we promoting it? Academic integrity means being honest about your intellectual work, which is fundamental to the pursuit of knowledge. We ask you to sign this honor code as a pact between you and the Biocore Program faculty/staff to abide by the academic rules of conduct laid out by the University. Without these rules of conduct our institution would be severely limited in its capacity to function as a community of higher learning. We encourage you to visit the following web-sites and get familiar with the University policy concerning Student Conduct and Disciplinary Rules (<http://students.wisc.edu/student-conduct/academic-integrity/>) As a student of the University of Wisconsin it is your responsibility to become familiar with, understand, and abide by the general Statement of Principles and Disciplinary Guidelines (https://docs.legis.wisconsin.gov/code/admin_code/uws/14.pdf) outlined by the Dean of Students and the UW Board of Regents. These guidelines protect both you and the university if an infraction has occurred. Ignorance of these regulations is not a defense in cases of infringement. So.. Just DON'T Do It!

DEFINITION OF ACADEMIC DISHONESTY

from UW Academic code 14.03 https://docs.legis.wisconsin.gov/code/admin_code/uws/14.pdf

“Academic misconduct is an act in which a student:

- seeks to claim credit for the work or efforts of another without authorization or citation;
- uses unauthorized materials or fabricated data in any academic exercise;
- forges or falsifies academic documents or records;
- intentionally impedes or damages the academic work of others;
- engages in conduct aimed at making false representation of a student's academic performance;
- assists other students in any of these acts.

Examples include but are not limited to: cutting and pasting text from the web without quotation marks or proper citation; paraphrasing from the web without crediting the source; using notes or a programmable calculator in an exam when such use is not allowed; using another person's ideas, words, or research and presenting it as one's own by not properly crediting the originator; stealing examinations or course materials; changing or creating data in a lab experiment; altering a transcript; signing another person's name to an attendance sheet; hiding a book knowing that another student needs it to prepare an assignment; collaboration that is contrary to the stated rules of the course, or tampering with a lab experiment or computer program of another student.”

CONSEQUENCES FOR ACADEMIC DISHONESTY

To determine whether academic dishonesty has occurred, the instructor and Biocore administrators will meet with the student. In Biocore, students who commit acts of academic misconduct will write letter describing what they did and, if appropriate, apologize to individuals who were involved in the incident. In alignment with the penalties listed in the University's UWS14, Student Academic Disciplinary Procedures we recognize three levels of consequences (1) An oral reprimand; and (depending on the severity of the case) written reprimand presented only to the student; or an appropriate assignment to be evaluated by the instructor or Biocore administrative staff, (2) a lower or failing grade on the assignment, exam, or course; removal of the student from the course or program; and a written reprimand included in the student's university disciplinary file, (3) recommendation for disciplinary probation for up to 2 years, suspension, or expulsion from the University.

BIOCORE HONOR CODE

This is a reminder that you signed an Honor Code statement last fall during the first week of class in Biocore 381. These following principles still apply:

1. I will report laboratory data honestly and accurately. Under no circumstances will I fabricate data or change data to fit what I think it should be.
2. All work that I submit under my name will be my own. I will not copy or paraphrase from another student presently or previously enrolled in this course.
3. For projects where collaboration is explicitly permitted, I will list the names of students with whom I worked.
4. I will not allow another student to copy or "borrow" my laboratory reports or other assignments.
5. I will not forge or falsify academic documents including graded assignments and examinations
6. I will strive to make Biocore a community that is based on honesty and integrity