



BIO 181—General Biology (Majors) I

SCOTTSDALE COMMUNITY COLLEGE

and 2 + 2 partnership with

NORTHERN ARIZONA UNIVERSITY

Syllabus and Course Outline

Spring 2024 (January 16–May 10)

Instructor Contact

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Lecture section : 15593

Lecture : On your own time, Online

Laboratory : On your own time, Online

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Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
9:30-10:20 NS 113	10:00-11:00 Online	9:30-10:20 NS 113	10:00-11:00 Online	By App't

Course resources

- All course content will be delivered via the following online platforms:
 - *Website:* <https://edresources.scottsdalecc.edu/nagy/teaching/bio-181>
This is the main place to find the lecture content. All learning modules, which consist of reading assignments, lecture videos and study guides, will be posted here.
 - *Canvas website:* [Sign in via SCC's Student page](#).
Quizzes, exams, laboratory exercises and grades will be posted here. See below for details.
- **Tutor center:** We have an excellent, free tutoring service available online. [Click here for information about how to access the tutor center](#).
- **Text (required):** Freeman, S. et al. 2020. *Biological Science*. 7th ed. Benjamin Cummings, San Francisco.
- **Calculator (required):** Must be a scientific calculator, able to calculate logarithms and exponentials. (TI-80 series allowed, but not required.)
- **Spreadsheet software (required):** Any standard spreadsheet package; e.g., Google Sheets, Excel, Numbers, or Open Office Calc.

Course Description

Lecture: 4 credits, 3 periods; Lab: 0 credits, 3 periods.

The study and principles of structure and function of organisms at the molecular and cellular levels. A detailed exploration of the chemistry of life, the cell, and genetics.

Prerequisites: A grade of “C” or better in RDG091 or higher or eligibility for CRE101 as indicated by appropriate reading placement test score. One year of high school or one semester of college-level biology and chemistry is strongly recommended.

Course attributes: General Education Designation: Natural Sciences (Quantitative) - [SQ]. Arizona Shared Unique Number (SUN#): BIO 1181

Course Objectives

1. Describe and apply scientific methods to solve problems in biological context.
2. Describe the characteristics of life.
3. Identify the basic parts of atoms and describe how they influence chemical characteristics.
4. Analyze the relationships between the structure and functions of the four kinds of organic molecules found in living things.
5. Identify the parts of a cell and describe their structure and functions.
6. Compare and contrast prokaryotic and eukaryotic cells.
7. Describe cellular transport, membrane structure, and membrane functions.
8. Describe the laws of thermodynamics, energy processes, and enzymes as they relate to biology.
9. Explain the purpose and components of cellular respiration.
10. Explain the purpose and components of photosynthesis.
11. Describe the biological processes of mitosis, meiosis, DNA duplication, and protein synthesis.
12. Compare Mendelian and non-Mendelian genetics and use problem solving to predict the outcome of genetic crosses.
13. Describe gene regulation and effectively analyze the various biotechnological applications.
14. Describe the genetic basis of development.
15. Demonstrate knowledge of laboratory safety skills and procedures.
16. Practice principles of scientific method while conducting laboratory activities and experiments.
17. Perform laboratory activities using relevant laboratory equipment, chemical reagents, and supplies to observe biological specimens, to measure variables, and to design and conduct experiments.
18. Operate light microscopes, prepare wet-mount slides, and use stains.

19. Exhibit ability to use pipettes and other volumetric measuring devices, chemical glassware, balances, pH meters or test papers, spectrophotometers, and separation techniques, such as chromatography and/or electrophoresis to perform activities relevant to other course competencies.
20. Develop graphing skills manually and/or by using appropriate computer software.
21. Calculate and make molar and/or percent solutions of varying concentrations.
22. Analyze and report data generated during laboratory activities and experiments.

Assumed Background

It is assumed that students enter this course with exposure to the following elements of the Arizona State Board of Education's High School Science Standards (March 5, 2005 update):

Strand 5: Physical Sciences

- *Concept 1: Structure and properties of matter*
 - PO 2. Describe substances based on their chemical properties.
 - PO 3. Predict properties of elements and compounds using trends of the periodic table (e.g., metals, non-metals, bonding—ionic/covalent).
 - PO 5. Describe the properties of electric charge and the conservation of electric charge.
 - PO 6. Describe the following features and components of the atom: protons, neutrons, electrons, mass, number and types of particles, structure, organization.
 - PO 8. Explain the details of atomic structure (e.g., electron configuration, energy levels, isotopes).
- *Concept 4: Chemical Reactions*
 - PO 3. Represent a chemical reaction using a balanced equation.
 - PO 4. Distinguish among the types of bonds (i.e., ionic, covalent, metallic, hydrogen bonding).
 - PO 5. Describe the mole concept and its relationship to Avogadro's number.
 - PO 6. Solve problems involving such quantities as moles, mass, molecules . . . using the mole concept and Avogadro's number.
 - PO 12. Compare the nature, behavior, concentration and strengths of acids and bases.

College Policies

Students are responsible for the college policies included in the college catalogue and the student handbook. Links are available on Canvas in the introductory module.

Course Delivery, Grading Standards and Practices

1. **Lectures:** Lectures and the laboratory exercises form the heart of the course. Online lectures correspond to a standard lecture in a face-to-face, 16-week class. Therefore, you will be required to complete 2 lectures per week. See the schedule on page 9 of this syllabus.

2. **Optional Lecture Study Guides**

<i>Number of study guides</i>	: 27 (one for each lecture).
<i>Value</i>	: 2 pts extra credit if completed (see below).
<i>Dates</i>	: See course schedule below.
<i>Format</i>	: Free response, online (Canvas).
<i>Material covered</i>	: One lecture only (see schedule).

Lecture study guides are optional. A student who completes all questions on a study guide before the deadline will be awarded 2 extra credit points. A student who does not completely answer all questions before the deadline will be awarded no extra credit for that study guide. Lecture study guides comprise a collection of questions that you should be able to answer from the material in the lecture. They are meant to help you prepare for the exams. Each study guide will be found online through Canvas. They are due before 11:59 PM on the day indicated on the schedule (see page 9).

3. **Midterm Examinations**

<i>Number of examinations</i>	: 3.
<i>Value</i>	: 150 points each.
<i>Dates</i>	: See course schedule below.
<i>Format</i>	: Multiple choice, problems and short answer.
<i>Material covered</i>	: Current unit only (see schedule).

Exams focus on concepts developed in lecture. Only a small portion of each exam will test your ability to memorize. Most questions are designed to test your ability to reason, synthesize ideas and solve problems. **All 3 examinations must be completed in order to pass the course.** If a student misses an examination, for excused or unexcused reasons, that student will be assigned a failing grade and/or withdrawn at the instructor's discretion for failure to complete the requirements of the course. During all midterm examinations, students must abide by the examination rules as set out by the instructor. If a student fails to abide by the rules of the exam, that student will earn zero points for that examination and face potential dismissal from class and the college with a permanent record of the infraction of the student's transcript. (See "Student Misconduct" section below.) Exams must be taken on the day indicated in the course schedule (see page 9) and must be completed before midnight on that day.

Exams use Respondus Lock-Down Browser. This technology is required to complete the course. Be sure that you have access to a system that can run this software stably.

4. Final Examination

<i>Value</i>	:	300 points.
<i>Date of exam</i>	:	See course schedule below.
<i>Time of exam</i>	:	See course schedule below.
<i>Format</i>	:	Multiple choice, problems, short answer and essay.
<i>Material covered</i>	:	All lecture and lab material throughout the course.

The final exam is comprehensive and required. Questions can be derived from any lecture or lab material. Students are required to follow the rules of the examination as described in the exam instructions. Students who do not follow the rules automatically fail the course (grade of F) and face potential dismissal from the college with a permanent record of the infraction on their transcript. (See the “Student Misconduct” section below.) If a student misses the final exam (i.e., fails to take it before the deadline) with an unexcused absence, that student will automatically fail the course. If a student misses the final with a college-sanctioned excused absence approved by the professor, that student will receive a grade of “incomplete” and must complete the course by taking an essay-format final. Note: *early vacation, including prepurchased airline tickets, other exams or work-related conflicts do not constitute valid excuses.* The final exam must be completed on the day listed on the course schedule (see page 9) before midnight.

The final exam uses Respondus Lock-Down Browser. This technology is required to complete the course. Be sure that you have access to a system that can run this software stably.

5. Laboratory

There are 12 laboratory exercises in this class ([see separate lab schedule posted on the course website](#)). Eleven include a 20 point write-up. One requires a 30 point report. Therefore, the lab is worth a total of 250 points.

Laboratory completion is mandatory. Students must complete all laboratory exercises to pass the course. Lab due dates are given on the lab schedule. **Labs submitted late will receive a 10% reduction for every week late. Students may be required to purchase materials for some labs.** All such materials will be available from chain stores throughout the country.

The laboratory is designed to introduce you to important biological research techniques and is absolutely central to your training. Since organization, neatness and attention to detail are critical to successful scientific study, you will be graded on these qualities.

6. Grading Summary

Here is a summary of the total point breakdown in the course. These are the only points available—there are no extra credit assignments.

3 lecture examinations	:	450	points
Final examination	:	300	points
Laboratory	:	250	points
Total	:	1000	points

7. Grading Scale and Procedures

Final grades are based on the final score applied to the following scale:

Final Score	% of Total	Grade
900-1000	90-100	A
780-899	78-89	B
660-779	66-77	C
500-659	50-65	D
< 500	< 50	F

Remarks and further information

1. Important Dates:

<i>Last day to withdraw with refund</i>	:	January 22
<i>Unrestricted withdrawal ends</i>	:	March 2
<i>Restricted withdrawal with 'W' ends</i>	:	March 22
<i>Restricted withdrawal ends</i>	:	April 19
<i>Final exam</i>	:	May 10 before midnight (online)

2. **Completion policy:** Students are required to complete all lectures, laboratory exercises and exams for full credit. Any student who has more than 2 unsubmitted labs or 1 missed exam will be withdrawn for lack of participation.

3. **Withdrawal policy:** The following are official policies of the college.

- Students may initiate an official withdrawal from any course by submitting a withdrawal form with required signatures to the Admissions and Records office within the published deadline dates.
- Failure to attend any classes is not a guarantee for a refund or an excuse of debt incurred through registration. See "Refund Policy" in the College Catalog, available from a link on this course's Canvas site.
- Official date of withdrawal is the last date of attendance as determined by student's withdrawal or as reported by the instructor.
- The official date of withdrawal will determine degree of refund, if any.
- Failure to file official withdrawal form within published deadlines can result in a failing grade and may affect refund of course tuition and fees.
- Additional information on withdrawals can be found in the College Catalog.
- Upon request, the instructor will withdraw a student through the first 10 weeks with a grade of "W." After the 10th week, the instructor will withdraw the student with a grade of "Y" unless the student is passing at the official time of withdrawal. Withdrawals will not be issued after the date identified as the "deadline for students to withdraw from a course" indicated in the SCC General Catalog (2 weeks before the last lecture).

4. **Incompletes:** A grade of “I” may be assigned at the end of the semester to a student who has completed at least 80% of the required coursework, is passing, and is unable to complete the remaining coursework due to illness or other circumstances beyond the student’s control. If approved by the instructor, the student and instructor will fill out the Incomplete contract, which will specify the work that needs to be done and the deadline for completion (not to exceed 7 months). A student WILL NOT re-register for the class in order to remove the grade of “I.”
5. **Student misconduct policy:** The classroom is an educational learning environment where students are expected to engage in behaviors which are conducive to their own learning and the learning of their peers. To facilitate this, respect for self and others is mandatory and necessary. Should a student exhibit disruptive behavior and/or use profane language to the extent that it interferes with the learning environment, an academic consequence may be imposed. Any student found by a faculty member to have committed academic misconduct may be subject to the following academic consequences:
 - **Warning**—A notice in writing to the student that the student has violated the academic code.
 - **Grade Adjustment**—Lowering of a score on a test or assignment.
 - **Discretionary Sanctions**—Additional academic assignments determined by the faculty member.
 - **Course Failure**—Failure of a student from a course where academic misconduct occurs. Further information can be found in the SCC Student Handbook, Academic Misconduct available from the course Canvas page.
6. **Academic honesty:** Cheating, including but not limited to copying another student’s work on any assignment or test and plagiarism of published literature, cannot be tolerated. With one exception a first offense will result in earning 0 points for the associated exam/quiz/assignment and a report to the Vice President of Academic Affairs. The exception is the final examination. If a student cheats on the final or commits a second offense, that student will be assigned a failing grade (F) for the course and a recommendation to the VP of Academic Affairs to enact the policies outlined in the College Catalog.

Academic dishonesty is defined in the current SCC College Catalog as the following:

- **Academic misconduct**—includes any conduct associated with the classroom, laboratory, or clinical learning process that is inconsistent with the published course competencies/objectives and/or academic standards for the course, program, department, or institution. Examples of academic misconduct include, but are not limited to: (a) cheating and plagiarism (including any assistance or collusion in such activities, or requests or offers to do so); (b) excessive absences; (c) use of abusive or profane language; and (d) disruptive behavior.
- **Cheating**—any form of dishonesty in an academic exercise. It includes, but is not limited to, (a) use of any unauthorized assistance in taking quizzes, tests, examinations, or any other form of assessment whether or not the items are graded; (b)

dependence upon the aid of sources beyond those authorized by the faculty member in writing papers, preparing reports, solving problems, or carrying out other assignments; (c) the acquisition, without permission, of tests or other academic material belonging to or administered by the college or a member of the college faculty or staff; and (d) fabrication of data, facts, or information.

- **Plagiarism**—a form of cheating in which a student falsely represents another person's work as his or her own. It includes, but is not limited to: (a) the use of paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment; (b) unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials; and (c) information gathered from the internet and not properly identified.

7. **Academic and student support services:** A variety of student services can be accessed online. Services are free of charge to all registered SCC students. Refer to the SCC College Resources Student Home Page (www.scottsdalecc.edu/college-resources).
8. **Accommodations:** Scottsdale Community College provides equal opportunity to qualified students. If you have a documented disability (medical, physical, learning, psychological, etc.) and wish to request disability-related accommodations to complete course requirements, contact Disability Resources and Services (located in SC building; 480-423-6517). Course requirements cannot be waived, but reasonable accommodations may be provided based on disability documentation and course objectives.
9. **Generative Artificial Intelligence (AI) Policy:** The World Economic Forum defines generative AI as “a category of artificial intelligence (AI) algorithms that generate new outputs based on the data they have been trained on. Unlike traditional AI systems that are designed to recognize patterns and make predictions, generative AI creates new content in the form of images, text, audio, and more.”

Some examples of generative AI tools include but are not limited to: ChatGPT, Google Bard, Microsoft Copilot, Stable Diffusion, GrammarlyGo, and Adobe Firefly.

In this class, all of your submitted work must be your own. The use of generative AI tools will be considered academic misconduct (see Administrative Regulation 2.3.11 1.B(b)) and will be treated as such. If you are unsure if the tool or website you are using is a generative AI tool, please contact the instructor for further clarification before using the tool or website.

Students are responsible for the information contained in this syllabus. The information in this syllabus is subject to change based on the discretion of the instructor.

Course schedule

Week	Lecture	Title	Due Date*	Laboratory
1	1.1	Introduction	1/17 (Wed)	Nature of Science
	1.2	Searching for life	1/19 (Fri)	
2	1.3	Chemistry of life	1/23 (Tues)	Biomolecules
	1.4	Foundations of life	1/26 (Fri)	
3	1.5	Introduction to metabolism	1/30 (Tues)	Mitosis and Meiosis
	1.6	Cells and chromosomes	2/2 (Fri)	
4	—	<i>First midterm examination</i>	2/6 (Tues)	<i>No labs!</i>
	2.1	Mendel's study	2/9 (Fri)	
5	2.2	Principle of Segregation	2/13 (Tues)	Professional Literature
	2.3	Principle of Independent Assortment	2/16 (Fri)	
6	2.4	Multiple Mendelian traits	2/20 (Tues)	Transmission Genetics
	2.5	Exceptions to Mendelian patterns	2/23 (Fri)	
7	2.6	Evidence for evolution	2/27 (Tues)	Natural Selection
	2.7	Principles of natural selection	3/1 (Fri)	
8	2.8	Hardy-Weinberg theorem	3/5 (Tues)	<i>No labs!</i>
	—	<i>Second midterm examination</i>	3/7 (Fri)	
9	—	<i>Spring Break</i>	3/12 (Tues)	<i>No labs!</i>
	—	<i>Spring Break</i>	3/15 (Fri)	
10	3.1	DNA structure and replication	3/19 (Tues)	Gene Regulation
	3.2	Gene structure and arrangement	3/22 (Fri)	
11	3.3	Transcription	3/26 (Tues)	Applied Genetics
	3.4	Translation	3/29 (Fri)	
12	3.5	Cancer	4/2 (Tues)	DNA Sequencing and Genomics
	3.6	Viruses and SARS-CoV-2	4/5 (Fri)	
13	—	<i>Third midterm examination</i>	4/9 (Tues)	<i>No labs!</i>
	4.1	Membranes and transport	4/12 (Fri)	
14	4.2	Introduction to metabolism	4/16 (Tues)	PCR and ELISA
	4.3	Enzyme structure and function	4/19 (Fri)	
15	4.4	Glycolysis	4/23 (Tues)	Enzymes
	4.5	Krebs cycle	4/26 (Fri)	
16	4.6	Electron transport and OxPhos	4/30 (Tues)	Respiration
	4.7	Photosynthesis	5/3 (Fri)	
	—	<i>Final Exam</i>	<i>5/10 (Fri)</i>	

*Quizzes and exams must be completed by 11:59 PM on the date listed.