Fundamentals of Life Science: Biomolecules, Cells and Inheritance

BIOL 2170-002 - Spring 2017
MW from 4:00-5:40 p.m. in WO1201
4 Credit Hours; CRN 10909

Instructor

Dr. Robert Steven
Office: BO1100
Phone: 419-530-7890
Email: robert.steven2@utoledo.edu
Office Hours: MT 10-11:00 a.m., WR 9:30-10:30 a.m. and R 3-4:00 p.m. (or by appointment)

Course Description

As a requirement for biology majors this four credit hour lecture course is the first half of a general introduction to the fundamentals of life science offered by the Department of Biological Sciences in the College of Natural Sciences and Mathematics. The topics of discussion focus on molecular biology and provide the fundamental basis of knowledge required for all professions in the life sciences. The specific topics include the molecules of life, cell structure and function, the stages of cell division and how they are controlled, energy processing pathways in plants and animals, genetics, gene expression and cell signaling mechanisms. Students will be assessed in class with “clicker” questions, after class with quiz homework completed online and with in-class summative examinations every three weeks.

Main Learning Outcomes

Students who successfully complete the course will be able to:

- Illustrate the scientific method through analysis of major biological discoveries.
- Outline the structure and function of the types of macromolecules found in all living organisms.
- Describe the structure and function of cells and the metabolic reactions that occur in cells.
- Explain the process of inheritance including genetic linkage and complex traits.
- Understand different types of mutations and their effects on gene products and on phenotype.
- Describe how RNA, DNA and proteins are synthesized.
- Understand recombinant DNA technologies and how they are used.
- Explain the process of cell division in both somatic and germ cells.

Teaching Strategies

The course topics are presented in a lecture format supplemented with "clicker question" based learning activities centered on data analysis or case studies. Students are encouraged to read the relevant textbook chapter(s) before class so they can fully appreciate the lecture material and participate in the class activities to maximize learning and retention. Lecture slides are made available in PDF form on Blackboard in advance of class, however, these slides are not complete so students must annotate the slides with their own notes in class and remain engaged.

Prerequisite

CHEM 1090 or CHEM 1230 or a minimum CHEM placement score of 20 or BIOL 2010 or BIOL 2150 or an ACT minimum composite score of 21 is a prerequisite for this course.

Required Materials

- **Note:** Do not rely on the bookstore to tell you what is required for the course. Read this section carefully instead.

- **Biology, How Life Works** (2nd Edition), Morris, Hartl, Knoll, Lue et al. editors. Purchase a hardcover (ISBN 1464126097), loose-leaf or e-book version. The textbook can also be purchased in two separate volumes in paperback form. BIOL 2170 requires Volume One while BIOL 2150 requires Volume Two. If you can do without a hard copy of the textbook you should consider purchasing just the LaunchPad access (see below) since LaunchPad includes a full e-book version of the textbook. *Note: If you purchase a used textbook you will have to purchase LaunchPad access separately.*

- **LaunchPad Access:** The LaunchPad website includes an e-book version of the full textbook, assigned quizzes, adaptive learning questions (Learning Curve) and other online activities. A LaunchPad access code is provided at the UT bookstore as part of a package with the purchase of a hard copy of the textbook. If you want to purchase LaunchPad access separately because you have a used textbook or you intend to use the e-book version of the textbook on LaunchPad, access can be purchased at the UT bookstore (ISBN 9781319100889) or by clicking "I want to purchase access" on the LaunchPad website. Access the LaunchPad website using the "LaunchPad" link provided in the course menu on Blackboard. *Note: Be sure to purchase enough LaunchPad access time to satisfy your needs, particularly if you are taking both BIOL2170 and BIOL2150.* Also note that *temporary LaunchPad access is available* through the website if, for example, you are waiting for delivery of your textbook. Click on "I need to pay later".

- **Clicker License**: A Turning Technologies "license", which must be purchased, is used in combination with either a physical "clicker" (optional purchase), or "ResponseWare" (free) on your phone, tablet, or laptop, to answer questions in class. If you choose to use ResponseWare in BIOL2170-002, a clicker is not required; however, other instructors may still require the use of the physical clicker in their classes so you should consider

purchasing a clicker if that is the case. *Important details are found in the document "Clicker Information for 2017"* under the "Syllabus and Instructions" link on Blackboard. Please read this document.

Clicker License Registration

Detailed instructions, titled "Turning Account Registration Instructions", are provided on the course Blackboard website under the "Syllabus and Instructions" link. An outline of the instructions is provided here. First, set up an account with Turning Technologies using the link provided on Blackboard. *You must use your UT email address when registering* and you *have to go through the link on Blackboard* at least once to link your Turning Account with Blackboard. Once you have an account you can enter your Turning Technologies license code, which is included with a clicker purchase, or purchase the license from within your Turning account, if you will be using ResponseWare. If you intend to use a clicker you must also register your clicker ID within your account. You must complete your purchase and registration by noon, Wednesday, **January 18**, the day grading of "clicker questions" will begin. Call **1- 866-746-3015** if you need assistance with the Turning account registration.

General Information

- Please ask questions during the lecture, especially if you feel something was not explained clearly. You can also ask questions after class by email or in person.
- Lecture slides are posted on Blackboard the day before class at the latest. Note that you can arrange your Blackboard settings so you are informed by email exactly when the lecture slides and other course content are posted to Blackboard. For instructions see "How to Set Up to Receive Blackboard Email Notifications" under the "More Course Info" link on Blackboard.
- Exam, clicker, and homework quiz grades will also be posted on Blackboard. *Contact me immediately if there are any issues regarding your clicker or homework grades.*
- If you are going to bring a cellphone, laptop or tablet to class please restrict their use to responding to "clicker" questions or taking notes.
- Please do not bring food into the room, although a drink is acceptable.
- If you wish to make audio recordings of the lectures for your personal use, please ask me first. Recordings are not to be distributed without the permission of the instructor.

Student Evaluation

Your **final grade** will be calculated as follows:

60% Best three of the four in-class exams (20% of your final grade for each)
25% Comprehensive final exam
10% Homework (Quizzes and Learning Curve activities)
5% "Clicker questions"
100%

Grading Scale:				
	90-100%	A	67-70%	C
	87-89%	A-	63-66%	C-
	83-86%	B+	59-62%	D+
	79-82%	B	55-58%	D
	75-78%	B-	50-54%	D-
	71-74%	C+	<50%	F

A **midterm** grade will be posted on Blackboard to give you an indication of how well you are doing in the course near the midpoint. It will be calculated using the averages of the available in-class exam, quiz and clicker results, weighted 85%, 10% and 5% respectively. Students that have stopped attending class will be reported at this time to meet state and federal laws regarding financial aid disbursement.

Homework

- Homework will consist of post-lecture quizzes and adaptive learning questions (LearningCurve) accessed on the LaunchPad textbook website.
- Homework is assigned to encourage timely student engagement with the material. The best practice is to read the appropriate sections of the textbook and to review your lecture notes before doing the homework.
- The first homework assignment will be due on **January 23** before the fourth lecture; therefore, you must have LaunchPad set up by then. The homework will continue through the remainder of the semester and is due **by 4 pm**, the start of each lecture or exam.
- Post-class activities will consist of quizzes due before the next lecture and LearningCurve activities due before each exam (except the final). Each quiz will contain multiple-choice and fill in the blank type questions for a total of ten points. LearningCurve is a personalized and adaptive learning program that uses game-like quizzing to motivate and engage students. Completion of each LearningCurve activity will also earn ten points.
- Homework quizzes can be taken twice so you can try to improve your score if necessary.
- Your lowest quiz or LearningCurve activity will be dropped from the calculation of your final homework grade.
- If you have any problems with the LaunchPad web site, including registration or access to the homework, call the **tech support line at 1-800-936-6899**. An extension to the homework deadline will not be given unless there is record with LaunchPad tech support indicating you attempted to resolve your issue before the homework due date.

“Clicker Questions”

- In each lecture you will be asked several “clicker questions” about the lecture material. Your responses will be recorded using your choice of a Turning Technologies response card (clicker) or “ResponseWare” on your phone, tablet, or laptop.
- If you have both a clicker and ResponseWare, you can respond to “clicker” questions using either device, but *once you start with one device in a particular lecture, you cannot*

switch to a different device in the same lecture. For the next lecture you can again choose either device, but you must stick with the same one for the remainder of that lecture.

- You will have the opportunity to check if your clicker/ResponseWare is working at the beginning of each class. *If your clicker or ResponseWare is not working or stops working during a class, the instructor must be notified* ***immediately*** otherwise no credit will be given for missed questions.
- *Confirm that your clicker responses are being recorded properly by checking your clicker grades on Blackboard.* The clicker grades will be updated at the end of each week.
- A full point is given for a correct answer to a "clicker" question, half a point is given for an incorrect answer.
- If you are using a clicker it must be set to channel 41 to communicate with the receiver.
- Clicker questions will begin in the third lecture (**January 18**).
- The grading system for clicker questions will be set so that you can still receive full credit even if you miss three classes during the semester. If, for example, 115 clicker points are available over the course of the semester (23 lectures x 5 questions) then you will only need to collect 100 points to receive the maximum 5% credit for clicker points.

Exam Information

- All exams, including the final exam, take place in the room where the lectures are held.
- There will be four one-hour exams during the semester and each will consist of 50 multiple-choice questions and two bonus questions. The best three exams will count toward your final grade. These exams will cover only new material (since the last exam). Exam questions will be based on the material covered in the lectures and will address the main learning outcomes.
- *You may view your most recent exam in my office, only up until the day of the next scheduled exam. You have this same time period to respond with any exam grading concerns.*
- The final exam (two hours in length) will be comprehensive and consist of 100 multiple-choice questions and five bonus questions. Approximately half of the exam will cover the last section of the course while the remaining half of the exam will cover the earlier sections of the course.
- Bring at least two pencils and an eraser to the exams.
- Students will be asked to present a **picture ID** when turning in their exam.
- Additional time will not be given to students who come late for exams and latecomers will not be permitted to start if someone has already left the exam.
- If for any reason the university is closed on the day of a scheduled exam, the exam will be given during the next scheduled class.
- *The exam schedule will not be changed for individuals who have more than one exam on an exam day.* This also applies for the final exam. The best way to prepare for this situation is to be aware of your exam schedules and review course materials regularly in advance of the exams.

Absences

- Make-up exams and adjustments to clicker grades or homework deadlines will only be provided for *serious* medical or personal reasons that are backed up with the proper documentation such as a doctor's note. *Accommodations will be made only if the instructor is notified by email or phone call as soon as possible after the absence.*
- Make-up exams will be scheduled within a week of the original exam date. If multiple students need a make-up exam they will write it at the same time in the Testing Center (FH1080). If it is not possible for a student to take the make-up exam within one week then the three remaining in-class exams will be used to determine the final grade for that student. *Make-up exams will be long answer or essay format.*
- Additional information regarding absences can be found in the University of Toledo Missed Class Policy, located at www.utoledo.edu/facsenate/missed_class_policy.html

University Policies

Policy Statement on Non-Discrimination on the Basis of Disability:

- The University of Toledo abides by the Americans with Disabilities Act (equal and timely access) and Section 504 of the Rehabilitation Act of 1973 (non-discrimination on the basis of disability). If you have a disability and are in need of academic accommodations, but have not yet registered with the Office of Academic Access (OA) please contact the office by phone (419-530-4981) or email as soon as possible for more information and/or to initiate the process of accessing academic accommodations.
- Students receiving accommodations through OA are encouraged to discuss these with me so that I may be better informed on how to assist you during the semester.

Academic Dishonesty:

- The university policy on academic dishonesty can be accessed at:
  "http://www.utoledo.edu/dl/students/dishonesty.html"
- Bringing a "clicker" or other response device to class for someone else is considered academic dishonesty for both students involved. Both students will be sanctioned according to university policy.
- Do not talk to other students or use electronic devices during examinations. Keep your eyes on your own work. Those who violate these rules will receive an F for the exam.

Keys to Success

1. **Attend every class.** Material presented during class will be emphasized for the exams and clicker points contribute to your final grade. In-class interactions with the instructor help strengthen your understanding of the material. If you need help with the material communicate with the instructor.
2. **Do not use your cell phone/tablet/laptop to text or surf the web**. Distracted students do not perform as well as those that are focused on the classroom material.
3. **Do not wait until a day or two before the exam to study.** This is one of the worst and most common mistakes students make. Go over your notes as often as you can between

exams and make sure you understand the material *before* your last study session. Ask questions about topics you don't understand as soon as possible, either during lecture or during office hours. Go to the S.I. sessions to reinforce the material.

4. **Be active with your studying.** Reading the textbook before class, taking notes during class, and making a separate set of study notes after class will aid in your ability to understand and retain the presented concepts. Participating in the Supplemental Instruction (SI) sessions will also help you in this regard. Passively reading the textbook and listening to the lectures without being engaged in the material will not lead to success. Take advantage of the Chapter Guides when studying. *It is also important to come to my office to review your exam results and take notes*. The comprehensive final exam will address the same topics you were tested on through the semester.
5. **Test yourself.** Have a roommate or classmate ask you questions about the material in your notes. Do all of the available LaunchPad activities (Quizzes, Flash Cards, Tutorials, etc.) and the self-assessment questions in the textbook. Testing yourself will let you know where you might have to spend more time on the details.
6. **Form a study group.** It helps with number five above and you will find out how well you know the material when you try to explain it to someone else.
7. A list of valuable resources to help students with their academic and social life at the University of Toledo can be found at "www.utoledo.edu/menu/current.html". This includes tutoring and writing center services among others. Assistance is also available at the Biological Sciences Help Center in WO1261A. Help Center hours are posted on the door.
8. Additional information can be found in the files "Keys to Success" and "Survival Skills" under the "More Course Info" link on Blackboard.

Course Schedule

Date	Lecture	Topic	Chapter
Jan 9	1	Chemistry of Life	2
Jan 11	2	Macromolecules I: Proteins, Carbohydrates and Lipids	2
Jan 16		*Martin Luther King Holiday*	
*Jan 18	3	Macromolecules II: DNA is the Genetic Material	2/3
‡Jan 23	4	Transcription and RNA Processing	3
Jan 25	5	Translation and Protein Structure	4
Jan 30		**Exam I** (Lectures 1-5)	
Feb 1	6	Membranes, Diffusion and Osmosis	5
Feb 6	7	The Internal Organization of Cells	5
Feb 8	8	Energy and Enzymes	6
Feb 13	9	Cellular Respiration	7
Feb 15	10	Cellular Respiration II	7
Feb 20		**Exam II** (Lectures 6-10)	
Feb 22	11	Photosynthesis	8
Feb 27	12	Cell Communication	9
Mar 1	13	Cytoskeleton	10
Mar 6-10		*Spring Break*	
Mar 13	14	Cell Junctions and the Extracellular Matrix	10
Mar 15	15	Cell Division I	11
Mar 20		**Exam III** (Lectures 11-15)	
Mar 22	16	Cell Division II	11
Mar 27	17	DNA Replication	12
Mar 29	18	DNA Manipulation and Genomes	12/13
Apr 3	19	Genomes and Mutations	13/14
Apr 5	20	DNA Mutations and Genetic Variation	14/15
Apr 10		**Exam IV** (Lectures 16-20)	
Apr 12	21	Genetics I: Mendelian Inheritance	16
Apr 17	22	Genetics II: Dominance, Epistasis and Sex Chromos.	16
Apr 19	23	Genetics III: Linkage and Complex Traits	17/18
Apr 24	24	Regulation of Gene Expression I	19
Apr 26	25	Regulation of Gene Expression II	19
May 4		**Final Exam (2:45 - 4:45 p.m.)** (All lectures)	

The pace of the lectures varies from year to year so the exact day a particular topic is discussed may differ from this schedule. However, the topic order and the exam dates will not change.

*__Purchase and register your license__ with Turning Technologies by noon on January 18, the first day of “clicker” questions.
‡The first post-class **quiz** is due at 4 pm on Monday, January 23.

Other important dates: Monday, January 23 is the last day to drop; Friday, March 24 is the last day to withdraw.