Course Overview
Welcome to Biology! This 4-credit online course is designed to give the non-biologist a working knowledge of the life sciences that will be useful in making informed decisions on health and the environment. We will cover a wide variety of introductory biological concepts and practice the scientific method by conducting a biology experiment over several weeks.

Course description: Fundamental principles of biology; emphasis on their application to humans in the modern world. Lectures, laboratory demonstrations, experiments and discussions of contemporary biological topics. For non-science majors; cannot be used as a biology elective by biological science majors. Prerequisites: Placement in WRTG F111X; placement in DEVM F105.

Student Learning Outcomes
During this course, you will be introduced to terminology and major concepts that are used to describe and understand living systems. We will address the interrelatedness and interdependence of living system from the sub-cellular to the ecosystem level while studying important biological processes. At the end of this course, you will be able to:

- Demonstrate an understanding of the structure and function of cells, energy and information flow in living systems, mechanisms of evolution and ecological interactions among biological systems,
- Apply the scientific method by formulating hypotheses, proposing testable predictions and then testing to reach supportable conclusions about biological processes and systems, and
- Articulate the relevance of modern biology to society.

Course Information

Instructor contact
Dr. Anja Kade: ankade@alaska.edu

Meeting times
This online course is asynchronous (i.e. we do not have a scheduled meeting time). However, this is NOT a self-paced course - you need to complete one lesson per week in chronological order. Please refer to the course schedule in the syllabus or on Blackboard and observe the deadlines.

Course materials

- Textbook. We will use the open-source textbook “Biology 2e” from Stax to keep course costs to a minimum. Please download the free text at https://openstax.org/details/books/biology-2e so you can complete the weekly reading assignments from your Stax textbook. I realize that the text is sometimes geared towards students majoring in biology and goes into much detail, so I suggest to filter out the main points when reading the chapters and to read over the chapter summaries at the end of each chapter. I also recommend that you check out a general biology textbook for nonmajors from your local library or other source of your choice and read over the same
material if you need to clarify certain concepts. Of course, you are always welcome to contact me for help, too.

- **Lab materials.** The lab activities are a mix of both online labs as well as at-home, hands-on labs. For the online labs, you will need a strong and secure internet connection. For the at home labs, you will need to get following materials:
  - **Carolina lab kits:** The at-home lab kits ($140) are supplied by Carolina Biological Supplies (order #581601, https://www.carolina.com/catalog/details.jsp?prodId=581601). Once you register for class, make sure to order your lab kit as soon as possible directly from Carolina as shipping and handling can take up to 10 days (and you want to make sure you can complete the first lab assignment on time). Alternatively, you can also purchase the lab kit at the UAF bookstore, but the price will be higher.
  - **Additional lab supplies:** Not all at-home labs will be kits from Carolina but require you to set up simple experiments at home. For these activities, you will need to get items such as a scale, AA batteries, knife, cups, sugar, salt, onion, potatoes, eggs, vinegar, soil, and seedling pots. The materials are listed on Blackboard under “Critical course information”.

**Course structure**

Your weekly learning materials and assignments are posted under the respective "Week" tab on the left-hand side menu in Blackboard. Each weekly lesson consists of following components:

1. **Topic overview and review questions.** I will give you a brief introduction to the lesson topic and define critical terms during brief movies based on lecture slides. Please note that you have the option of closed captioning to assist with understanding. Embedded in each short overview, you will demonstrate your understanding with the help of review questions.

2. **Reading assignment and critical-thinking question.** Please read over the assigned material in your free open-source biology textbook available from OpenStax. You will then have the opportunity to apply your knowledge by answering a critical-thinking question. I will give you two questions to choose from.

3. **Lab activities.** You will perform a variety of activities relating to each week’s lab topic, ranging from online labs to home kits and field trips. Please read the instructions outlined under "Assignment Overview" carefully. The activities are coupled with a set of questions, which are set up as "tests" in Blackboard. You can save your progress once started - just make sure to submit your work before the deadline of the respective lab.

4. **Hot topic discussion forum.** Each week’s prompt will give you the opportunity to explore how a biological topic relates to a current hot topic facing society. You will explore credible sources and showcase research that we will share with the class.

5. **Research project.** You will design and carry out a research project on plant growth over the course of the semester. Each week is associated with a certain task that relates to your research project, such as creating a research study plan, setting up your plant experiment, collecting and analyzing data and presenting your findings to the class at the end of the semester.

6. **Quiz.** Each weekly quiz consists of 10 multiple-choice questions and is timed (15 minutes). You will have the opportunity to take the quiz up to three times, and the average points you earned during your attempts will be recorded as a grade. The quiz questions will cover information from the overview lecture movie, textbook reading, research project and lab activities.
<table>
<thead>
<tr>
<th>Week/ due date</th>
<th>Lesson topic and reading</th>
<th>Lab activities</th>
<th>Hot topic discussion</th>
<th>Research project</th>
</tr>
</thead>
</table>
| #1 09/08       | Introduction and study of life (Ch. 1.2, 2.1, 2.2) | H: Carolina safety manual  
C: Microscope introduction  
H: Properties of life | Student introductions | Research factors influencing plant growth |
| #2 09/15       | Scientific method and credible sources (Ch. 1.1) | C: Alka-Seltzer experiment  
O: RADAR challenge* | Credible biology news website | Credible source on seedling growth |
| #3 09/22       | Cell structure and function (Ch. 4.2-4.5) | O: Virtual tour of cell  
C: Animal and plant cells under microscope | Diseases linked to cell organelles | Research topic, question and hypothesis |
| #4 09/29       | Cell membranes and cell energetics (Ch. 5.1-5.3, 7.1-7.5 summary, 8 summary) | H: Potato-sugar osmosis  
H: Onion-salt osmosis | Biofuels | Draft of research proposal |
| #5 10/06       | Cell division (Ch. 10.2-10.4, 11.1) | O: Mitosis stages in animal and plant cells  
H: Meiosis photo project | Cancer treatments | Revision of research proposal |
| #6 10/13       | DNA, proteins and genes (Ch. 14.2-14.5, 15.1, 15.3, 15.5) | C: DNA replication, RNA transcription and protein synthesis  
C: Cheek cell DNA extraction | Genetically modified organisms | Data table |
| #7 10/20       | Inheritance (Ch. 12) | O: Genetic crosses*  
C: Blood typing | Ethics of genetic testing | Setup of experiment |
| #8 10/27       | Evidence for evolution and phylogenies (Ch. 18.1, 20.1, 20.2) | O: Phylogenetic trees* | Credibility of “evolution” sources | Data collection I |
| #9 11/03       | Mechanisms for evolution and speciation (Ch. 18.2, 19.2, 19.3) | O: Evolution of anole lizards  
H: Your super organism | Worldwide evolution examples | Data collection II |
| #10 11/10      | Human immune system and vaccination (Ch. 42.1, 42.2, 42.4) | H: Innate immune metaphor  
H: Adaptive immune photo shoot  
O: Stop-deadly-disease activity  
O: Herd immunity movie | Vaccinations and disease outbreaks | Data collection III |
| #11 11/17      | Population and community ecology (Ch. 44.1, 45.1, 45.3 - 45.6) | H: Population size estimate  
O: Predator-prey graph analysis  
O: Niche partitioning* | Human carrying capacity | Data analysis and summary graphs |
| #12 11/24      | Ecosystems and energy flow (Ch. 46) | H: Food-web analysis  
C: Owl pellet comparison | Biomagnification | Research presentation draft |
| #13 12/08      | Human impacts (Ch. 44.5, 47.3) | O: Climate change movies  
O: Personal carbon footprint  
H: Simulated ocean acidification effect on egg shells  
H: Acid rain effects on seedling germination | Climate case studies on resilience | Revision of research presentation |
| Final 12/15     | Student research symposium | -- | -- | -- |

*Activities are not fully accessible. If you need an accessibility accommodation, please contact me for an alternative assignment option that is accessible and covers the same content ideas.

O: online activity; C: Carolina kit; H: home activity
Assessment and Evaluation

Your overall course grade is based on following components:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 2-part lecture movies (4 review questions at 10 points per week)</td>
<td>390</td>
</tr>
<tr>
<td>13 Textbook readings &amp; critical-thinking questions (10 points each)</td>
<td>130</td>
</tr>
<tr>
<td>13 Lab activities (25 points each)</td>
<td>325</td>
</tr>
<tr>
<td>13 Hot topic discussion prompts (10 points each)</td>
<td>130</td>
</tr>
<tr>
<td>13 Research project tasks (15 points each)</td>
<td>195</td>
</tr>
<tr>
<td>13 quizzes (20 points each)</td>
<td>260</td>
</tr>
<tr>
<td>Final research symposium (review of 5 projects at 10 points each and reflection at 10 points)</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,230</strong></td>
</tr>
</tbody>
</table>

Letter grades will be based on the percentage of the total points earned and awarded as follows:

- A+ = 97-100%; A = 90-96%; A- = 88-89%
- B+ = 86-87%; B = 80-85%; B- = 78-79%
- C+ = 76-77%; C = 70-75%
- D = 60-69%
- F = 0-59%

How to check your grade

To check your grades for assignments and quizzes and find comments from me, click on the My Grades link in the Blackboard sidebar menu. All assignments and any due dates are listed. To see my comments, click on the speech bubble icon to view overall comments and feedback. If the score is for a quiz, the title of the quiz is a link. Then click on the check mark or your score to see results and feedback. If the score is for an assignment, the title of the assignment is a link and by clicking this link you’ll be taken to your submission, grade and comments. If you see a green exclamation point, your assignment has not been graded yet.

Course Policies

Late work and grading policy

All assignments are due by the time noted in the course schedule and in the weekly assignment folders. If you turn in late work, 10% of the total possible number of points will be deducted from your points earned for every 24 hours an assignment is late. No assignment will be accepted three days after its due date. If urgent, verifiable circumstances arise that cause you to need extra time on an assignment, email your instructor ASAP for guidance. Exception: I will not accept any late work for the research symposium during finals week!

Student effort and technical requirements

You should expect to spend 10-12 per week on this class. You must have regular access to a computer and the Internet to access online materials in Blackboard. You are expected to download course material as well as upload assignments, create pdfs and play video/audio.
**Safety rules**
It is important that you perform all lab activities in a safe manner at home. Thus, it is critical that you study Carolina’s lab safety manual (included in your Carolina hands-on activity kits) and familiarize yourself with the proper use of personal protective equipment, preventing contamination, safely performing lab activities, correct clean-up and safe field work. For example, wear appropriate clothing; use your personal protective equipment when needed; keep children and pets away from your work area; refrain from drinking, eating and smoking when performing labs; do not leave your work area unattended.

**Academic integrity**
Science is a process whereby people work together to achieve new knowledge and verify previously discovered knowledge. It is critical that we cite those ideas and information that we are using to form new knowledge. You must show us how you came to your ideas and thoughts by citing those works that helped you formulate your ideas. As described by UAF, scholastic dishonesty constitutes a violation of the university rules and regulations and is punishable according to the procedures outlined by UAF. Scholastic dishonesty includes, but is not limited to, cheating on an exam, plagiarism, and collusion. Cheating includes providing answers to or taking answers from another student. Plagiarism includes use of another author’s words or arguments without attribution. Collusion includes unauthorized collaboration with another person in preparing written work for fulfillment of any course requirement. Scholastic dishonesty is punishable by removal from the course and a grade of “F.” For more information read over the Student Code of Conduct.

**Student Support Services**

**Notice of nondiscrimination**
The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University’s commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA’s statement of nondiscrimination available at www.alaska.edu/titleIXcompliance/nondiscrimination.

**Student protection**
Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans’ services, rural student services, etc. to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, then I am required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: www.uaf.edu/handbook.
Student Handbook
Go to the Student Handbook (www.uaf.edu/handbook) for things like: academic advising, tutoring, library and academic support, disability services, computing and technology, veteran and military support, academic complaint and appeals, late withdrawals, “classroom” behavior expectations and more.

UAF eCampus Student Services
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UAF Help Desk and technical assistance
Go to http://www.alaska.edu/oit/ to see about current network outages and technology news. For technical questions, contact the Help Desk at helpdesk@alaska.edu or 450.8300 (in the Fairbanks area) or 1.800.478.8226 (outside of Fairbanks).