BIOLOGY 200: Concepts in Biology

Spring 2023

Course Description

This course will introduce students to the study of biology at the beginning of their course of study. Central ideas in the biological sciences will be highlighted, with an **emphasis on the process of scientific discovery and investigation**. The course will provide the basis for more advanced coursework and learning experiences in biological sciences as students delve into the curriculum of study. This is a required course for all Biology majors.

Instructors

Course Instructor:
Dr. Maria Stanko
(she/her)
CKB 340E
mstanko@njit.edu

Office Hours: Mon 2:30pm-4:00pm & Wed 1:00pm-2:30pm OR please email me for an appointment. I am happy to meet with you in person in my office or online via WebEx.

Course Website:
http://canvas.njit.edu/

Recitation Instructor: **Katie Gallman** *(she/her)*
kathryn.e.gallman@njit.edu

To meet with your recitation instructor, please email her to schedule an appointment.

Class Meetings

Class meets twice weekly for lecture and once weekly for recitation. This course is offered in the Face-to-Face Instructional Delivery Mode.

Lecture: Monday & Wednesday 11:30am - 12:50pm
Central King Building (CKB) G-08

Recitation: Section 002: Thursday 8:30am-9:50am CKB 341
Section 004: Thursday 10:00am-11:20am CKB 114

Course Policies:

- All course materials (including recordings of lectures) are for students' own use only (no sharing or posting anywhere).
- Homework assignments, learning journals, and projects may be submitted late, but 10% of the points available for each 24 hours after the assignment was due will be deducted from late submissions. The maximum deduction is -50%.
- Review quizzes and exams cannot be completed late without documentation of an excusable absence from the Office of the Dean of Students:
- Each student is expected to do his/her/their own submitted work **independently**. (See Academic Dishonesty statement on p. 2.)
- Lectures may sometimes be recorded and shared with the class via Canvas. These recordings will not be used beyond this semester.
- Compliance with current NJIT Covid-19 policies and other safety policies is required.
- All class communication will be to your NJIT email address – check your email regularly!

Recitation Policies: Recitation is an essential part of the course, in which you will meet in smaller groups to discuss class concepts and work together to solve biological problems. Recitation materials (available on Canvas) must be printed or downloaded to a laptop or tablet. A phone is not an acceptable format for viewing recitation materials. Your recitation instructor may have additional policies.

Discuss making up missed class time or work with your instructors as soon as possible. We provide numerous reminders of course deadlines and expect you to be responsible for meeting them. However, we will make every effort to work with you if you are struggling or falling behind. ***Be sure to communicate with us about your concerns regarding the course, the earlier the better! We are here to help.***

Disability Statement: Please let me know if you are eligible for accommodations for a disability. If you are in need of accommodations due to a disability, please contact the Office of Accessibility Resources & Services (OARS) to discuss your specific needs: https://www.njit.edu/accessibility

Course Materials

1. **Canvas.** You need to ensure that you can access the course website (http://canvas.njit.edu) ASAP! Log-in with your UCID.
2. **Textbook**. We will use the FREE online textbook OpenStax Biology 2e: https://openstax.org/details/books/biology-2e supplemented with additional readings. All readings will be provided via links on the course website, but you may find it useful to download (free) the OpenStax Biology2e text.
3. **iClicker REEF app or remote**. In order to gauge your understanding of topics we discuss in lecture, I will regularly poll the class using iClicker: http://iclicker2.wpengine.com/students/apps-and-remotes/apps
4. **Writing Materials.** You should bring materials to take notes to every class meeting. Handwriting notes is recommended.

Evaluation

Assessment of Learning – Components

1. **Learning Journal –** At the end of each week, you will have an assigned prompt on Canvas asking you to reflect on your own learning and progress in the course. Only instructors can see your entries. Students earn 2 points for each complete, thoughtful response to a learning journal, and can earn up to a total of 22 points for this grade component. The three lowest journal scores are dropped.
2. **Participation -** Lecture participation (2/3 of participation score) will be assessed using iClicker questions. Each lecture will include at least a couple of clicker questions. You must answer (correct or not) at least 80% of the questions to receive full credit for this component; lower response rates are scaled accordingly. Recitation participation (1/3 of participation score) will be earned by active participation during recitations. Students who fully participate and contribute to recitation discussions in at least 10 recitations will receive full credit for recitation participation.
3. **Quizzes -** During the course, there will be 4 quizzes to assess your understanding of concepts that we have covered in class and your ability to apply that knowledge. These are intended to provide practice as part of your preparation for exams and to give you an opportunity to mark your progress.
4. **Homework -** There will be several homework assignments throughout the course that will require slightly more in depth work on a topic and application of knowledge. Homework assignments will be discussed during Recitation and completed assignments will be submitted on Canvas.
5. **Projects –** Science often requires pulling together information from multiple sources to arrive at an end result. The course will include two projects that consist of several components that build towards a final goal.
6. **Exams –** There will be two exams that cover the application and understanding of the material covered in the course. These exams will also require you to apply the skills that we have emphasized. See course schedule for exam dates.

Course Grade

Your grade for this course will be based on the components described on the left. You can choose how your grade is calculated by determining the weight of each grade component as a percentage of your total semester grade, within the given ranges. Your final grade will be the highest of two possible grades: the grade that results from your selected weight (Your %) or the one resulting from the standard weight (Standard %). You will choose your % selection halfway through the semester following the first exam. This process should help you assess your strengths in the course and determine a course of action for the remainder of the semester.

Grade Component	% Range	Standard %	Your %
Learning journal	2-12%	7%	
Participation	5-12%	10%	
Quizzes	2-12%	7%	
Homework	10-18%	17%	
Projects	22-32%	26%	
Exams	28-38%	33%	

Grades will be determined by the higher of the final percentage of the possible points earned (as described above, rounded to a whole number), following the standard grade scale.

A	90% +
B+	85-89%
B	80-84%
C+	75-79%
C	70-74%*
D	60-69%
F	< 60%

Grades are not curved, and there is no individual extra credit.
*You must earn a C or better in order to progress within the Biology major.

Academic Dishonesty: Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

Course Learning Outcomes

A. Biological Principles

Students will be able to….

1. Identify mechanisms of evolutionary change and explain how they lead to genetic change in populations through time.
2. Describe the structural characteristics of nucleotides (DNA/RNA) and explain how they are related to the functions of these molecules.
3. Identify the basic steps involved in gene expression and describe ways that gene expression can be regulated so that different cells produce different proteins.
4. Be able to transcribe information from DNA to RNA and to translate mRNA into amino acid sequences.
5. Interpret information depicted on a phylogenetic tree.
6. Outline the stages of cell division (mitosis and meiosis), explain what occurs during each stage, and describe how the nuclear DNA of daughter cells compares to that of the original cell.
7. Be able to utilize a Punnett square to predict the potential genotype/phenotype of offspring.
8. Define and give some examples of interspecific interactions and describe how different types of interactions affect the population sizes of the species involved.
9. Identify the different trophic levels in a community and explain how energy moves through them.
10. Explain traits related to an organism's life history and what influences the evolution of different life history strategies.

B. Learning, Reasoning, and Problem-Solving Skills

Students will be able to…

1. Monitor and adapt their personal learning strategies throughout the semester.
2. Develop a plan for their continued learning beyond this course.
3. Propose hypotheses to explain observed phenomena.
4. Design a basic experiment to test a hypothesis, taking into account the ethical and methodological considerations for proper experimental design.
5. Identify and describe patterns in data and interpret statistical analysis of others' results.
6. Communicate scientific information effectively in written and graphical form.
7. Attribute primary sources for scientific writing using proper citation format.
8. Synthesize concepts from multiple biological scales.
9. Apply knowledge to solve problems in biology.
10. Cooperate with their peers to solve problems as part of a team.

Individual class sessions will have more specific content outcomes, based on what is being discussed that week and how it relates to the larger goals of the course. Look for those in the lecture slides for each topic.

Succeeding in Concepts in Biology

Learning is an active process, and it requires actively thinking, discussing and writing. Being successful at this process necessitates you understanding how you best learn biology. That requires thinking about more than just what you are learning, but how you are learning it. This is referred to as metacognition. Practicing this process will make you more efficient learners and better able to learn and integrate new material. We want you to do well in this course. In fact, we want to help you develop skills in this course that will help you do well in every course you take from this point forward. So, don't treat these things as a chore you just have to do for this course. These are all suggestions that can be helpful in any class that you take.

1. **Be Present.** It's important to "show up" to class. Limit your distractions, be prepared to take notes, and be active in your participation with the class. Engagement in class activities means that you will learn more and struggle less when you work on your own later.
2. **Be Proactive.** This applies to a number of contexts. For example, cramming for an exam is something that many students do, and sometimes it even feels vaguely successful –especially when memorization of something for short-term recall is the goal. Memorization of facts is not the point of this course though, so that strategy is even less likely to work here. Being proactive also means that you need to think about how you are doing and make an effort to improve. In other words, don't wait until you see your final grade posted online to care about how you are doing in the course.
3. **Talk.** Talking through an idea can help with your understanding. Discussion will be a big part of this course, so we will encourage your active discussion during lecture and recitation. But, talking things through shouldn't end when you walk out of class. Form study groups, meet virtually, and talk about the class.
4. **Use the Learning Outcomes.** I have provided the overall goals for you just above this section and will include more specific ones throughout the semester. These are posted for your benefit to help guide your studying and illustrate key ideas and skills you should work to master.
5. **Test Yourself.** Take some time to think about the material that has been covered in class. Potentially, ask yourself (or your classmates) questions like:
    - What were the main topics from this class session? (Objectives? Questions?)
    - What do I need to know in order to understand that concept, question or problem?
    - Can I break the topic into smaller parts? What parts can I explain in a manner that makes sense to me?
    - What parts are unclear or don't make sense yet?
    - How does today's class session relate to the larger goals of the course?

    Clues to the answers to several of these questions will be found in the specific learning outcomes emphasized for each class/topic.

Course Schedule

Schedule: Dates listed by week. Course "weeks" begin on Tuesday and end on Monday. Lectures meet twice every week and recitations meet every week, unless otherwise noted. Please note that this is the proposed schedule and is subject to change. A more detailed schedule will be continually updated via the course Canvas site.

Week of	Week #	Lecture Topic	Recitation	Assignments/Notes
1/16	1	M - No Lecture W- Intro: Syllabus, Class Goals	Intro: Succeeding in College	NO LECTURE on Mon 1/16 Pre-Quiz in Recitation
1/23	2	M- What is Biology? W - Experimentation/Graphing	Graph Interpretation	HW 1 – Intro
1/30	3	M- Evolution / Natural Selection W- Adaptation / Fitness	Selection - Finches	HW 2 – Interpreting Graphs
2/6	4	M - Viruses and Vaccines W- **QUIZ 1** / DNA/RNA	Disease Spread	HW 3 – Finches
2/13	5	M -Transcription / RNA Processing W - Translation	Codon Bingo	HW 4 – Disease Spread
2/20	6	M - Regulation of Gene Expression W – Epigenetics	Project 1 Epigenetics	Project 1, Part 1
2/27	7	M – **QUIZ 2** / Mutation W - Phylogenetic Trees	Project 1 SARS	Project 1, Part 2 HW 5- Epigenetics
3/6	8	M - COVID-19 W - **EXAM 1**	Project 1 Gradesheet Exploration	Project 1, Part 3
3/13		SPRING BREAK	SPRING BREAK	
3/20	9	M - Scientific Writing and Citation W – DFTD	DFTD	HW 6 - Mid-semester Assessment
3/27	10	M - Cell Cycle / DNA Replication W – Mitosis	Primer Design	HW 7 – DFTD Project 1, Part 4
4/3	11	M - Cancer W - Meiosis / Mendelian Inheritance	Project 2 Genes and Cancer	Project 2, Part 1
4/10	12	M - Inheritance W – **QUIZ 3** / Population Genetics	Project 2 Pedigrees	HW 8 – Cancer Project 2, Part 2
4/17	13	M - Life History Strategies W - Interactions / Competition	Project 2 Devil Life History	Project 2, Part 3 HW 9 – Pedigrees
4/24	14	M - Predation W – **QUIZ 4** / Food Webs	Tasmanian Food Web	HW 10 – Devil Life History
5/1	15	M - Future for Tasmanian Devils W – No Lecture (classes end 5/2)	NO RECITATION – Classes end 5/2	Project 2, Part 4 NO LECTURE on Wed 5/2
5/5-11		**EXAM 2** and Post-Quiz - During Final Exam Period*		Final Exam Schedule will be posted: www.njit.edu/registrar/exams/

*Do not schedule travel during the final exam period until after the NJIT final exam schedule has been announced.

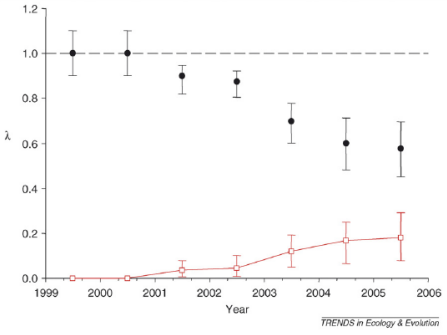

Figure 1 (left) – **DFTD**. Effect of DFTD on the growth rate of the devil population on the Freycinet Peninsula, Tasmania (black) and the prevalence of DFTD in the total devil population over the same time period (red). From: McCallum. 2008. Trends in Ecology and Evolution 23: 631-637.

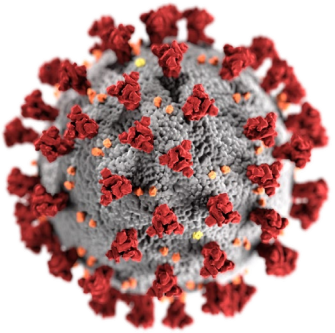

Figure 2 (right) – SARS-CoV-2 virion. Illustration of the virus identified as the cause of an outbreak of the respiratory disease COVID-19.. CDC Public Health Image Library (PHIL).