Welcome to Team Adams! This course is being offered online asynchronously; however, I will be available via zoom for online "student" hours, help sessions, and individual appointments as needed (Please see Brightspace for more information). Email is the best way to communicate with me and I will respond within 24 hours (unless it’s the weekend – but even then, I’m usually quick to respond). I am here to help you – so please do not hesitate to reach out. Welcome aboard!

COURSE DESCRIPTION:
Selected laboratory exercises to accompany BIO 101/BIO 110. (Lab 1 credit)

PREREQUISITES:
Earned credit or concurrent enrollment in BIO 101 or BIO 110.

COURSE LEARNING OBJECTIVES (CLO):
This course is designed to introduce undergraduate students to the fundamental principles of biology through simulated laboratory activities. Students will participate in a variety of virtual labs that will enable them to explore and engage in the concepts of biology that are essential for understanding the world around us. Upon successful completion of this laboratory course, students will be able to:

- CLO 1: Conduct virtual laboratory experiments, collect, record, and analyze data, and communicate findings in a clear and concise manner.
- CLO 2: Demonstrate an understanding of basic laboratory techniques, including measurement, observation, and analysis of biological data.
- CLO 3: Apply scientific inquiry to interpret and make predictions to biological problems.
- CLO 4: Explain how scientific principles relate to issues of personal and/or public importance.
- CLO 5: Collaborate with peers to apply biological literacy and data science to real-world scenarios to make informed decisions.

Laboratory specific learning outcomes are listed at the end of the syllabus and are available on Brightspace. Overall, this online laboratory course provides a comprehensive overview of the basic principles of biology and prepares students for further study in this field. Biological literacy, especially data science, is a critical skill for students pursuing careers in the life sciences, as well as those in other fields where an understanding of technology and software skills is necessary. Through virtual laboratory activities and course assessments, students will develop important skills in scientific inquiry, data analysis, and collaboration, while gaining a deeper understanding of the essential concepts of biology.

MAJOR STUDY UNITS:
- Unit 1 “Intro – The Foundation”
  - Laboratory 0.5: Lab Safety & Metric Measurement (length, weight, volume, temperature)
  - Laboratory 1: Applying the Scientific Method: Pillbug Preference
  - Laboratory 2: How Enzymes Function: Enzyme activity, effect of temperature, pH, and concentration
  - Laboratory 3: Chemical Composition of Cells: Test for starches, sugars, fats, proteins

DISCLAIMER: The contents of this syllabus are subject to change at the instructor’s discretion.
● Unit 2 “The Cell”
  ○ Laboratory 4: Cell Structure:
    ■ Examining Plant and Animal Cells
    ■ Cell Membrane Transport: Passive and Active Processes of Membrane Transport
  ○ Laboratory 5: Osmosis & Diffusion
    ■ Diffusion & osmosis across a selectively permeable membrane
    ■ Osmosis: Tonicity in Red Blood Cells and Elodea Cells
  ○ Laboratory 6: Cellular Respiration
    ■ Measure Energy Production in Plants
    ■ Yeast Fermentation
  ○ Laboratory 7: Cell Reproduction: Examining Mitosis & Meiosis
● Unit 3 “Genetics”
  ○ Laboratory 8: DNA Biology and Technology
    ■ Isolation of DNA, Gel Electrophoresis, DNA and RNA Structure
  ○ Laboratory 9: Mendelian Genetics
    ■ Fruit fly characteristics, Monohybrid & Dihybrid & X-Linked Fruit Fly Crosses
  ○ Laboratory 10: Human Genetics: Genetic Inheritance
● Unit 4 “Form & Function”
  ○ Laboratory 11: Microscopy: Muscle Tissue
  ○ Laboratory 12: Cardiovascular Physiology: Cardiac Cycle

ESSENTIAL EQUIPMENT:
To successfully complete this online course, you will need access to a computer with reliable, high-speed Internet access and appropriate system and software to support the Brightspace learning platform. URI supports various applications, including Microsoft tool suite (Word, Excel, etc.). You can find more information and access here: https://its.uri.edu/services/945d3e053d288718a2a58e4f6ea7aa62f16ca4cc45/

TECHNOLOGY REQUIREMENTS & RESOURCES:
Computer access to the internet is required to successfully navigate this course. The course is delivered through the Brightspace Learning Management System (LMS), Zoom and Google Drive platform, which are a set of web applications designed to work with modern web browsers. Recommended browsers (those with the most QA testing effort against them) are Google Chrome, Safari, and Mozilla Firefox. The mobile versions of these browsers also work well with most operations in Brightspace. Internet Explorer is not recommended.

To successfully complete this course, you will also need a working knowledge of Brightspace, McGraw-Hill Virtual Labs, Zoom, and Google Drive. For help attaining these skills please refer to the tutorial links below.

● Brightspace
  ○ Account Access https://brightspace.uri.edu
  ○ Resource page https://web.uri.edu/brightspace/
  ○ Tutorials https://www.youtube.com/playlist?list=PLZz77ffBC33ItZ_XzSgohYHpzIo6TxiE
  ○ Accessibility Information https://www.d2l.com/accessibility/standards
● McGraw Hill Virtual Laboratory Activities
  ○ Account Access will occur through our course Brightspace course.
  ○ Tutorials: An introduction tutorial lab will be assigned during the first week of classes. For more information about the labs: https://www.mheducation.com/highered/virtual-labs.html
  ○ Accessibility Information https://www.mheducation.com/highered/explore/accessibility
● Zoom (as needed)
  ○ Account Access https://uri-edu.zoom.us/
  ○ Tutorials https://youtube.com/playlist?list=PLZz77ffBC33kRvShf_m2hdmoeLShm-Ewf

DISCLAIMER: The contents of this syllabus are subject to change at the instructor’s discretion.
REQUIRED SOFTWARE

This course requires Connect, an online homework and assessment platform, for *Virtual Labs: Biology*: ISBN 9781266802690. You can purchase access to Connect either directly during the Connect registration process using a credit card or PayPal account OR you can purchase a Connect access code from the URI Bookstore. McGraw Hill Virtual Labs are a mobile friendly, interactive, and easily navigable lab experience through accessible (508 compliant) realistic simulations. Laboratory activities and pre & post assessments will be completed through our Brightspace course, but students will need access to McGraw Hill Virtual labs: [https://connect.mheducation.com](https://connect.mheducation.com). Here is a [brief video](#) that explains the Virtual Labs.

For any technical problems, call McGraw-Hill tech support at 800-331-5094. More information will be available on Brightspace.

SUPPLEMENTAL TEXT = FREE 😄!

If you would like to review some biological concepts, check out this free resource (it's also the textbook for the BIO 101/BIO 110 lecture). Biology Textbook by OpenStax (2nd Edition) is licensed under Creative Commons Attribution License v4.0. Links on how to obtain the textbook for FREE can be found on Brightspace and accessed here: [https://openstax.org/details/books/biology-2e](https://openstax.org/details/books/biology-2e)

- Print copy ($) : ISBN-10:1-947172-51-4
- OpenStax Accessibility Statement: [https://openstax.org/accessibility-statement#:~:text=At%20OpenStax%2C%20we're%20committed,to%20the%20widest%20possible%20audience.](https://openstax.org/accessibility-statement#:~:text=At%20OpenStax%2C%20we're%20committed,to%20the%20widest%20possible%20audience.)

INSTRUCTIONAL STRATEGIES – FULLY ONLINE ASYNCHRONOUS LEARNING

For this online course, Brightspace is our “classroom” and much of the instruction will be within virtual laboratory activities linked within our Brightspace course. Please refer to the [Brightspace YouTube video tutorials](#) before you get started and refer back to them as a resource as needed while you complete this course. You will begin this course with a tutorial of McGraw Hill’s Virtual Lab software to ensure you can manipulate and engage with the laboratory simulations. Each Virtual Laboratory activity will be complete through Brightspace.

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Lab begins with "Key Concepts" to include appropriate vocabulary, short videos, and an overview of the lab before you begin, and each lab is interrupted with questions to apply what you are learning through the activity.

**GRADE POINT SYSTEM**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93%-100%</td>
</tr>
<tr>
<td>A-</td>
<td>90%-92%</td>
</tr>
<tr>
<td>B</td>
<td>83%-86%</td>
</tr>
<tr>
<td>B-</td>
<td>80%-82%</td>
</tr>
<tr>
<td>C</td>
<td>73%-76%</td>
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<tr>
<td>C-</td>
<td>70%-72%</td>
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<tr>
<td>D</td>
<td>60%-66%</td>
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<tr>
<td>D+</td>
<td>67%-69%</td>
</tr>
<tr>
<td>F=59%</td>
<td>and below</td>
</tr>
</tbody>
</table>

Performance accounts for 100% of your grade. Every learner can earn an "A" under this system. Percentage scores are not rounded up. **You must earn your grade.** There is no exception to this policy.

**METHODS OF EVALUATION**

<table>
<thead>
<tr>
<th>Student Deliverables</th>
<th>Percentage</th>
<th>Course Learning Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Laboratory Assessments (pre-quiz)</td>
<td>10</td>
<td>CLO 2, CLO 3</td>
</tr>
<tr>
<td>Virtual Lab Activities</td>
<td>25</td>
<td>CLO 1, CLO 2, CLO 3</td>
</tr>
<tr>
<td>Post-Laboratory Assessments</td>
<td>35</td>
<td>CLO 1, CLO 2, CLO 3</td>
</tr>
<tr>
<td>Group Project</td>
<td>20</td>
<td>CLO 4, CLO 5</td>
</tr>
<tr>
<td>Discussions</td>
<td>10</td>
<td>CLO 4, CLO 5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION OF ASSESSMENTS**

**Pre-Laboratory Assessments:** Before each virtual lab, students will be required to complete a pre-lab assessment that will test their understanding of the lab objectives, procedures, and concepts covered in the lab. The pre-lab assessments will be graded on accuracy and completeness.

**Laboratory Activities:** On average, the Virtual Lab simulations take 45-60 minutes to complete, some weeks will include more activities and will require more time. Additional time will be required to complete the pre-lab and lab introduction as well as the completion of the post-lab assessments. The time commitment is comparable to a traditional in-person lab. The Virtual Lab grade is based on completion of the simulation. A student who completes the simulation will receive 100% credit, with no deductions for resetting phases, selecting the wrong hypothesis, or requiring multiple attempts to correctly answer pop-up questions. If a student does not complete a simulation by the due date, the progress will be auto submitted, and he or she will receive a grade that reflects the phases completed. For example, completing 3 of 4 total phases will produce a grade of 75%.

**Post-Laboratory Assessments:** After each virtual lab, students will be required to complete a post-lab assessment that will test their understanding of lab results, analysis, and conclusions. The post-lab assessments will be graded on accuracy, completeness, and critical thinking skills.

**Discussion Forums:** Students will participate in weekly online discussions that focus on the biological concepts reinforced by the laboratory activities – specifically data skills. Discussions will vary weekly but will revolve around data science, such as analyzing and interpreting scientific literature, data visualization, statistical analysis, and/or evaluating scientific claims. In addition to the weekly discussion topics, students will collaborate on their group projects beginning with selecting a dataset and defining a research question and ending with the finalizing of their project.

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The discussions will be graded on the quality of the responses, the level of engagement and participation, and the ability to apply critical thinking and scientific inquiry skills. To create dialog with your classmates, I suggest completing your initial post by Wednesday and then respond to at least two of your group mates later in the week. The first discussion post “Introduce Yourself” will be your first interaction with the class. This will allow you to connect with me as well as your fellow classmates. These discussions will allow us to build a community of learners 😊 and help you with your group project while you gain valuable data skills!

**Data Visualization Group Project:** Students will work in groups on a collaborative project that applies the concepts and data skills learned in the course to a real-world problem or scenario. Student agency will allow for groups to decide on the project topic and final product – provided the project contains two components: data visualization and science communication. Students can use data collected from lab or other sources on a topic of interest (possible sources of data include genetics, ecological, social media usage, weather, sports, demographics, economics, educational data etc.) Students will create a final product to communicate their data visualizations and/or show trends and patterns within the data. Possible examples include:

- **Infographics:** Students can create visual representations of their data using graphics, icons, and text to present information in a concise and engaging way for a specific audience (a digital children’s book, or to be used during a job interview etc.) Infographics can be created using tools like Canva, Piktochart, or Adobe Illustrator.
- **Interactive dashboards:** Students can create interactive dashboards using tools like Google Data Studio or Tableau to allow viewers to explore the data and see different visualizations based on their interests or questions.
- **Videos:** Students can create videos to explain their data visualization project, using animations or screencasts to show the data and the process of creating the visualizations. Videos can be created using tools like OBS Studio, Zoom, Adobe Premiere, iMovie, or Screencast-o-matic.
- **Presentations:** Students can create presentations using tools like PowerPoint or Google Slides to showcase their data visualizations and explain their insights and findings.
- **Posters:** Students can create posters to display their data visualizations and key insights in a concise and visual format. Posters can be created using tools like Canva or Adobe Illustrator and can be shared online.
- **Or something else...please run your project idea by me first.**

The group projects will be graded on the quality of the final product, the level of collaboration and communication between group members, and the ability to apply scientific inquiry skills to data visualization and science communication. More information can be found on Brightspace.

**ATTENDANCE AND OTHER CLASS POLICIES**

- Monday of the first week is considered the first day of class for online instruction.
- In an online learning environment, “attendance” is measured by regular online participation and engagement—important components expected for student success. Online participation is evident through posting to a discussion board, completing Virtual Labs, and other course-related assessments.
- This course is offered online asynchronously and therefore does not have set class meeting times. However, we will meet from time to time via zoom.
- Required first week meeting: Be on the lookout for a Brightspace announcement and sign-up sheet. This 15-minute meeting will be informal and allow us to connect so I may better support you on your educational journal.
- Assessment due dates by 2359 (11:59pm for non-military time folks 😊), Eastern Standard Time zoon. Please refer to the Brightspace calendar for specific due dates.
- Late work is not accepted.

**COURSE NAVIGATION**

The “Start here” module under the “content” tab in Brightspace will introduce you to the course and how it will operate. Within this module you will also make a discussion post, “Introduce Yourself”, where you will get your first opportunity to interact with your professor and fellow classmates. The course is then broken down by laboratory topic. Within each module you will find the laboratory learning objectives, Virtual Lab activities, pre and post lab assessments, discussions, and any additional resources.

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EVOLUTION IN THE CURRICULUM
Evolution is the unifying theory of modern biology. In recognition of this fact, I make the inclusion of evolutionary themes in the biology curriculum a major priority. Where the course content is appropriate, processes and phenomena are presented from an evolutionary perspective.

"Nothing in Biology Makes Sense Except in the Light of Evolution" - Theodosius Dobzhansky, 1973

SELF DIRECTED LEARNING
I am an educator and I love my job. I believe in the power of education and desire to foster a love of learning in my students. To meet that end, I have designed this course (and its assignments) to teach you how to learn and provide you with the skills to become a self-regulated learner. (Ha – doesn’t that sound like I am advocating a practice that will lead to my job becoming obsolete – Yikes! But it would be worth it :) )

Self-regulated learners are able to set goals for their learning (what do you want to learn?), use strategies to be successful in meeting those goals (we will cover many strategies this semester), and monitor and reflect on their learning progress in order to adjust their strategies as needed.

The bottom line is you are in the driver’s seat, you control your learning – I am here to help you navigate. ROAD TRIP!

MY COMMITMENT TO YOU
I am committed to quality teaching. This course is well organized, interactive, relevant, challenging, and the course objectives will be met. I need you to commit to the course as well. If there is anything I can do to make this course more relevant to you and your professional goals, please let me know. I encourage you to take advantage of my student “office” hours via zoom. I will help you in any way that I can. Thank you in advance for what I know is going to be a fantastic semester. I am glad you are a student in my class, and I am so excited to be on this biological exploration with you!

My advice: Learning is social! One of the best ways to become an active learner is to TALK about what you are learning. In all Adams-style classes, you are expected to communicate with your classmates. The more you engage with each other, the more you engage with the content. In an online class like this, the more people you are connect to, the more opportunities you will have to really cement the material into your new neural networks! There will be plenty of opportunities to engage with your peers - so please don't be shy! Form study groups and find people to work with. You'll be happy you did!

ADAMS DIVERSITY & INCLUSION STATEMENT
My goal as an educator is to support learning in a way that is welcoming to all students and that acknowledges and respects a diversity of perspectives, values, voices, and bodies. I believe that diversity in all is forms enriches our learning experience and allows us to better understand the complexity of the biological world. I recognize that each of us brings unique perspectives and experiences to the classroom, and I encourage open and respectful communication between all members of the class. In my courses, I strive to create an educational atmosphere where all students feel valued and included, and where diversity is celebrated. I believe that as a community of learners, we have a responsibility to challenge biases and work towards a more equitable and just society. Therefore, I will make every effort to incorporate diverse perspectives and experiences into the course materials and discussion. I will also work to ensure that all students feel heard and respected, and that their ideas and contributions are valued. I look forward to working with each of you to create a classroom where all students can succeed. Welcome to class – I am so happy you are here!

NETIQUETTE FOR ONLINE COURSE
● Be polite and respectful of one another.
● Avoid personal attacks. Keep dialogue friendly and supportive, even when you disagree or wish to present a controversial idea or response.
● Be careful with the use of humor and sarcasm. Emotion is difficult to sense through text.

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Be helpful and share your expertise. Foster community communication and collaboration.

Contribute constructively and completely to each discussion. Avoid short repetitive “I agree” responses and don’t make everyone else do the work.

Consider carefully what you write. Re-read all e-mail and discussion before sending or posting.

Remember that e-mail is considered a permanent record that may be forwarded to others.

Be brief and succinct. Don’t use up other people’s time or bandwidth.

Use descriptive subject headings for each e-mail message.

Respect privacy. Don’t forward a personal message without permission.

Cite references. Include web addresses, authors, names of articles, date of publication, etc.

Keep responses professional and educational. Do not advertise or send chain letters.

Do not send large attachments unless you have been requested to do so or have permission from all parties.

2-word postings (e.g.: I agree, Oh yeah, No way, Me too) do not “count” as postings.

DOCUMENTATION:
Any material not original to the student must be cited in APA documentation format. Deliberate use of information or material from outside sources without proper citation is considered plagiarism and can be grounds for disciplinary action. See the explanation of Academic Integrity below.

ACADEMIC INTEGRITY:
As a learning community of scholars, URI emphasizes the ethical responsibility of all its members to seek knowledge honestly and in good faith. Students are responsible for doing their own work, and academic dishonesty of any kind will not be tolerated. “Violations of academic integrity include, but are not limited to, cheating, plagiarism, or misrepresentation of information in oral or written form. Such violations will be dealt with severely by the instructor, the dean/center director, and the standards committee. Plagiarism means presenting someone else’s idea or writing as if it were your own. If you use someone else’s idea or writing, be sure the source is clearly documented.” Other guidelines for acceptable student behavior are specified in the university catalog.

1. Plagiarism: Plagiarism consists of using another author’s (including artificial intelligence) words without proper identification and documentation of that author. Plagiarism takes the form of direct quotation without the use of quotation marks and/or documentation or paraphrasing without proper identification and documentation. The fabrication of sources, or the act, deliberately or unconsciously, of passing another author’s work off as your own are also considered to be plagiarism.

2. Falsification: Falsification consists of deliberately changing results, statistics, or any other kind of factual information to make it suit your needs. It also consists of deliberately changing a source’s intent by misquoting or taking out of context.

3. Multiple submission: If you wish to turn in the same work or use the same research, in whole or in part, for more than one course, you must obtain permission to do so from all professors involved. Failure to obtain this permission constitutes academic dishonesty. “Recycled work” must contain significant work as related to the current course topic, meeting the standards for the current assignment.

All submitted work must be your own. If you consult other sources (class readings, articles or books from the library, articles available through internet databases, or websites) these MUST be properly documented, or you will be charged with plagiarism and will receive an F for the submitted work. In some cases, this may result in a failure of the course as well. In addition, the charge of academic dishonesty will go on your record in the Office of Student Life.

Cheating will not be tolerated. URI’s regulations regarding cheating will be upheld.

Students are expected to be honest in all academic work. A student’s name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student’s own independent thought and study. Work should be

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stated in the student’s own words, properly attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite, and reference the work of others with integrity. The following are some examples of academic dishonesty:

- Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation
- Claiming disproportionate credit for work not done independently
- Unauthorized possession or access to exams
- Unauthorized communication during exams
- Taking an exam for another student
- The use of notes or electronic devices to gain an unauthorized advantage during exams
- Unauthorized use of another’s work or preparing work for another student
- Facilitating or aiding another's academic dishonesty
- Altering or attempting to alter grades
- Fabricating or falsifying facts, data or references
- Submitting the same paper for more than one course without prior approval from the instructors.

URI ACADEMIC WRITING STANDARDS:

Specific writing standards differ from discipline to discipline and learning to write persuasively in any genre is a complex process, both individual and social, that takes place over time with continued practice and guidance. Nonetheless, URI has identified some common assumptions and practices that apply to most academic writing done at the university level. These generally understood elements are articulated here to help students see how they can best express their ideas effectively, regardless of their discipline or any writing assignment.

Venues for writing include the widespread use of e-mail, electronic chat spaces and interactive blackboards. URI is committed to guaranteeing that students can expect all electronic communication to meet Federal and State regulations concerning harassment or other “hate” speech. Individual integrity and social decency require common courtesies and a mutual understanding that writing--in all its educational configurations--is an attempt to share information, knowledge, opinions and insights in fruitful ways.

Academic writing (as commonly understood in the university) always aims at correct Standard English grammar, punctuation, and spelling. The following details are meant to give students accurate, useful, and practical assistance for writing across the curriculum of URI.

Students can assume that successful collegiate writing will generally:

- Delineate the relationships among writer, purpose, and audience by means of a clear focus (thesis statements, hypotheses or instructor-posed questions are examples of such focusing methods but are by no means the only ones) and a topic that's managed and developed appropriately for the specific task.
- Display a familiarity with and understanding of the discourse styles of the discipline and/or assignment.
- Demonstrate the analytical skills of the writer rather than just repeating what others have said by summarizing or paraphrasing.
- Substantiate abstractions, judgments, and assertions with evidence specifically applicable for the occasion whether illustrations, quotations, or relevant data.
- Draw upon contextualized research whenever necessary, properly acknowledging the explicit work or intellectual property of others.
- Require more than one carefully proofread and documented draft, typed or computer printed unless otherwise specified.

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STUDENT SUPPORT SERVICES:
The following student support services are provided by the university and available to all URI students:

- Student support services such as counseling center: https://web.uri.edu/counseling
- Food assistance: https://web.uri.edu/rhody-outpost
- Bias resource team: https://web.uri.edu/brt

We are a community of learners, and I am here to support you in any way that I can. Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. As always, if you are comfortable in doing so, please let me know and I'll provide any resources that I can.

URI ANTI-BIAS SYLLABUS STATEMENT:
We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you are a target or a witness of a bias incident, you are encouraged to submit a report to the URI Bias Response Team at www.uri.edu/brt. There you will also find people and resources to help.

ACADEMIC SUPPORT SERVICES (Summer availability varies):
Disability accommodations and inclusion:
Your access in this course is important. Please send me your Disability, Access, and Inclusion (DAI) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DAI, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DAI can be reached by calling: 401-874-2098, visiting: web.uri.edu/disability, or emailing: dai@etal.uri.edu. They are available to meet with students enrolled in Kingston as well as Providence courses.

Office of Disability Services:
Americans With Disabilities Act Statement:
Any personal learning accommodations that may be needed by a student covered by the “Americans with Disabilities Act” must be made known to the university as soon as possible. This is the student’s responsibility. Information about services, academic modifications and documentation requirements can be obtained from The Office of Affirmative Action, Equal Opportunity, and Diversity (AAEOD). https://web.uri.edu/affirmativeaction/

Any student with a documented disability is welcome to contact me early in the semester so that we may work out reasonable accommodations to support your success in this course. Students should also contact Disability Access, and Inclusion Office, Office of Student Life, 302 Memorial Union, 401-874-2098. They offer online drop-in hours for student support: https://web.uri.edu/disability/

From the University Manual: 6.40.10 and 6.40.11 Accommodations for Qualified Students with Disabilities. Students are expected to notify faculty at the onset of the semester if any special considerations are required in the classroom. If any special considerations are required for examinations, it is expected the student will notify the faculty a week before the examination with the appropriate paperwork.

Academic Enhancement Center:
Success requires that you keep pace with the work, understand course concepts, and study effectively. The Academic Enhancement Center (http://www.uri.edu/aec/) is a great place to do this and they offer online services. The Academic Enhancement Center helps URI students succeed through three services: Academic Coaching, Subject-Based Tutoring, and The Writing Center. To learn more about any of the services below, please visit uri.edu/aec or call 401-874-2367 to speak with reception staff. AEC is located 4th floor of Roosevelt Hall.

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Subject Tutoring: To view more information about our offerings and schedules, please visit uri.edu/aec/tutoring.

Academic Skills Development resources helps students plan work, manage time, and study more effectively. All Academic Skills and Strategies programming are offered both online and in-person. UCS160: Success in Higher Education is a one-credit course on developing a more effective approach to studying. Academic Consultations are 30-minute, 1 to 1 appointment that students can schedule on Starfish with Dr. David Hayes to address individual academic issues. Study Your Way to Success is a self-guided web portal connecting students to tips and strategies on studying and time management related topics. For more information on these programs, visit uri.edu/aec/academic-skills or contact Dr. Hayes directly at davidhayes@uri.edu.

The Writing Center, located in Roosevelt Hall 009, provides free writing support to students in any class, at any stage of the writing process: from understanding an assignment and brainstorming ideas, to developing, organizing, and revising a draft. Fall 2020 services are offered through two online options: 1) real-time synchronous appointments with a peer consultant (25- and 50-minute slots, available Sunday - Friday), and 2) written asynchronous consultations with a 24-hour turn-around response time (available Monday - Friday). Synchronous appointments are video-based, with audio, chat, document-sharing, and live captioning capabilities, to meet a range of accessibility needs. View the synchronous and asynchronous schedules and book online, visit uri.mywconline.com.

BRIGHTSPACE SUPPORT SERVICES
The ITS Service Desk, located in the URI Library, is prepared to help students should they encounter problems with Brightspace. Please read through the following information:

1. For login problems, call the Service Desk at 874-4357.
2. The Service Desk Website, https://web.uri.edu/itservicedesk/ opens in new window, posts the semester operating schedule as well as a link on the right index to the self-help technical wiki. That site contains Brightspace help and instructions for both students and faculty.
3. Recommended browsers (those with the most QA testing effort against them) are Google Chrome, Safari, and Mozilla Firefox. The mobile versions of these browsers also work well with most operations in Brightspace. Internet Explorer is not recommended.

URI ONLINE LIBRARY RESOURCES
https://web.uri.edu/library/

BIOLOGICAL SCIENCES BEREAVEMENT STATEMENT
If you are grieving or have experienced the death of a loved one, the Biological Sciences Faculty, Staff, and Teaching Assistants understand and want to support you during this difficult time. The University Counseling Center can offer further support 24/7 (call 401-874-2288, https://web.uri.edu/counseling/crisis).

• If you have questions about missing “class” or your assignments, we encourage you to reach out to your Dean so they can notify all your instructors about your circumstances. If you are in University College, call 401-874-5903 and ask to speak to the UC Dean about a private matter; if you are in CELS, contact Dean Kim Anderson (kand@uri.edu; 401-874-5026) in the CELS Office of Student Affairs.
• Next, please reach out to me and together, we can make a plan that will allow you to be as successful as possible in this class during this tough time. Your mental health is so much more important than your grade in this class.

DISCLAIMER: The contents of this syllabus are subject to change at the instructor’s discretion.
## SUMMER SESSION COURSE ALIGNMENT

<table>
<thead>
<tr>
<th>Week</th>
<th>Laboratory</th>
<th>Learning Objectives</th>
<th>Assessments*</th>
</tr>
</thead>
</table>
| 1    | 0.5: Lab Tutorial, Lab Safety, Metric Measurement  
1: Applying the Scientific Method  
2: How Enzymes Function | Please see learning objectives for each laboratory activity below. | ● Each lab has a pre & post assessment.  
● Weekly discussion topic |
| 2    | 3: Chemical Composition of Cells  
4: Cell Structure & Membrane Transport  
5: Diffusion & Osmosis | Please see learning objectives for each laboratory activity below. | ● Each lab has a pre & post assessment.  
● Weekly discussion topic |
| 3    | 6: Cellular Respiration  
7: Mitosis & Meiosis  
8: DNA Biology & Technology | Please see learning objectives for each laboratory activity below. | ● Each lab has a pre & post assessment.  
● Weekly discussion topic |
| 4    | 9: Mendelian Genetics  
10: Human Genetics | Please see learning objectives for each laboratory activity below. | ● Each lab has a pre & post assessment.  
● Weekly discussion topic |
| 5    | 11: Microscopy: Histology - Muscle Tissue  
12: Cardiac Cycle | Please see learning objectives for each laboratory activity below. | ● Each lab has a pre & post assessment.  
● Weekly discussion topic |

**SUGGESTED COURSE SCHEDULE FOR ASYNCHRONOUS LEARNING**

Below is a suggested schedule for completing the lab asynchronously that follows a Monday, Wednesday, Friday schedule – the remaining days should be spent reviewing and studying the content. The best advice I can give you when learning asynchronously is to set a schedule and stay on top of the course requirements. Becoming a self-directed learner takes work, it is easy to fall behind and challenging to get caught back up. All lab activities, content, and assessments will be available on Brightspace and can be completed at anytime prior to the unit due dates. The lab activities are coordinated with the lecture topics to reinforce the biological concepts covered in these courses.

### SUMMER SESSION 1 SUGGESTED COURSE SCHEDULE (due dates below)

<table>
<thead>
<tr>
<th>Date</th>
<th>LAB</th>
<th>LABO 3 LAB Topics</th>
<th>BIO 101 Lecture Topic (Check their site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/22</td>
<td>M</td>
<td>0.5 Lab Tutorial, Lab Safety, Metric Measurement</td>
<td>Study of Life</td>
</tr>
<tr>
<td>05/24</td>
<td>W</td>
<td>1 Applying the Scientific Method</td>
<td>The Chemical Basis of Life</td>
</tr>
<tr>
<td>05/26</td>
<td>F</td>
<td>2 How Enzymes Function</td>
<td>Biological Macromolecules</td>
</tr>
<tr>
<td>05/29</td>
<td>M</td>
<td>3 Chemical Composition of Cells</td>
<td>Cell Structure</td>
</tr>
<tr>
<td>05/31</td>
<td>W</td>
<td>4 Cell Structure &amp; Membrane Transport</td>
<td>Plasma Membrane</td>
</tr>
<tr>
<td>06/02</td>
<td>F</td>
<td>5 Diffusion &amp; Osmosis</td>
<td>Metabolism</td>
</tr>
<tr>
<td>06/05</td>
<td>M</td>
<td>6 Cellular Respiration</td>
<td>Cellular Respiration</td>
</tr>
<tr>
<td>06/07</td>
<td>W</td>
<td>7 Mitosis &amp; Meiosis</td>
<td>Cellular Reproduction</td>
</tr>
<tr>
<td>06/09</td>
<td>F</td>
<td>8 DNA Biology &amp; Technology</td>
<td>Meiosis &amp; Sexual Reproduction</td>
</tr>
<tr>
<td>06/12</td>
<td>M</td>
<td>9 Mendelian Genetics</td>
<td>Mendel &amp; Heredity</td>
</tr>
<tr>
<td>06/14</td>
<td>W</td>
<td>10 Human Genetics</td>
<td>DNA Structure &amp; Function</td>
</tr>
<tr>
<td>06/16</td>
<td>F</td>
<td></td>
<td>Genes &amp; Proteins</td>
</tr>
<tr>
<td>06/19</td>
<td>M</td>
<td>11 Microscopy: Histology - Muscle Tissue</td>
<td>Basic Form &amp; Function</td>
</tr>
<tr>
<td>06/21</td>
<td>W</td>
<td>12 Cardiac Cycle</td>
<td>Animal Nervous System</td>
</tr>
<tr>
<td>06/23</td>
<td>F</td>
<td></td>
<td>Animal Reproduction</td>
</tr>
</tbody>
</table>

**DUE DATES** (individual units highlighted above) **PLEASE CHECK BRIGHTSPACE CALENDAR FOR DUE DATES:**

- **Unit 1 (red)** = Wednesday 05/31 (all unit 1 course work must be submitted by 11:59pm EST)
- **Unit 2 (orange)** = Friday 06/09 (all unit 2 course work must be submitted by 11:59pm EST)
- **Unit 3 (green)** = Monday 06/19 (all unit 3 course work must be submitted by 11:59pm EST)
- **Unit 4 (blue)** = Friday 06/23 (all unit 4 course work must be submitted by 11:59pm EST)

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### SUMMER SESSION 2 SUGGESTED COURSE SCHEDULE (due dates below)

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<thead>
<tr>
<th>Date</th>
<th>LAB</th>
<th>LAB 103 LAB Topics</th>
<th>BIO 101 Lecture Topic (Check their site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/26</td>
<td>M</td>
<td>0.5 Lab Tutorial, Lab Safety, Metric Measurement</td>
<td>Study of Life</td>
</tr>
<tr>
<td>06/28</td>
<td>W</td>
<td>1 Applying the Scientific Method</td>
<td>The Chemical Basis of Life</td>
</tr>
<tr>
<td>06/30</td>
<td>F</td>
<td>2 How Enzymes Function</td>
<td>Biological Macromolecules</td>
</tr>
<tr>
<td>07/06</td>
<td>T</td>
<td>3 Chemical Composition of Cells</td>
<td>Cell Structure</td>
</tr>
<tr>
<td>07/05</td>
<td>W</td>
<td>4 Cell Structure &amp; Membrane Transport</td>
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<td>07/10</td>
<td>M</td>
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</tr>
<tr>
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</tr>
</tbody>
</table>

**DUE DATES** (individual units highlighted above) **PLEASE CHECK BRIGHTSPACE CALENDAR FOR DUE DATES:**

- **Unit 1 (red)** = Tuesday 07/06 (all unit 1 course must be submitted by 11:59pm EST)
- **Unit 2 (orange)** = Friday 07/14 (all unit 2 course work must be submitted by 11:59pm EST)
- **Unit 3 (green)** = Monday 07/24 (all unit 3 course work must be submitted by 11:59pm EST)
- **Unit 4 (blue)** = Friday 07/28 (all unit 4 course work must be submitted by 11:59pm EST)

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LABORATORY LEARNING OBJECTIVES

Instructional Objectives: At the completion of this course, the students will be able to:

✓ Perform basic laboratory techniques using the Virtual Lab software including making observations, formulating hypothesis, collecting, and recording data, and interpreting results.
✓ Analyze and interpret data collected including identifying trends, making comparisons, and drawing conclusions.
✓ Effectively represent biological data in visual formats, including graphing, charts, and tables, using appropriate software tools.
✓ Troubleshoot common issues that may arise during a laboratory experiment, including problems with equipment, errors in data collection, or issues with the software itself.
✓ Apply biological laboratory skills and reasoning to real-world scenarios.

These specific laboratory learning objectives serve as your “study guide” for this course. Students should be able to....

Pre-Laboratory: Virtual Lab Tutorial
✓ Navigate the Virtual Lab software including accessing different features and menus, using tools and instruments, and interacting with simulations and virtual experiments.

Laboratory 0.5: Lab Safety
Hand Washing Procedure:
✓ Demonstrate proper hand washing procedure.
✓ Recognize importance of proper hand washing.

Personal Safety:
✓ Identify potential laboratory dangers and hazards.
✓ Identify proper safety equipment used in a variety of laboratory situations.

Laboratory 0.5: Metric Measurement
Length:
✓ Identify metric divisions on a ruler.
✓ Determine correct measurements of length using the metric system.
✓ Convert centimeters into millimeters.
✓ Identify importance of accurate measurements in scientific research.

Weight:
✓ Identify the importance of taring a scale.
✓ Determine correct measurements of weight using the metric system.
✓ Convert grams into milligrams and kilograms.

Volume:
✓ Recall how to properly read a graduated cylinder.
✓ Determine correct measurements of volume using a graduated cylinder.
✓ Convert milliliters and liters.
✓ Calculate volume of a sample drop of water.
✓ Calculate volume of an object using volume displacement.
✓ Recognize use of volume displacement in determining the volume of an object.

Temperature:
✓ Identify Celsius on a thermometer.
✓ Determine correct measurements of temperature using the metric system.

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Laboratory 1: Applying the Scientific Method: Pillbug Preference

- Determine the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Identify experimental and control groups.
- Create an appropriate graph of data.
- Analyze data to determine Pillbug preference.

Laboratory 2: How Enzymes Function

**Enzyme Activity:**
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Demonstrate understanding of how enzymes are specific for a substrate.
- Recognize enzyme specificity.
- Recognize that reactions (typically) require an enzyme.

**Effects of Concentration:**
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Analyze change of independent variable in an experiment.
- Identify correct measurement of product of an enzymatic reaction.
- Identify a negative control.
- Create an appropriate graph of data.
- Analyze data to determine that reaction rate increases with enzyme concentration.

**Effects of Temperature:**
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Identify correct measurement of product of an enzymatic reaction.
- Create an appropriate graph of data.
- Analyze data to determine that reaction rate increases with increased temperature up to a certain point of denaturation.
- Infer the effect of temperature on enzymatic reaction rate.

**Effects of pH**
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Infer the effect of HCl on pH.
- Infer the effect of NaOH on pH.
- Identify correct measurement of product of an enzymatic reaction.
- Create an appropriate graph of data.
- Analyze data to determine that there is an optimal pH for reaction rate.

Laboratory 3: Chemical Composition of Cells

**Test for Starch:**
- Identify a positive control in the test for starch.
- Identify function of a negative control.
- Interpret iodine test for starch data.
- Distinguish starch concentration based on iodine test for starch color.
- Apply knowledge of carbohydrates and iodine test to starch and glucose.

**Test for Sugars:**
- Evaluate erroneous results.
- Interpret Benedict test for sugar.

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✓ Distinguish sugar concentration based on Benedict test color.

Digestion of Starch (time permitted):
✓ Infer the rationale for use of a graduated cylinder.
✓ Recognize potential sites of contamination during experiment.
✓ Determine possible reasons for lack of results during experiment.
✓ Interpret results of Benedict test on digestion of unknown samples of water or starch.
✓ Apply knowledge of carbohydrate hydrolysis to Benedict test.

Test for Fat:
✓ Interpret results of lipid test.
✓ Infer identity of unknowns based on test results.

Test for Proteins:
✓ Infer the rationale for use of a graduated cylinder.
✓ Recognize a negative control.
✓ Interpret results of Biuret test.

Laboratory 4: Cell Structure and Function

Examining Plant and Animal Cells:
✓ Recognize animal and plant cells under a microscope.
✓ Identify and label basic cell structures on micrograph images.
✓ Label cell structures on animal and plant cell diagrams.
✓ Draw cell structures and label their functions.

Cell Membrane Transport:
✓ Recall the structure of the plasma membrane.
✓ Compare the various forms of transport across the plasma membrane, including passive and active processes.

Laboratory 5: Osmosis & Diffusion

Diffusion Across a Selectively Permeable Membrane:
✓ Determine the hypothesis for the experiment.
✓ Recognize an appropriate experimental design.
✓ Predict experimental outcome.
✓ Correctly interpret observations of the effect of diffusion.
✓ Interpret results of experiment to show the connection between molecular size and ability to diffuse across a membrane.
✓ Infer that diffusion of molecules occurs based on molecular size.

Movement of Water Across a Selectively Permeable Membrane:
✓ Define selectively permeable membrane.
✓ Determine correct measurement of fluid volume as a result of osmosis in different concentrations of solutions.
✓ Interpret results of experiment to show the connection between solution concentration and osmosis.

Tonicity in Red Blood Cells:
✓ Identify the hypothesis for the experiment.
✓ Recognize an appropriate experimental design.
✓ Correctly interpret observations of the effect of osmosis.
✓ Interpret results of experiment to show the connection between solution concentration and effect of osmosis.

Tonicity in Elodea Plant Cells: (time permitting)
✓ Identify the hypothesis for the experiment.
✓ Recognize an appropriate experimental design.
✓ Correctly interpret observations of the effect of osmosis.
✓ Interpret results of experiment to show the connection between solution concentration and effect of osmosis.

Laboratory 6: Cellular Respiration

DISCLAIMER: The contents of this syllabus are subject to change at the instructor’s discretion.
Measuring Energy Production in Plants:
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Recall purpose of polyester in the experimental set up.
- Infer how glass beads are used to ensure a proper experimental design.
- Calculate volume change during cellular respiration of germinating and non-germinating soybeans.
- Create an appropriate graph of data.
- Analyze data to determine the effect germination has on the amount of cellular respiration.

Yeast Fermentation: (time permitting)
- Identify the hypothesis for the experiment.
- Recognize an appropriate experimental design.
- Determine the purpose of disposing of pipettes with each solution.
- Recognize a negative control.
- Create an appropriate graph of data.
- Analyze data to determine the correct order from most to least amount of fermentation by yeast in 20 minutes.

Laboratory 7: Mitosis & Meiosis

Examining Mitosis:
- Order and label the phases of mitosis.
- Identify the correct phases of mitosis from micrographs of cells.
- Identify cells of an onion root undergoing mitosis.
- Draw and appropriately label the cell cycle.

Examining Meiosis:
- Order the different phases of meiosis I and meiosis II.
- Identify the correct phases of meiosis from micrographs of cells.
- Identify cells of germ-line cells and structures undergoing mitosis.

Laboratory 8: DNA Biology & Technology

DNA and RNA Structure:
- Label the components of a DNA molecule.
- Label a DNA molecule undergoing DNA replication.
- Label a DNA molecule undergoing transcription.

Isolation of DNA:
- Recognize importance of steps in DNA isolation
- Perform a DNA isolation.

Gel Electrophoresis:
- Identify equipment used for gel electrophoresis.
- Identify the function of equipment used during gel electrophoresis.
- Perform a gel electrophoresis.
- Interpret results of a gel electrophoresis experiment.

Laboratory 9: Mendelian Genetics

Fruit Fly Characteristics:
- Differentiate between male and female fruit flies.
- Determine the importance of fruit fly sex differentiation.
- Identify common fruit fly mutations (ebony, sepia eye, short wing, and white eye).
- Identify wild type fruit fly characteristics.

Monohybrid Fruit Fly Cross:
- Determine phenotypic ratio of assorted monohybrid fruit fly crosses based on parental genotypes.

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✓ Differentiate between long wing and short wing fruit flies.
✓ Determine phenotypic ratio of offspring based on fly counts.
✓ Determine parental genotypes based on phenotypic ratio of offspring.
✓ Determine genotypic ratio of offspring based on phenotypic ratio of offspring and parental genotype.

Dihybrid Fruit Fly Cross (time permitting):
✓ Predict phenotypic ratio of offspring from a dihybrid fruit fly cross using a Punnett-square.
✓ Perform a dihybrid fruit fly cross.
✓ Determine the reason for removal of adult flies during a fruit fly cross.
✓ Distinguish between phenotypes of a dihybrid fruit fly cross.
✓ Determine observed phenotypic ratio of offspring from a dihybrid fruit fly cross based on lab data.
✓ Compare predicted and observed phenotypic inheritance patterns of offspring.

X-Linked Fruit Fly Cross:
✓ Predict phenotypic ratio of offspring from an X-linked fruit fly cross using a Punnett-square.
✓ Perform an X-linked fruit fly cross.
✓ Match genotype with phenotype for an X-linked gene.
✓ Determine the reason for a one-week incubation of the parental generation during a fruit fly cross.
✓ Determine the reason for removal of adult flies during a fruit fly cross.
✓ Distinguish offspring of an X-linked cross.
✓ Determine observed phenotypic ratio of offspring from an X-linked fruit fly cross based on lab data.
✓ Compare predicted and observed phenotypic inheritance patterns of offspring.

Laboratory 10: Human Genetics:

Genetic Inheritance:
✓ Recognize examples of phenotypes.
✓ Interpret a pedigree to determine dominant and recessive phenotypes.
✓ Recognize genotypes in their abbreviated form.
✓ Interpret a pedigree to determine genotypes.
✓ Infer likelihood of X-linked mutations in males compared to females.
✓ Interpret genotype to determine phenotype.

Laboratory 11: Microscopy

Histology: Muscle Tissue:
✓ Utilize microscopy to observe and identify the different types of muscle tissue.
✓ Identify structures such as muscle cell type, nucleus, striation (if present), in muscle tissue.
✓ Recognize the three factors that determine the quality of a microscopic image.

Laboratory 12: Cardiovascular Physiology

Cardiac Cycle:
✓ Explain the general anatomy of the heart.
✓ Identify the chambers and valves of the heart.
✓ Identify the components of the cardiac conduction system.
✓ Sequence the phases of a cardiac cycle.

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