BIO 181—General Biology (Majors) I

Scottsdale Community College
and 2 + 2 partnership with
Northern Arizona University

Syllabus and Course Outline, Section # 15594

Spring 2024 (January 17–May 8)

Instructor Contact

Instructor	:	Dr. John Nagy	**Time**	:	MW 10:30−11:45
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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

- This in-person course will be supported by the following online platforms:
  - *Website:* https://edresources.scottsdalecc.edu/nagy/teaching/bio-181
    This is the main place to find the lecture content. All lecture slides, reading assignments, study guides, and more will be posted here.
  - *Canvas website:* Sign in via Canvas Login-portal.
    Quizzes, laboratory exercises and grades will be posted here. See below for details.
- **Learning center:** We have an excellent, free tutoring service available both in-person and 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 catalog and the student handbook. Links are available on Canvas in the introductory module.

Grading Standards and Practices

1. **Lecture Quizzes**

Number of quizzes	:	27 (one for each lecture).
Value	:	5 points each.
Dates	:	See course schedule below.
Format	:	Multiple choice, online (Canvas)
Material covered	:	One lecture only (see schedule).

Lecture quizzes are meant to help you study for the exams. Each quiz will be given online through canvass. They are due before 11:59 PM on the day indicated on the schedule (see page 10). No late quizzes will be accepted. **You will be given 3 attempts to complete the quiz.** The highest score will be recorded. Quizzes are required. If a student misses 3 quizzes they will be withdrawn from the course for failure to complete course requirements.

2. **Lecture Examinations**

Number of examinations	:	3.
Value	:	100 points each, lowest score dropped.
Dates	:	See course schedule below.
Format	:	Multiple choice, problems and short answer.
Material covered	:	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. **There are absolutely no make-up examinations.** Your lowest score will be dropped. If a student misses an examination, that will be the exam dropped. If a student misses more than one 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 on the exam cover sheet and instructions from the proctor. If a student fails to abide by the rules of the exam, that student will earn zero points for that examination, and this zero cannot be dropped as the lowest score. The student would also 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.)

3. **Final Examination**

Value	:	270 points.
Date of exam	:	See course schedule below.
Time of exam	:	See course schedule below.
Format	:	Multiple choice, problems, short answer and essay.
Material covered	:	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 on the cover sheet and the proctor(s). 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 with a college-sanctioned excused absence approved by the professor, that student will receive a grade of "incomplete." If a student misses the final with an unexcused absence, that student will automatically fail the course. A student who misses the final with a documented, college-sanctioned excuse approved by the instructor 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.*

4. **Research Report**

   This semester you will present one short research report summarizing a primary research article. The report is worth 70 points plus an additional 30 points for an associated literature search and synopsis (written summary of the paper). Therefore, this assignment is worth a total of 100 points. Details will be given at the time of assignment.

5. **Laboratory**

   There are 13 laboratories in this class (see lab schedule attached). Eleven include a 20 point write-up, the lowest of which is dropped. Two have 40 point reports, and one of these requires a 20 point proposal. Therefore, the lab is worth a total of 300 points (200 for the 20-point labs, 80 for the two lab reports and 20 for the proposal).

   Laboratory attendance is mandatory. Attendance is defined as *arrival to lab prior to the scheduled starting time and continuous participation in the lab until at least the exercise is completed every day the class is scheduled to meet.* Participation in every laboratory exercise is required. Laboratory absences will be assigned as follows:

   (a) A student misses a lab completely = 1 absence.

   (b) A student arrives late or leaves early = 1/2 absence.

   The laboratory requirements are very strict because experimentation is at the heart of biology. If you miss a lab, for an unofficial, unexcused reason, you will receive 0 points for that lab. There are absolutely no make-up labs. Students unable to attend their lab in a given week may, with prior instructor permission, attend another lab section that week only. Students may miss 1 lab with no additional penalty. **For every unofficial, unexcused absence greater than 1, the student will lose one step in their final letter grade for the entire course; for every half absence, the student will lose 50 percentage points in his or her final letter grade.** If a student misses more than three labs regardless of the reason, excused or unexcused, that student will be assigned a failing final grade or withdrawn from the course at the instructor's discretion.

   Labs handed in late will receive a 10% reduction for every week late.

   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.

27 lecture quizzes	:	130 points (lowest score dropped)
3 lecture examinations	:	200 points (lowest score dropped)
Final examination	:	270 points
Research report	:	100 points
Laboratory	:	300 points
Total	:	**1000 points**

7. **Grading Scale and procedures**

   Points from lecture and lab are added together to obtain the raw score. The raw score is then adjusted in the following way, based on lab absences, to obtain the final score:

   (a) The final score equals the raw score for students with one or no absences.

   (b) The final score for students with 2 or more absences will be awarded as follows:

      i. For every subsequent full absence (one miss or two late arrivals or early departures), 110 points (one full letter grade) will be deducted from the raw score.

      ii. For every half absence (one late arrival/early departure), 55 points (half a letter grade) will be deducted from the raw score.

   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

   Example 1: Student A's raw score was 808 points (raw grade of B), but she missed 3 labs resulting in a $100 \times 2 = 200$ point deduction. Therefore, her adjusted score is now 608 points, which gives her a final grade of D.

   Example 2: Student B's raw score was 910 points (raw grade of A), but he missed 2 labs and arrived to another lab 30 minutes late. Therefore, his adjusted score is now $910 - 100 - 50 = 760$ points, which gives him a final grade of C.

Remarks and further information

1. **Important Dates:**

Last day to withdraw with refund	:	January 23
Unrestricted withdrawal ends	:	March 5
Withdrawal with 'W' and instructor permission	:	March 19
Restricted withdrawal ends	:	April 17
Final exam	:	See schedule

2. **Attendance policy:** Students are required to attend lecture, laboratories and any field trips for full credit. Attendance is defined as arrival to class prior to the scheduled starting time and continuous participation in the class until at least the scheduled finishing time every day the class is scheduled to meet. **Students who arrive late, leave early, sleep, check email, surf the internet or otherwise disengage during any class activity or lecture will be marked as absent for that day.** Any student who misses more than 6 lectures or 3 consecutive lectures will be withdrawn for excessive absences at the instructor's discretion.

3. **Excused absences:** An absence is considered excused if it is a documented official absence (absence for a school function, verified with an official absence verification card), an absence for a religious holiday provided that the student submit to me, no later than one week in advance, a written statement including the date of the holiday and the reason why attendance to class is impossible, or an absence due to injury, sickness or loss of a relative, given proper documentation is provided (note from the physician or copy of the death certificate). Any other absence, or an absence without documentation, is unexcused.

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

   - Students my 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 2016-2017 College Catalog, page 241.
   - 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 2016-2017 College Catalog, page 252.
   - 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 class period).

5. **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."

6. **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 2.3.11, page 277.

7. **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.

8. **Laboratory safety:** The laboratory is designed to be safe and to use mostly materials that are commonly found in grocery stores. However, if you have a special health concern, especially if you are pregnant or suspect you might be pregnant, please consult your physician before attending the laboratory. Provide your physician with this syllabus and laboratory schedule, and we will provide him or her with a list of materials used in each laboratory as soon as we are contacted by his or her office.

9. **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).

10. **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.

11. **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 and material posted online in Canvas. The information in this syllabus is subject to change based on the discretion of the instructor.

Lecture schedule

Date	Lecture	Title	Quiz Due Date*	Laboratory
1/15	—	***M.L. King Day—No Class***	***No quiz***	Biomolecules
1/17	1.1	Introduction	1/19 (Fri)	(Take-home)
1/22	1.2	Searching for life	1/23 (Tues)	Nature
1/24	1.3	Chemistry of life	1/26 (Fri)	of Science
1/29	1.4	Foundations of life	1/30 (Tues)	Mitosis
2/31	1.5	Introduction to metabolism	2/2 (Fri)	and Meiosis
2/5	1.6	Cells and chromosomes	2/6 (Tues)	Professional
2/7	—	***First midterm examination***	***No quiz***	Literature
2/12	2.1&2	Principle of Segregation	2/13 (Tues)	Transmission
2/14	2.3&4	Principle of Independent Assortment	2/16 (Fri)	Genetics
2/19	—	***President's Day—No Class***	***No quiz***	***No lab***
2/21	2.5	Exceptions to Mendel	2/23 (Fri)	
2/26	2.6	Evidence for evolution	2/27 (Tues)	Natural
2/28	2.7	Principles of natural selection	3/1 (Fri)	Selection
3/4	2.8	Hardy-Weinberg theorem	3/5 (Tues)	Genetic
3/6	—	***Second midterm examination***	***No quiz***	Drift
3/11	—	***Spring Break—No Class***	***No quiz***	***No lab***
3/13	—	***Spring Break—No Class***	***No quiz***	***No lab***
3/18	3.1	DNA structure and replication	3/19 (Tues)	Gene
3/20	3.2	Gene structure and arrangement	3/22 (Fri)	Regulation 1
3/25	3.3	Transcription	3/26 (Tues)	Applied
3/27	3.4	Translation	3/29 (Fri)	Genetics
4/1	3.5	Cancer	4/2 (Tues)	Gene
4/3	3.6	Viruses and SARS-CoV-2	4/5 (Tues)	Regulation 2
4/8	—	***Third midterm examination***	***No quiz***	PCR and
4/10	4.1	Membranes and transport	4/12 (Fri)	ELISA
4/15	4.2	Introduction to metabolism	4/16 (Tues)	Enzymes
4/17	4.3	Enzyme structure and function	4/19 (Fri)	
4/22	4.4	Glycolysis	4/23 (Tues)	Respiration
4/24	4.5	Krebs cycle	4/26 (Fri)	
4/29	4.6	Electron transport and OxPhos	4/30 (Tues)	***Research***
5/1	4.7	Photosynthesis	5/3 (Fri)	***Presentations***
5/6	—	***Final Exam Part 1***		
5/8	—	***Final Exam Part 2***		

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