

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. Michael Nelson

(he/him)

CKB 339A

michael.nelson@njit.edu

Office Hours: 2:00PM – 3:30PM CKB339A

Course Website:

<http://canvas.njit.edu/>

Recitation Instructors:

Cat Eno

(she/her)

cte5@njit.edu

Sections 001 and 007

Grant Bowers

(he/him)

gb364@njit.edu

Section 003 and 009

Danni Sanchez Hernandez

(she/her)

ds286@njit.edu

Sections 005 and 011

To meet with your recitation instructor, please email 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: Tuesday and Thursday 10:00am – 11:20am CKB 303

Recitation: Section 001: Thursday 11:30am – 12:50pm FMH 411

Section 003: Friday 10:00am – 11:20am GITC 2315A

Section 005: Thursday 2:30pm – 3:50pm CKB 212

Section 007: Friday 8:30am – 9:50am CKB 220

Section 009: Friday 2:30pm – 3:50pm CKB 220

Section 011: Thursday 1:00pm – 2:20pm CKB 214

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 20% of the points available for each 24 hours after the assignment was due will be deducted from late submissions. Late submissions not accepted after 5 days.
- If you miss an exam or an assignment deadline due to an excusable absence, contact Dr. Nelson as soon as possible and submit documentation of your absence via the [Student Absence Verification Request](#) at the Office of the Dean of Students. If your absence is related to university sports, please submit the relevant documentation to Dr. Nelson. Missed quizzes cannot be completed late, but the lowest quiz score is dropped.
- 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 health and safety policies is required.
- All class communication will be to your official 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.***

- 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 and within the SimUText homework platform.
- 3. **Poll Everywhere app.** In order to gauge your understanding of topics we discuss in lecture, I will regularly poll the class using Poll Everywhere. Download the app to your phone or computer: <https://www.polleverywhere.com/mobile>
- 4. **SimUText Homework Platform.** Homework assignments and required reading preparation will be completed via the online SimUText system. Instructions for registering are on Canvas.
- 5. **Writing Materials.** You should bring materials to take notes to every class meeting. Handwriting notes is recommended.

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 (1/2 of participation score) will be assessed using PollEverywhere questions. Each lecture will include at least a couple of PollEverywhere 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 (1/2 of participation score) will be earned by active participation during recitations. Students who arrive on time and fully participate and contribute to recitation discussions in at least 10 recitations will receive full credit for recitation participation.
- 3. **Preparation** - Preparation for class includes reading and watching required materials BEFORE class. Preparing in advance of class will allow us to go more in depth on key topics and include more concept application practice in lectures and recitations. Assessment of preparation will be primarily through feedback and graded questions on the textbook readings, administered through SimUText. These assignments will be due before the relevant lecture and cannot be completed late. Score on Preparation assignments will be scaled to 10 points. Students who earn 80% of possible Preparation assignment points receive full credit for this component; lower performances are scaled accordingly.
- 4. **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. You will also take a Pre-Quiz and Post-Quiz, used to assess scientific literacy before and after the course. Only the Post-Quiz is scored. The lowest score of the five scored quizzes is dropped.
- 5. **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 completed on SimUText and must be completed within one week of the due date.
- 6. **Projects** – Science often requires applying skills and 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.
- 7. **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. Exams are a mix of approximately half multiple choice and half short-answer style questions. 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. Note, the Canvas gradebook shows only your Standard %. All grade calculations will be made available upon request.

Grade Component	% Range	Standard %	Your %
Learning journal	2-10%	6.3%	
Participation	2-10%	5.7%	
Preparation	1-6%	2.8%	
Quizzes	8-15%	11.4%	
Homework	18-26%	22.7%	
Projects	18-26%	22.7%	
Exams	25-33%	28.4%	

Grades are 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 determined from work submitted for the components described on this syllabus and completed during the semester. Grades are not curved. There is no opportunity for individual extra work, though a few opportunities for extra credit will be made available to all students. *You must earn a C or better in order to progress within the Biology major.

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. 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.

Accessibility 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>

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.

Generative AI: This course expects students to work without artificial intelligence (AI) assistance. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

<p>Your classroom as well as your college experience is meant to be a place where the free flow of ideas is encouraged and nurtured. It is not acceptable for any community member to make hurtful and demeaning remarks, or otherwise disrupt your learning experiences or your safety.</p> <p>As such, there are many NJIT support systems and policies of which you should be aware.</p>		
<p>Basic Needs</p> <p>Students who face challenges securing their food or a safe and stable place to stay are urged to contact the Dean of Students (dos@njit.edu). If you are comfortable doing so, you may notify me as well.</p> <p>Food Insecurity: If you are experiencing food insecurity, there is a food pantry on campus for your convenience (You must bring your UCID). Campus Center, Room 478 (foodpantry@njit.edu)</p>	<p>Emergency Support</p> <p><u>Crises Happen:</u> If you experience a life emergency and are unsure which support services to turn to, NJIT Public Safety can connect you to emergency support systems - call 973.596.3111.</p> <p>For medical, psychological, or psychiatric emergencies, you can also call: University Hospital Crisis 973.623.2323</p> <p>If you want to report a concern about another student's well-being you can also reach out to the NJIT CARE Team (https://www.njit.edu/care/) or the Dean of Students Office.</p>	<p>Mental Health and Stress Management</p> <p>Center for Counseling and Psychological Services (C-CAPS) is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. https://www.njit.edu/counseling/gethelp</p> <p>Diminished mental health, including significant stress, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with optimal academic performance. The source of symptoms might be related to your course work; if so, please speak with me. However, problems with relationships, family worries, loss, or a personal struggle or crisis can also contribute to decreased academic performance. Please seek out help as needed.</p> <p>Campbell Hall, Room 205 (Main Level) 973.596.3414</p>
<p>Student Parents</p> <p>If circumstances arise that necessitate your absence from class - such as the illness of a child, closing of day care for inclement weather, etc. - please contact me as soon as possible so we may make arrangements to keep you up-to-date with course material and activities. If you should need any other kind of assistance for circumstances relating to your status as a student and parent, please consider contacting the Dean of Students and Campus Life at 973.596.3466 for a referral to appropriate services including on and off campus support.</p>	<p>Consensual, Healthy Personal & Professional Relationships</p> <p>Your body is your own and NJIT strives to protect its community members from any unwanted advances. Title IX prohibits discrimination based on sex, including harassment, domestic and dating violence, sexual assault, and stalking. Sexual violence undermines students' academic success. Anyone dealing with sexual misconduct should consider talking to someone about their experience, so he/she/they can get the support needed.</p> <p>Confidential Resource: <u>Center for Counseling and Psychological Services (C- CAPS)</u> Campbell Hall, Room 205 (Main Level) 973.596.3414</p> <p>Non-Confidential Resources:</p> <ul style="list-style-type: none"> • <u>NJIT Public Safety</u> 973.596.3111 • <u>Dean of Students Office</u>, 255 Campus Center 973.596.3466 	<p>Religious/Cultural Observance</p> <p>Students who have religious or cultural observances that coincide with this class should let me know by email within the first two weeks of class. I strongly encourage you to honor your cultural and religious holidays! However, if I do not hear from you within the first two weeks, I will assume that you plan to attend all class meetings. If you miss an exam or an assignment deadline due religious observance, you should also submit documentation of any religious observance-related absence via the Student Absence Verification Request at the Office of the Dean of Students.</p> <p>Supporting Academic Integrity</p> <p>Our community functions best when its members treat one another with honesty, fairness, respect, and trust. The college promotes the assumption of personal responsibility and integrity, and prohibits all forms of academic dishonesty and misconduct.</p> <p>Issues of Concern (Non-Emergency)</p> <p>Alert the Dean of Students Office (dos@njit.edu) about issues of concern, including academic and non-academic violations (https://www5.njit.edu/dos/reporting/).</p>

Course Schedule

Schedule: Dates listed by week. Course “weeks” begin on Monday and end on Sunday. 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 Monday	Week #	Lecture Topic	Recitation	Assignments/Notes
9/1	1	Tu – 1: Intro: Syllabus, Class Goals Th – 2: Diversity of Life	Succeeding in Concepts and College	
9/8	2	Tu – 3: Experimentation / Graphing Th – 4: Natural Selection	Diversity of Life	Academic Engagement Assignment HW0 – Course Introduction
9/15	3	Tu – 5: Mechanisms of Evolution Th – 6: Viruses and Vaccines	Interpreting Graphs	
9/22	4	Tu – 7: Quiz 1 / DNA/RNA Structure Th – 8: DNA Replication	Disease Spread Models	HW 1 – Darwinian Snails
9/29	5	Tu – 9: Transcription / RNA Processing Th – No class (wellness day)	No Recitations	HW 2 – How Diseases Spread
10/6	6	Tu – 10: Translation Th – 11: Regulation of Gene Expression	Project 1: Graphing Variants and Codon Bingo	HW 3 – DNA Explored Project 1, Part 1
10/13	7	Tu – 12: Quiz 2 / Mutation Th – 13: Phylogenetic Trees	Project 1: Decoding New Variants	HW 4 – Transcription and Translation Explored Project 1, Part 2
10/20	8	Tu – 14: COVID-19 Th – 15: Scientific Writing and Citation	Project 1: Writing	HW 5 – Gene Regulation Explored
10/27	9	Tu – Exam 1 Th – 16: DFTD	DFTD – Part 1	Project 1, Part 3
11/3	10	Tu – 17: Cell Cycle / Mitosis Th – 18: Cancer	DFTD – Part 2	Project 1, Part 4
11/10	11	Tu – 19: Epigenetics Th – 20: Meiosis / Mendelian Inheritance	Genes and Cancer	HW 6 – Mitosis Explored Project 2, Part 1
11/17	12	Tu – 21: Inheritance Th – 22: Quiz 3 / Population Genetics	Pedigrees	HW 7 – Meiosis Explored Project 2, Part 2
11/24	13	Tu – 23: Life History Strategies Th - No class	No class	HW 8 – Mendelian Pigs *Tues 11/25 follows Thurs schedule
12/1	14	Tu – 24: Interactions / Competition Th – 25: Predation	Tasmanian Food Webs	Project 2, Part 3
12/8	15	Tu – 26: Quiz 4 / Food Webs Th – 27: Future for Tasmanian Devils	No Recitations	Project 2, Part 4
12/15-21		Exam 2 – Exam 2 and PostQuiz - During Final Exam Period*		Final Exam Schedule will be posted at: www.njit.edu/registrar/exams/

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

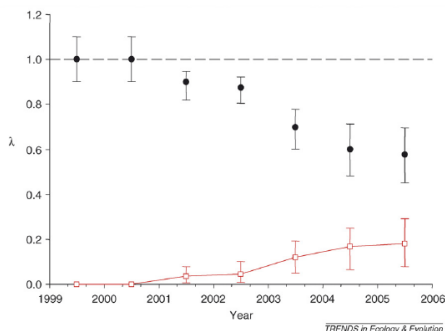


Figure 1 (left) – DFTD. Effect of DFTD on the growth rate of the devil population on the Freycinet Peninsula, Tasmania (black) and the prevalence of DFTD in the total devil population over the same time period (red). From: McCallum. 2008. Trends in Ecology and Evolution 23: 631-637.

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).

