Biology 110: Biological Exploration
Fall 2022

lecture instructors: Dr. Michelle Kanther and Dr. Tamara L. Davis

Course Description

Biology 110 is an introductory-level course designed to encourage students to explore the field of biology at multiple levels of organization: molecular, cellular, organismal and population. Each course will explore these areas of biology through a unifying theme. In Fall 2022, Biology 110 will explore the ways the central dogma of molecular biology relates to the biochemical basis of human disease through the lens of biochemistry, cell biology, genetics, and molecular biology. The laboratory portion of the course will explore the fundamentals of molecular and cellular biology through scientific research, with an emphasis on scientific process and experimental design. Topics include genetically modified organisms, stem cell biology, and molecular biological techniques.

Course learning goals:

- Students will gain foundational knowledge in biology, with an emphasis in the sub-disciplines of cell biology, genetics & molecular biology, by learning basic principles of the field and how these basic principles were derived.
- Students will become familiar with various methodological approaches used to investigate biological questions.
- Students will develop skills required to synthesize information and apply their knowledge to new situations.
- Students will make connections among the different sub-disciplines of biology, as well as to disciplines outside of biology.

Important information for students

- Lectures will be held in Carpenter B21.
  - Section 001 meets MWF from 10:10 am – 11 am.
  - Section 002 meets MWF from 11:10 am – noon.
  - Students are expected to attend lecture in person unless they are ill. Lectures are being recorded in case of extended illness or injury, and students in this situation are encouraged to reach out to obtain access to recordings.
- Instructors:
  - Dr. Michelle Kanther – office: Park Science 210; email: mkanther@brynmawr.edu
    Dr. Kanther's office hours: please schedule appointments here.
  - Dr. Tamara Davis – office: Park Science 222; email: tdavis@brynmawr.edu
    Dr. Davis's office hours: Tuesday 8-9 pm (via Zoom); Wednesdays, 12:30-2 pm, Park 363C.
- The laboratory component for this course is taught by Dr. Michelle Kanther (M,T,W,F afternoons) and Sadie Marlow (T evening) and has its own Moodle page. Students must enroll in and attend **one** laboratory section each week; sections meet at the following times: Monday, 1:10 – 4 pm; Tuesday, 1:40 – 4:30 pm; Tuesday, 7:10 – 10 pm; Wednesday, 1:10 – 4 pm; Friday, 1:10 – 4 pm.
- Homework assignments, supplemental readings, etc. are ONLY found on the course Moodle site; be sure to check Moodle regularly!

Biology 110: Biological Exploration
Course Requirements & Policies

COURSE DESCRIPTION: The educational goal for Biology 110 is to explore the field of biology at multiple levels of organization: molecular, cellular, organismal and population. In-class instruction is accomplished via lectures, case studies, discussion, and laboratory sessions, and class time may be spent engaged in student research projects, group activities, problem solving or discussion. In addition, students are expected to take considerable responsibility for their own learning. To guide you in your studies, the Bio110 Moodle site contains links to a variety of resources, including supplemental readings, on-line learning modules and animations.

Bio110 differs from your high school classes in that you will take considerable responsibility for your own learning. Regular attendance is expected, and excessive absences will result in grade penalties. ***It is very important for students to take personal responsibility to keep up with the work.*** If you fall behind, it becomes increasingly difficult to catch up. If you have questions about material covered in class, ask questions IN CLASS; other students will be grateful. If you remain confused, or want more information, come to office hours or set up an appointment with your instructors. We can't help you if you don't reach out to us. Study actively with classmates--if you can explain a concept to someone else, then you most likely understand it. If you only study passively, alone, you might think that you fully grasp a concept when you do not.

You are encouraged to focus on material that is discussed on class, NOT the substantial additional information contained in the very dense textbook (see textbook information below). Short on-line homework quizzes will allow students to test their understanding of core concepts in biology and extensions of these concepts; the homework quizzes may be taken twice to encourage review and further learning (see homework information below).

ATTENDANCE: Attendance at every lecture is essential to your success in this course, and regular attendance is expected. Excessive absences will result in grade penalties, as students are required to participate during class activities and discussion. If you miss a lecture for any reason, it is your responsibility to acquire the notes from one (or two) of your classmates.

TEXTBOOK, ON-LINE RESOURCES AND SUPPLEMENTAL READINGS: Textbooks are a resource for learning. We strongly recommend obtaining an Introductory Biology textbook that will complement the lectures and provide an alternate way for you to approach and learn the course content. Textbooks also provide additional resources, such as end-of-chapter practice problems. Be aware that not all of the lecture material is covered in the textbook – you should focus your study on material that is discussed in class. Your textbook cannot replace class attendance.

There are several high-quality Introductory Biology textbooks available. The recommended course textbook is *Campbell's Biology*, which is published by Pearson. It is not essential to buy the current (12th) edition of this textbook – the 11th edition, which can be purchased (or rented) for significantly less money, will serve you equally well. In addition, four copies of the 11th edition of *Campbell's Biology* are on reserve at Collier library.

In addition to using a textbook as a learning resource, there are also a variety of different on-line resources posted on the Moodle site, including links to on-line learning modules that provide animations, practice problems, etc. You will be held responsible for **ALL** material covered in lecture and laboratory sessions. You are strongly encouraged to use your all of the available resources to gain additional perspective on the course material, to practice problem solving, and to learn more about a topic that interests you.

EVALUATION & GRADING: Your grade for this course will be based on your performance on exams, homework, a writing assignment focused on scientific communication, participation, and laboratory activities. All work submitted for a grade must be your own.

There are 1000 points possible in this course, and points will be distributed in the following way:
-two exams during the semester (exam I, 100 points; exam II, 120 points); see more details below
-one self-scheduled final exam (180 points)
-on-line homework quizzes (150 points total; lowest score will be dropped)
-scientific communication writing assignment, 2 pages, double-spaced (100 points); see more details below
-active engagement and participation (50 points)
-laboratory component (300 points)

The distribution of final grades for the class, on a 4.0 scale, are calculated after all requirements are submitted and graded. Therefore, it is not possible to provide an interim "grade" during the semester. Typically, grades are distributed as follows:

- 92 - 100% = 4.0
- 88 - 91% = 3.7
- 84 - 87% = 3.3
- 80 - 83% = 3.0
- 75 - 79% = 2.7
- 71 - 74% = 2.3
- 66 - 70% = 2.0

If you have any questions about the way the course or an individual assignment is graded, or if you have concerns about your overall progress in the course, please speak to the relevant instructor. Please note that the laboratory component of this course is complementary to, but independent of the lecture, and that the laboratory grade is determined solely by the laboratory instructor.

EXAMS: There will be three closed-book exams given in this course. Two exams will be given during the semester; students will be able to pick up and return these exams at Collier Library at any point when the library is open during the designated five-day period of time. Once the exam is picked up, students will have 90 minutes to complete their checked-out exam and return it to the Collier circulation desk. These exams will be available on the designated Friday afternoon and must be completed by 10 am the following Wednesday. There will also be a cumulative, self-scheduled 3-hour final exam at the end of the semester.

MAKE-UP EXAMINATIONS: There will be no make-up examinations in this course; exams will be available over a five-day period of time, and students should plan their schedules accordingly. Extensions will not be given because a student has work due in other courses. In the case of unforeseen circumstances or a genuine emergency that is out of your control, please contact the appropriate instructor as soon as possible.

EXAMINATION REVIEW POLICY: When each exam is returned to you, please take time to examine it immediately and read the comments provided by your instructor. If you have any questions about how your answers were graded, consult the posted answer key. If you still have questions, you will have ONE WEEK from the time the examination is returned to request adjustments. After that week, the score is considered final. Please keep in mind that if you request a review of your exam, the entire exam will be re-graded.

HOMEWORK QUIZZES: Eleven open note, open book homework assignments will be given throughout the semester; these assignments will be set up as multiple-choice quizzes available on the course Moodle site. The purpose of these assignments is to reinforce concepts communicated in class and to assess your level of comprehension. Students will have the opportunity to take each quiz twice to ensure understanding of the material. The homework quizzes will be available at 5 pm on Fridays and must be completed by the following Wednesday at 8 am (see the lecture syllabus for specific dates). ***You are responsible for completing the homework assignments during the available period***. If you have any problems with Moodle while attempting to complete an assignment, it is your responsibility to contact the instructor via e-mail immediately; this way, your problem will be time-stamped, and the instructor can take appropriate action to remedy the problem.

SCIENTIFIC COMMUNICATION WRITING ASSIGNMENT: Each student will complete a writing assignment in the format of a news article that communicates information about a biological topic of interest; students are encouraged to choose a topic based on their personal interest. Additional information about this 2-page assignment is posted on the course Moodle site. For information about how cite reference sources in biology, please see the material posted on the course Moodle site, directly below the link to the writing assignment document. Please keep in mind that the written work you submit must be your own: plagiarism is a violation of the Honor Code.

HONOR CODE: All students in Bryn Mawr classes are bound by the Bryn Mawr College Honor Code. If you witness a violation by another student, you are expected to confront that person politely but promptly.

RESPECT OF DIVERSITY: It is our intent that students from all backgrounds and perspectives be well served by this course and that students' learning needs be addressed both in and outside of class. The diversity that students bring to class will be viewed as a resource, strength, and benefit. Please feel free to let us know ways that we can improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with religious events, please let us know so accommodations can be made.

POLICY ON ELECTRONIC DEVICES: Students can use electronic devices during class for taking notes but are **not** permitted to use them during class or while taking exams for texting, checking or writing e-mail, social networking, surfing the web, or ANY non-class related activity. Engaging in non-class related activities of this sort during class time is distracting both to yourself and others and is disrespectful. The only acceptable exception to this policy is if there are extenuating circumstances, such as a current family emergency; if this is the case, please notify the instructor that you are expecting an emergency call or text prior to the beginning of the class period. Use of electronic devices while taking exams is strictly prohibited.

STUDENTS WITH LEARNING DIFFERENCES: Students who are eligible for academic accommodations because of the impact of a learning, physical or psychological disability should speak with the Coordinator of Access Services to verify their eligibility for reasonable academic accommodations. Students can contact Access Services at 610-526-7351 or in Guild Hall, room 103. Requests for accommodations for examinations or for other course work must be made at least one week in advance so that appropriate arrangements can be made.

EMAIL POLICY: Email is a very convenient way to correspond with your instructor(s). Both Dr. Kanther and Dr. Davis do their best to respond to emails in a timely manner, though you should allow 24 hours for responses on weekdays. Please be aware that emails sent to the instructors after 5 pm M-F or over the weekend may not be received until the following weekday.

OFFICE HOURS: Office hours provide an opportunity for you to ask questions you have concerning the lecture component of the course. We look forward to getting to know you better, and office hours provide a great opportunity for doing so, so we encourage you to take advantage of the opportunity to speak with us. Keep in mind that questions related to the lab should be directed specifically to Dr. Kanther.

- Dr. Kanther's office hours are made by appointment using this Calendly link; she uses this by-appointment system to more easily connect with students at times that work best for them while also allowing students the opportunity of uninterrupted one-on-one time that is not always possible with traditional open door office hours.
- Scheduled office hours for Dr. Davis are posted on the course Moodle site.

If none of the available office hours are at times that work for you, please reach out to the relevant instructor via email (mkanther@brynmawr.edu or tdavis@brynmawr.edu), listing at least 3 days & time blocks when are available. If you are open to sharing your appointment timeslot with fellow students, we encourage you to do so.

We are here to help you, so please do not hesitate to talk to us about any concerns or questions you have!

TAs and TA OFFICE HOURS: We are fortunate to have two Biology majors working as Bio110 lecture TAs this semester: Yeipyeng Kwa (ykwa@brynmawr.edu) and Emma Unglaub (eunglaub@brynmawr.edu). Yeipyeng and Emma will hold weekly office hour sessions that you are encouraged to attend.

BIOLOGY MENTORING PROGRAM: The Biology Department has a mentoring program that offers students the opportunity to be mentored by students majoring in Biology or Biochemistry/Molecular Biology. The goal of the mentoring program is to connect students entering the biology curriculum with older students in order to build a more diverse, inclusive and supportive community. Mentors can offer you advice, guidance and support related to class schedule, STEM education, navigating Bryn Mawr and more from a student perspective. More information about the mentoring program can be found at: https://www.brynmawr.edu/inside/academic-information/departments-programs/biology/biology-mentorship-program-frequently-asked-questions. The co-coordinators for the Biology/BCMB mentoring program are Siena Martin (smartin3@brynmawr.edu) and Anne Meyer (ameyer@brynmawr.edu).

Biology 110: Biological Exploration
Lecture Schedule

unless otherwise noted, all readings are from *Campbell Biology*, 11th edition

date	topic	readings to be completed BEFORE CLASS	homework
Week 1 Aug 29 – Sept 2 (Kanther)	Course introduction Scientific inquiry Chemistry of life	Chapter 1.3 & 1.4: Scientific Inquiry Chapters 3 & 4: Water & Life	**Quiz #1**
Week 2 Sept 5-9 (Kanther)	Chemistry of life, continued Macromolecules	Chapters 4: Carbon and the Molecular Diversity of Life Chapter 5: The Structure & Function of Large Biological Molecules	**Quiz #2**
Week 3 Sept 12-16 (Kanther)	Cells and organelles Cell cycle and signaling Cell membranes and metabolism	Chapter 6: A Tour of the Cell Chapter 12: The Cell Cycle Chapter 11: Cell Communication Chapter 7: Membrane Structure & Function Chapter 8: An Introduction to Metabolism	**Quiz #3**
Week 4 Sept 19-23 (Kanther)	Cell respiration & fermentation	Chapter 9: Cellular Respiration and Fermentation	**Quiz #4**
Week 5 Sept 26-30 (Kanther & Davis)	**Review session Mon, Sept 26** Mendelian genetics & concepts of dominance Pedigrees, transmission patterns and probabilities	Chapter 14: Mendel & the Gene Idea pp. 269-274, 276-280, 284-287 Chapter 15: The Chromosomal Basis of Inheritance pp. 296-300	**Exam I – available Friday, September 30th; due Wednesday, October 5th** (covers material from 8/29-9/26)
Week 6 Oct 3-7 (Davis)	Pedigrees, transmission patterns and probabilities, continued Cancer genetics **no in-person class Wednesday, Oct 5; watch the recorded lecture before Friday!** Case study, part 1: cancer genetics	Chapter 14: Mendel & the Gene Idea pp. 269-274, 276-280, 284-287 Chapter 15: The Chromosomal Basis of Inheritance pp. 296-300 Chapter 12: The cell cycle pp. 244-249 Chapter 18: Regulation of Gene Expression pp. 386-392	**Quiz #5**
Oct 10-14	**-------- FALL BREAK --------**		

Week 7 Oct 17-21 (Davis)	Meiosis Independent assortment & linkage Extensions to Mendelian Genetics: epistasis	Chapter 13: Meiosis & Sexual Life Cycles Chapter 14: Mendel & the Gene Idea pp. 274-278, 280-283 Chapter 15: The Chromosomal Basis of Inheritance pp. 301-306	**Scientific communication assignment draft due 11:59 pm, Sunday, October 23rd** **Quiz #6**
Week 8 Oct 24-28 (Davis)	Extensions to Mendelian genetics: polygenic traits Population genetics	Chapter 14: Mendel & the Gene Idea pp. 280-283 Chapter 23: The Evolution of Populations pp. 487-495	**Quiz #7**
Week 9 Oct 31 – Nov 4 (Davis)	DNA is the genetic material Discussion: eugenics	Chapter 16: The Molecular Basis of Inheritance pp. 314-317 Chapter 17: Gene Expression, From Gene to Protein pp. 335-338	**Quiz #8 (due Friday!)** **Exam II – available Friday, Nov 4th; due Wednesday, Nov 9th** (covers material from 9/28-11/2)
Week 10 Nov 7-11 (Davis)	DNA structure DNA replication Transcription	Chapter 16: The Molecular Basis of Inheritance pp. 317-327 Chapter 17: Gene Expression, From Gene to Protein pp. 338-347	**Scientific communication assignment reviews due 11:59 pm, Sunday, November 13th** **Quiz #9**
Week 11 Nov 14-18 (Davis)	Translation Protein folding Mutations	Chapter 17: Gene Expression, From Gene to Protein pp. 347-356	**Quiz #10**
Week 12 Nov 21-25 (Davis)	Case study, part 2: mutations and cancer **THANKSGIVING** (no class Friday, Nov 25th)		
Week 13 Nov 28 – Dec 2 (Davis)	Gene regulation	Chapter 18: Regulation of Gene Expression pp. 363-375, 377-382	**Scientific communication assignment final paper due 11:59 pm, Sunday, December 4th** **Quiz #11**
Week 14 Dec 5-7 (Davis)	Discussion: Bioethics		
finals week	**Self-Scheduled Final Exam - cumulative**		