

GENERAL BIOLOGY FOR MAJORS I SYLLABUS AND COURSE OUTLINE

Biology 181

Scottsdale Community College, Fall Semester (August 23 – December 15, 2016)
Tu and Th, 5:50 p.m. - 7:05 p.m., Section #27777

Instructor : Dr. Carrie Anderson **e-mail:** carrie.anderson@scottsdalecc.edu
Office : NS 135 **Lecture Room** : SL 107
Phone : 480-731-8866 x.13513 **Laboratory** : NS 211

Office Hours:

| | | | | |
|--------|---------------------|-----------|----------------------|--------|
| Monday | Tuesday By App't | Wednesday | Thursday By App't | Friday |
|--------|---------------------|-----------|----------------------|--------|

Text : Freeman, S. et al. 2017. *Biological Science*. 6th Ed. Benjamin Cummings, San Francisco.

Required resource: Scientific calculator

Course Website: Canvas at <https://learn.maricopa.edu/>

NOTE: All materials will be posted on the course website.

The official course website contains the syllabus, pdf files of lecture slides and labs, lab data, extra readings, assignments, links to useful websites, course announcements, and/or other resources. However, authoritative material will be presented in lecture and lab. Required course material may not be reflected completely in the online resources. Lab and lecture attendance is required, although you are encouraged to make use of the website.

Course Description:

4 credits, 6 periods.

Principles of structure and function of living things at molecular, cellular and organismic levels of organization. A detailed exploration of the chemistry of life, the cell, and genetics. Field trips may be required at students' expense. *Prerequisites:* Grade of "C" or better in RDG091 or eligibility for CRE101 as indicated by appropriate reading placement test score. One year of high school or one semester of college-level chemistry is **strongly** recommended. **Attribute:** General education designation: Natural Sciences (Quantitative) – [SQ].

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.

Course Competencies:

1. Describe and apply scientific methods to solve problems in biological context (I).
2. Describe the characteristics of life (I).
3. Identify the basic parts of atoms and describe how they influence chemical characteristics (II).
4. Analyze the relationships between the structure and functions of the four kinds of organic molecules found in living things (II).
5. Identify the parts of a cell and describe their structure and functions (III).
6. Compare and contrast prokaryotic and eukaryotic cells (III).
7. Describe cellular transport, membrane structure, and membrane functions (IV).
8. Describe the laws of thermodynamics, energy processes, and enzymes as they relate to biology (V).
9. Explain the purpose and components of cellular respiration (V).
10. Explain the purpose and components of photosynthesis (V).
11. Describe the biological processes of mitosis, meiosis, DNA duplication, and protein synthesis (V).
12. Compare Mendelian and non-Mendelian genetics and use problem solving to predict the outcome of genetic crosses (VI).
13. Describe gene regulation and effectively analyze the various biotechnological applications (VI).
14. Describe the genetic basis of development (VI).
15. Demonstrate knowledge of laboratory safety skills and procedures (I-VII).
16. Practice principles of scientific method while conducting laboratory activities and experiments (I-VII).
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 (I-VII).
18. Operate light microscopes, prepare wet-mount slides, and use stains (III, VI, VII).
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 (I-VII).
20. Develop graphing skills manually and/or by using appropriate computer software (I, IV, VI, VII).
21. Calculate and make molar and/or percent solutions of varying concentrations (I, II, V, VII).
22. Analyze and report data generated during laboratory activities and experiments (I, V, VI, VII).

Course Policies:

Students are responsible for the college policies included in the college catalogue and the student handbook:

www.e-digitaleditions.com/t/172739-2015-16-scc-college-catalog

Grading Standards and Practices

1. Lecture Examinations

| | |
|-------------------------------|--|
| <i>Number of examinations</i> | : 3 |
| <i>Value</i> | : 100 points each, lowest score dropped. |
| <i>Dates of examinations</i> | : See course schedule (last page of syllabus). |
| <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. ***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 from the course 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 the "Academic dishonesty" section below.)

2. **Final Examination:** Tuesday, December 13, 2016 from 6:00 p.m. to 7:50 p.m.

| | |
|-------------------------|---|
| <i>Value</i> | : 200 points. |
| <i>Date of Exam</i> | : See course schedule (last page of syllabus). |
| <i>Time of Exam</i> | : See course schedule (last page of syllabus). |
| <i>Format</i> | : Multiple choice, problems and short answer. |
| <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 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 “Academic dishonesty” 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.***

3. **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. Therefore, this assignment is worth a total of 100 points. Details will be given at the time of assignment.

4. **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:

- 1) A student misses a lab completely – 1 absence.
- 2) 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 an automatic 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 biological research, you will be graded on these qualities.

5. **Grading Summary.** In summary, the total points available in this class are the following:

| | |
|------------------------|-------------------------------|
| 3 lecture examinations | : 200 points (lowest dropped) |
| Final examination | : 200 points |
| Research report | : 100 points |
| Laboratory | : 300 points |
| Total | : 800 points |

6. **Grading Scale:** Raw grades will be assigned on the following scale:

| Points Earned | % of Total | Grade |
|---------------|------------|-------|
| 720-800 | 90-100 | A |
| 624-719 | 78-89 | B |
| 544-623 | 68-77 | C |
| 440-543 | 55-67 | D |
| < 440 | < 55 | F |

Raw grades are then adjusted based on laboratory absences, as follows:

- 1) Students with one or no lab absences will be assigned their raw grade as their final grade.
- 2) For students who have 2 or more lab absences will have their final grade lowered in the following manner:
 - a) For every full lab absence (one miss or two late arrivals or early departures), 80 points (10%, or one full letter grade) will be deducted from the raw grade.
 - b) For every half absence (one late arrival/early departure), 40 points (5%, or half a letter grade) will be deducted from the raw grade.

Example: Student A's raw score was 660 points (raw grade of B), but she missed 3 labs resulting in a $80 \times 2 = 160$ point deduction. Therefore, her adjusted score is now 500 points, which gives her a final grade of D.

Example: Student B's raw score was 745 points (raw grade of A), but he missed 2 labs and arrived to another lab 30 minutes late. Therefore, his adjusted score is now $745 - 80 - 40 = 625$ points, which gives him a final grade of C.

Remarks:

1. Important dates:

| | |
|--|---------------|
| <i>Unrestricted withdrawal ends</i> | : October 9 |
| <i>Restricted withdrawal with 'W' ends</i> | : October 28 |
| <i>Last day to withdraw</i> | : November 24 |

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 or read during any portion of the class will be marked as absent for that day. Any student who misses more than 4 lectures or 2 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:** 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 of an excuse of debt incurred through registration. See "Refund Policy" in the 2016-2017 College Catalogue, page 241.

The following is the withdrawal policy for all courses with a BIO prefix:

*Upon request, an instructor will withdraw a student through the first 10 weeks with a grade of "W." After the 10th week, an instructor will withdraw the student with a grade of "Y" unless the student is passing. Withdrawals **will not be issued** after the date identified as the "Last Day Withdrawal Accepted" indicated in the SCC General Catalogue (usually 2 weeks before the last lecture).*

If you withdraw, you are responsible for filling out all necessary paperwork. See dates for unrestricted and restricted withdrawal listed above. Failure to do so can result in a failing grade and may affect refund of course tuition and fees. The official date of withdrawal is the last date of attendance as determined by the student's withdrawal form or as reported by the instructor. The official date of withdrawal will determine the degree of refund, if any.

5. **Incompletes:** The following is the policy covering assignments of *incomplete* for all courses with a BIO prefix:

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. **Academic dishonesty:** 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.

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 for dismissal from the college.

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

- 1) **Academic misconduct** – includes misconduct associated with the classroom, laboratory or clinical learning process. Some examples of academic misconduct are cheating, plagiarism and excessive absences.
 - 2) **Cheating** – includes but is not limited to, (a) use of any unauthorized assistance in taking quizzes, tests or examinations; (b) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems or carrying out other assignments; or (c) the acquisition, without permission, of tests or other academic material belonging to a member of the college faculty or staff.
 - 3) **Plagiarism** – includes, but is not limited to, the use of paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.
7. **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.
8. **Academic and student support services:** The official course website contains the syllabus, pdf files of lecture slides and labs, lab data, extra readings, assignments, links to useful websites, course announcements and other resources. However, authoritative material will be presented in lecture and lab. Required course material may not be reflected completely in the online resources. Lab and lecture attendance is required, although you are encouraged to make use of the website.
9. **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 & 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.
10. **Pregnant and parenting students:** Students who are pregnant may receive accommodations similar to those given to students with a temporary illness when deemed medically necessary. Students may be eligible to receive attendance leniency, extended deadlines, alternative test dates, or in cases of severe temporary illness, an "incomplete" from a course.

Students who are pregnant should contact Disability Resources & Services for consultation. If a student needs an academic or athletic accommodation due to pregnancy they will need to provide documentation, from their doctor, regarding their condition. Medical documentation regarding absences must also be provided. Disability Resources & Services is located in the SC Building; 480-423-6517.

11. **Sexual Harassment:** Sexual harassment is any unwelcome, verbal or physical conduct of a sexual nature that is sufficiently severe, persistent, or pervasive that it alters working conditions and creates a hostile environment or reasonably interferes with, limits, or deprives a student of the ability to participate in or benefit from any educational program or activity.

Sexual harassment and discrimination in any college education program or activity is prohibited. Students should report any discrimination and/or harassment they experience or observe to the Vice President of Academic and Student Affairs (SCC's Title IX coordinator) located in the Administration Building (AD), phone 480-423-6300.

To view the full Sexual Harassment Policy, refer to the Student Handbook, page 254.

12. **SCC General Education Policy:** General Education enhances students' abilities in critically analyzing and effectively communicating in Written, Oral, Visual, and Numerical form. General Education is woven throughout the curriculum and co-curricular experiences at Scottsdale Community College.
13. Please realize that I am here to help you. If you have difficulty on any quiz, especially before the first exam, feel free to ask me questions and help clear things up for you; that's why I am here.

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.

TENTATIVE COURSE SCHEDULE AND READING ASSIGNMENTS:

NOTE: This schedule is subject to change depending on the needs of this particular class.

| Week | Lecture Title | Reading | Laboratory |
|--------------|---|-----------------------|----------------------|
| 8/23 | Introduction; Discovering Life | Baloney detection | Biomolecules |
| 8/25 | Attempts to find life on another planet | Skills 12, 15, 17, 18 | (Take-home) |
| 8/39 | Fundamentals of science | Ch 2, Skills 2, 14 | Scientific |
| 9/1 | Foundations of biology—Evolution, Genetics and Cell Theory | Chs 1, 4, Skill 1 | Method |
| 9/6 | Cells and chromosomes | Ch 7 | No Labs! |
| 9/8 | Mendel's Principle of Segregation | Chs 12, 13 | (Labor day) |
| 9/13 | Mendel's Principle of Independent Assortment | Secs 14.1, 14.2 | Mitosis and |
| 9/15 | First Midterm Examination | Skill 9 | Meiosis |
| 9/20 | Violations of Mendel's first principle | Sec 14.3, Skills 3, 4 | Mendelian |
| 9/22 | Violations of Mendel's second principle | Sec 14.4, 14.5 | Genetics |
| 9/27 | Paleontologist for a day | Sec 14.6 | Natural Selection |
| 9/29 | Evolution and Natural Selection | Sec 22.1&2, Skill 13 | |
| 10/4 | The Hardy-Weinberg conjecture | Sec 22.3, 22.4, 22.5 | Genetic Drift |
| 10/6 | Some interesting fossils | Sec 23.1 | |
| 10/11 | Second Midterm Examination | Sec 32.5 | Library |
| 10/13 | DNA | | Research |
| 10/18 | Gene structure | Ch 4, Skill 11 | Molecular |
| 10/20 | Basic gene function | Ch 15 | Genetics I |
| 10/25 | Transcription | Ch 16, Skills 6, 10 | Applied |
| 10/27 | Translation | Sec 17.1, 17.2 | Genetics |
| 11/1 | Gene regulation | Sec 17.3, 17.4, 17.5 | Molecular |
| 11/3 | HIV and influenza | Ch 19 | Genetics II |
| 11/8 | Membranes and diffusion | Ch 33 | Polymerase |
| 11/10 | Third Midterm Examination | | Chain Reaction |
| 11/15 | Thermodynamics | Ch 6 | Enzymes |
| 11/17 | Control of metabolism—details of enzyme function | Sec 8.1, 8.2 | |
| 11/22 | Metabolism in hydrothermal vent microbes | Sec 8.3, 8.4, 8.5 | No Labs! |
| 11/24 | Thanksgiving, no class! | Sec 9.1, 9.2 | (Thanksgiving) |
| 11/29 | Glycolysis and the Krebs cycle | Sec 9.3, 9.4 | Respiration |
| 12/1 | Electron transport, chemiosmosis and OxPhos | Sec 9.5, 9.6 | |
| 12/6 | Characteristics of light and how light energy is captured | Sec 10.1, 10.2 | Research |
| 12/8 | Photosynthesis | Sec 10.3, 10.4 | Presentations |
| 12/13 | Final Exam – 6:00 p.m. to 7:50 p.m. in the normal lecture room | | |