# Syllabus for Foundations of Biostatistics (BIOL 350)

**Fall 2019**

Gregg Hartvigsen  
Version date: August 23, 2019

“Knowledge is power.” Francis Bacon (1561-1626)  
“To measure is to know.” Lord Kelvin (1824-1907)  
“Heavier-than-air flying machines are impossible.” Lord Kelvin (1824-1907)  
“Knowledge is good.” Emil Faber. Founder of Faber College (see documentary: Animal House, 1978)  
“Knowledge comes from collecting, analyzing, visualizing, and interpreting information correctly.” Gregg Hartvigsen

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meetings</strong></td>
<td>MF 2:30 - 3:45, ISC 115</td>
</tr>
</tbody>
</table>
| **Dr. H’s info** | Office = ISC 360 = college safe zone:  
Office phone = 245.5448  
Email = hartvig@geneseo.edu  
Office hrs = M 4:00 - 5:00, T 11:00 - 11:00 |
| **TAs** = Claire Prunier (cmp30) and Emma McMahon (eem19) | Times and place will be announced |
| **Required textbook** | Hartvigsen (2014). You might choose to bring this to class. |
| **Required laptop (not chromebook)** | Bring this to all meetings, unless otherwise instructed. Also, bring a power cord. |
| **Required software (free)** | Excel (or similar), R (version 3.6.1 or later), RStudio (version 1.2.1335 or later), and LaTeX. |
| **Cloud storage (free)** | You are expected to keep all files from this class in a folder that automatically syncs in the cloud. This can be through “Google Backup and Sync” (recommended), Dropbox, OneDrive, or iCloud. |
| **Calculator** | Absolutely forbidden. |

## Course Resources

1. **Me!** Please consider me a member of your academic success team. It’s not you against me. It’s you and me against me. I can be helpful with R. Come to office hours.
2. **Your TAs!** The TAs are experienced and will likely be able to answer any question you have. They will not tell me you asked an especially simple question. Note that we love answering stupid simple questions because they’re the ones we probably can answer! So, ask away - you are in a safe place! The only thing that matters is that you get answers to your questions. We’re here to make that happen.
3. **Book:** The required book [Hartvigsen (2014)] was written based on my teaching of this course. It is a brief introduction to biological data analysis and visualization using R. Each chapter has problems that you should be able to complete on the day the chapter is due. The book was written using RStudio and LaTeX, skills you will have by the end of the course!
4. **Post-lecture notes.** After lectures I’ll post the notes on Canvas.
5. **ICEs.** These are in-class exercises, provided on Canvas, that will have background information for a specific topic, instructions, sample code, and problems to complete. These are integral parts of the course and your knowledge of these will be rewarded on exams.
6. **Old exams.** Some old mid-term and final exams are available in my Geneseo “Outbox” in the BDA folder. For help on boxes see [https://wiki.geneseo.edu/display/cit/Inboxes+and+Outboxes](https://wiki.geneseo.edu/display/cit/Inboxes+and+Outboxes).

7. **Additional resources for help using R.**
   
   (a) You can Google search questions pretty effectively.
   
   (b) A quick entry to the breadth of the R software packages can be found through the [Cran Task Views](https://cran.r-project.org/web/views/).
   
   (c) Please ask me or the TAs for help before emailing a list or people you find online.

8. **Let’s do lunch!** This is an opportunity to chat about anything - the course, undergraduate research, life goals, post-graduate opportunities, juggling, hitchhiking, motorcycles, music, tennis, racquetball, squash, nature, cycling, the next exam, whatever. Please gather a group of two or more. The venue is your choice. We each pay for ourselves (i.e., “Dutch treat”).

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**Overview**

This is a course on empowerment and discovery in biology. It’s designed to be an introduction to the management, visualization, analysis, and interpretation of biological data. The process of understanding what data are telling us requires proficiency in a range of fundamental procedures, from the design of experiments through the generation of results to the interpretation of biological information to the presentation of data and ideas. Your ability to challenge ideas with data should be helpful and inspiring to you. If you seek to understand and solve problems in science or critically assess the meaning of biological information (e.g., as a doctor, PA, ecologist, or reader of the news and interpreter of statements by politicians) then you are in the right place.

In this course you will survey a variety of statistical approaches which should help you be able to think more creatively. Biological data analysis is, however, an ever-expanding area of inquiry. New methods are being developed daily. New data also are creating the need for new types of analytical tools. You will be learning to use the program R to perform your analyses and create professional-quality visualizations because all new analytical procedures are being developed in this environment.

My goal is for you to learn how to solve problems. This will require that you push yourself to solve your own problems. The TAs and I are glad to help but part of your learning will involve figuring out how to find answers to your questions.

You, no doubt, will forget how the data are supposed to be entered for a particular test or how to do something cool when making a graph. But you don’t have to remember everything because you’ll develop many script files that you can simply reuse. Be sure to name your files appropriately (do not name your work on a t-test “lab7.r”). What I hope you get (or keep) is the attitude that you can figure anything out.

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**A peek at what happens during a typical class**

We often begin discussing a few basic principles for the day regarding statistics, visualizations, experimental design, and/or the interpretation of information. We then apply this information to solve an in-class exercise (ICE) using R. The most common suggest on my SOFIIs is that I should lecture more. I like lecturing but I think you’ll learn more by doing.
Expected Learning Outcomes

If you successfully complete this class your ability to critically assess commonly encountered biological information will improve. Specifically, you will be able to:

1. work with data. This will involve finding, entering and/or “reading in” data, saving data and organizing and manipulating data. To accomplish this you will learn how to use both Excel and the R statistical and programming language;
2. identify correctly basic experimental design principles that are used to answer a variety of biological questions;
3. correctly develop and test hypotheses statistically using data;
4. understand the differences between parametric and non-parametric statistical tests;
5. create appropriate publication-quality visualizations of results;
6. correctly identify and report, in appropriate scientific format, the results of a statistical test;
7. write a professional-looking report using Sweave and LATEX (pronounced lay-tech);
8. explain the meaning of quantitative results (and accompanying visualizations), whether done by you or others (e.g., in books, papers, presentations, and news media);
9. conduct an original project that requires gathering, analyzing, and graphing data using R that assesses a comprehensive biological problem and culminates in an oral, poster-based presentation;
10. write and use your own functions;
11. write computer programs in an object-oriented programming language, including “for” and “while” loops, and “if” conditional statements.

These outcomes are aligned with the report “Scientific Foundations for Future Physicians” produced by the Association of American Medical Colleges and the Howard Hughes Medical Institute, 2009. This report states that

...biology students must be able to “apply quantitative reasoning and appropriate mathematics to describe or explain phenomena in the natural world.”

and:

“It is essential not only to read the medical and scientific literature of one’s discipline, but to examine it critically to achieve lifelong learning. These activities require knowledge and skills in critical analysis, statistical inference, and experimental design.”

Additionally, [Schwartzstein et al. (2013)] state that students taking the MCAT are required to demonstrate

1. “scientific reasoning and problem solving by reasoning with scientific principles, theories, and models and by analyzing and evaluating scientific explanations and predictions;
2. reasoning about the design and execution of research by demonstrating their understanding of important components of scientific research and by reasoning about ethical issues in research; and
3. data-based and statistical reasoning by interpreting patterns in data presented in tables, figures, and graphs and by reasoning about data and drawing conclusions from them.”
We can achieve these outcomes by working together. You are more likely to achieve these if you actively play with data analysis and modeling techniques. You should work to solve all problems posed in the ICEs and your book. Those questions may appear on an exam. Use R in your other classes to solve problems, too. And write up lab reports using Sweave from within RStudio. These skills will come back to reward you. The evidence of others using this platform are found in leading scientific journals, including Science, Nature, and PNAS. It also is an important analytics program used extensively by a variety of organizations, including Pfizer, Merck, Google, Facebook, Mozilla, Microsoft, NY Times, Shell, and others. Also, the data skills you learn in this class will help you get into med school (see the MCAT test) or graduate school (see the GRE test) and help you succeed when there.

Finally, by the time you successfully complete this course you should be able to counter the following misguided thinking:

**Why do we need to use statistics and mathematics in biology?** If the hypothesis is clear, the experiment is designed correctly, and the data carefully collected, anyone should be able to just look at the data and clearly see whether or not the hypothesis is supported. Statistical procedures and mathematical tricks are simply safety nets and smoke screens to cover up sloppy science.

**Expected Learning Shortcomings (things you won’t likely learn)**

Biology is an extremely broad and rapidly changing, data rich discipline. Techniques used to understand and visualize biological information are being developed and implemented continuously. This course introduces you to the most widely used platform for understanding biological information but you’ll see only the most basic principles and procedures. However, if you open a recent issue of the journal Science or Nature you’ll find analyses and visualizations that you will do in this class and that you can do if you do research with those scientists. But do keep in mind that, as you grow in ability, you will need to explore strange new statistics, to seek out new data and new visualizations, to boldly go where at least you have not gone before to be a part of modern biology.

**Grading**

Below are the basic assessment tools for this class. These include homework assignments, R Challenges during part of a class, a mid-term and final exam, and a final project. I don’t post grades on Canvas - it is your responsibility to keep track of your grades and weights to know what your grade is during the class. Your final grade proportion will be converted into a letter grade using the following ranges.

<table>
<thead>
<tr>
<th>Score</th>
<th>Letter Grade</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.933</td>
<td>A</td>
<td>0.900</td>
</tr>
<tr>
<td>0.900</td>
<td>A-</td>
<td>&lt; 0.933</td>
</tr>
<tr>
<td>0.867</td>
<td>B+</td>
<td>&lt; 0.900</td>
</tr>
<tr>
<td>0.833</td>
<td>B</td>
<td>&lt; 0.867</td>
</tr>
<tr>
<td>0.800</td>
<td>B-</td>
<td>&lt; 0.833</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that I will round your grade UP to three decimal places using Excel’s function CEILING(number, 0.001). The college rounds grades DOWN (truncates) when calculating your
GPA (see pages 15-16, 2018-2019 College Bulletin). In the Bulletin the college tells you that a student earning a GPA of 2.728571 will have a GPA = 2.72! They probably round down your cumulative GPA, as well! To help counter this I will take a grade of, say, 0.832105, which would be a B-, and round it up to 0.833, making it a B. Note, too, that the college gets you again by making a a B+ 3.3 “quality points” instead of 3. You get a GPA boost for getting a grade with a minus (e.g., A- = 3.7 instead of 3.6). So, maybe it’s a wash, but you might go look at your grades. If you have more grades with a “+” then you’re getting stiffed quantitatively. You also might check to see if your grades are normally distributed. Most students grade distributions are not normally distributed and skewed left, meaning something you should be interested in.

Assessments

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Number</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>Short, written challenges assessing competencies with concepts and possibly hand-writing R code</td>
<td>2</td>
<td>5 ea</td>
</tr>
<tr>
<td>R Challenges</td>
<td>Solving problems using R script and Sweave files</td>
<td>2</td>
<td>15 ea</td>
</tr>
<tr>
<td>Homeworks</td>
<td>Problems with strict due dates/times. May be to just submit answers to ICE and/or book questions</td>
<td>~ 5</td>
<td>10 ea</td>
</tr>
<tr>
<td>Project proposal</td>
<td>One page, paper copy</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Speed Presentation</td>
<td>2 minutes, one slide</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Project presentation</td>
<td>Presentation and poster</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>Written + computer</td>
<td>1</td>
<td>20 + 40</td>
</tr>
<tr>
<td>Final exam</td>
<td>Written + computer (cumulative)</td>
<td>1</td>
<td>30 + 60</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>350</td>
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</tbody>
</table>

Quizzes. These are short opportunities for 5 points.

Homeworks. These are assignments you bring in printed on paper. These you need to hand in at the beginning of class, only. Expect the printer you want to use to be down so complete and print this well before class starts.

Exams. Exams are cumulative. They will have two parts. The first will be a written part that takes about a third of the time. Once you hand that in you can proceed to open your computer and do the computer part. The written exams are closed book. The computer exams are open (book, notes, computer, and internet). For all exams you are not allowed to communicate with anyone (chatting, talking, texting, or emailing, unless otherwise instructed). The computer part needs to be completed and emailed to me when you are done (attaching just the .rnw file). Gmail attaches a time stamp for when you send it to me. It’s tempting to stop working when “time” is called and then try to send it. Each minute the exam is late costs 5% of the overall exam grade.

Project proposal. This is a one page proposal that needs to convince me that you’ve done your homework to find a project you can complete. You need to convince me that you have a clear question, or set of questions that are biologically oriented and that you have found data that you can use. This should include citations and/or links to data. This proposal requires approval. If your project is not approved you have one week from the time I hand it back to redo it and submit it for approval. Your grade will not change on this assignment but getting steered onto a new, better path will pay dividends on the presentation.
Semester project

This is a solo project that will give you, if done well, an awesome talking point during a job, grad school, or med school interview. You will present a projected poster (single slide) of a deep analysis of an original hypothesis, or hypotheses, using real data (e.g., from journals, your own original research (no part can have been previously presented), or using data found on the internet; e.g., CDC at https://www.cdc.gov/). All the files for this project need to be emailed to me by 11:59pm on the last day of classes. You must provide the data and the R script files used to complete all the analyses from your presentation and produces your graphs so that I can simply run the script file. Each 24-hour period after the due date/time that the project is handed in late will accumulate a 10% grade deduction for your project. If the R script file doesn’t work you lose 20% of the points for the project. You have 5-minutes only for the presentation. You will be describing the important parts of your poster and likely answering questions. You will not want to talk slowly and use filler/fluff to buy time and you don’t want to get cut off at 5 minutes, unable to provide a conclusion, for instance.

The presentations will be completed during a randomly determined time slot during the final exam period. You are welcome attend any other presentations but this is not required. You should arrive well before your time slot in case we’re running ahead of time or someone skipped/missed their time slot. Missing your time will result in a 25% loss assuming you’re still allowed to present. No guarantees are made about when or if you can present if you are not present during your assigned time. If you miss the presentation you will be charged 50% of the grade.

For this project you will need data. Be warned: good science is hypothesis driven. You always should

1. develop a question;
2. phrase the question as a testable hypothesis;
3. get the appropriate data to answer the question;
4. answer the question.
5. share the result with clean data analysis and beautiful, revealing visualizations.

You should not build a project around whatever data you can find. [This paper] raised an important issue about whether people who analyze other people’s data are just scientific parasites. An interesting rebuttal to that paper can be found here: “The one true route to good science is...” Do check these out before spending a lot of time on your project.

Here are some rules to keep in mind for this project. Ignore these at risk of losing an indeterminant number of percentage points from your project.

1. Submit one zip file. All the files must be named Lastname-Firstname.extension (extensions are likely .csv, .r, and .pdf). Do not name a file “presentation1.pptx” or “FOBproject.r”. If you don’t follow this you’re giving me permission to subtract 5% of your grade from the project before seeing it.
2. Data analyses must work. You can’t get a passing grade on this project if your code does not complete the analyses and make the visualizations used in your talk. If you have strange R packages then include one or more lines like this at the top of the file:

   # install.packages("package.name")

   If necessary I will simply uncomment those lines and install the packages myself. Another common mistake is to set the working directory on your computer in the code (setwd()). This will make your code NOT work on my computer.
3. **Poster structure.** There are many good examples of how to construct an effective scientific poster. A good project presentation will flow much like a good scientific paper:

(a) **Descriptive title.** This shouldn’t be a tease - it should be \( \leq 10 \) words. Include your name underneath.

(b) **Abstract.** A 150 word summary. About one sentence for each section: Introduction, Methods, Results, Discussion.

(c) **An Introduction.** Introduce the problem and why your audience should care. Citations expected.

(d) **Methods.** Describe how the data were originally collected and what you did to analyze the data. Results from normality tests, if necessary, would go here because it justifies why you did a particular test. If showing how the data are distributed is a result then it belongs in the results section.

(e) **Results.** Share what you found. There should be graphs and results from statistical tests (e.g., the ANOVA table).

(f) **Discussion.** What do your results mean? Pull together the significance of your results.

(g) **Acknowledgments and citations.**

Good posters generally have few words and many self-explanatory visualizations. Below is the approximate rubric for your presentation evaluation. The actual rubric may differ slightly from this.

The poster:

(a) was professionally structured. Not too much text. Majority of the space was occupied by visualizations. The locations and lengths of the title, abstract, intro, methods, results, discussion, citations, and acknowledgements were professional;

(b) included publication-quality visualizations with appropriate captions;

(c) included results that were concise and referenced all visualizations;

(d) included appropriate and correctly executed statistical tests and results to tell a logical story. Appropriate statistical information was included;

(e) asked and answered appropriate questions for this class;

(f) relied on extensive/appropriate data to answer the questions asked;

(g) included correct/appropriate citations and acknowledgements.

The presentation of the poster:

(a) was well organized to lead listeners through a well structured story told by the data, visualizations, and analyses;

(b) was described verbally at an appropriate depth in the time permitted (5 minutes). You didn’t waste an opportunity (it was too short) and you didn’t get cut off and not finish because you planned more than 5 minutes;

(c) included, if appropriate, precise and concise answers to questions.

**Note:** You do NOT print the poster out. It is projected using my computer.

**Project Ideas**

Wow. So many possibilities! Projects have ranged from creating a simple stochastic model of logistic growth and analyzing the data to very large-scale, comprehensive analyses of different disease incidence rates across different countries.

One thing to keep in mind is that, at this point in time, R has become ubiquitous in scientific data analysis, particularly in biology. It is possible to find all sorts of data sets with associated
R script files that will crunch the data in a variety of ways and produce amazing visualizations. You, however, will be evaluated on your creativity, difficulty, and the work you do. This is like an Olympic diving competition - it’s a combination of difficulty and execution. If you lift a project then your learning and grade will suffer.

Keep in mind the TAs and I can usually help you. Sometimes, however, other faculty members in the department will be great resources for understanding the system you’re studying. I’m an ecologist so can usually be somewhat helpful in this area. If you find ecology revolting that’s OK! But I might not be a lot of help with the biology of your particular system. Also, keep in mind that if you choose a project that is way over your head, and it remains that way until the end, your grade will suffer! Given all this, here are few ideas:

1. Talk to a professor and, possibly, develop a research project with them that involves helping them analyze some of their data.
2. You are in a lab doing independent research already and want to “double-dip” so you can better understand the data. You may NOT use someone else’s analysis for this project. But if this is something you’re working on and hope to present at GREAT Day, for instance, you’re in business. Also, clear this with me.
3. Check out data online, of course, such as Dryad Data Outlet, state cancer profiles, State Cancer Profiles, Ecological Data Wiki or Nature Serve, the Ecological Society of America’s data archive site and Blast genomic data.
4. Most add-on packages in R come with data sets (e.g., see R data sets). Type > data(data) at the console and a file will be opened and available. These are not appropriate for this project since code is provided for analyzing these data.

Note that proceeding without talking to me is not recommended. There always seems to be someone who goes off in a direction with the best of intentions but without realizing they have no oars, no rudder, no life vests, no nothing. Don’t be that person! Use the resources available to you. Consider me and TAs to be your group members.

Work handed in late

All work excluding exams will be charged a value of 20% per 24-hour period the work is late. Submitting exams late will cost 5% per minute on the time stamp of the last email in which the file(s) are sent.

Religious observances

It is my responsibility, as outlined in the College’s Undergraduate Bulletin, to accommodate religious observances. No exams have been scheduled to occur on notable observance days. However, as stated in the 2016-2017 Bulletin, I am “to comply in good faith with the provisions of... ” section 224-a of the Education Law of New York State. I am happy to meet your needs if you inform me of any such absence at least one week prior to the conflict. Without you providing me this information I may not be able to meet your learning expectations for the class.

Schedule

Note: bring your computer unless otherwise instructed. Also, the first day survey should be completed by 11:59pm on the first day of classes.
<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Activity, Topic</th>
<th>Prep for Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/26/2019</td>
<td>Mon</td>
<td>Introduction to class + data analysis</td>
<td>Chapt. 0 - the book’s introduction.</td>
</tr>
<tr>
<td>9/2/2019</td>
<td>Mon</td>
<td>Labor Day - No Class</td>
<td></td>
</tr>
<tr>
<td>9/6/2019</td>
<td>Fri</td>
<td>Go over homework. Extending getting data into R - Webplot Digitizer</td>
<td>HW: All probs for Chapt 1 + 2.</td>
</tr>
<tr>
<td>9/9/2019</td>
<td>Mon</td>
<td>A written quiz. Crash course in statistics for the project</td>
<td>Quiz - Be familiar with the major statistical tests in book. Skim through the entire book looking at chapters and section headings</td>
</tr>
<tr>
<td>9/13/2019</td>
<td>Fri</td>
<td>Working with data</td>
<td>HW: Your choice. Chapt. 3</td>
</tr>
<tr>
<td>9/16/2019</td>
<td>Mon</td>
<td>Introduction to Sweave/LaTeX</td>
<td>Make sure that Sweave works (in Rstudio try File -&gt; New File -&gt; R Sweave. Type some words, and click on “Compile PDF”)</td>
</tr>
<tr>
<td>9/20/2019</td>
<td>Fri</td>
<td>Tell me about my data</td>
<td>HW: Chapt. 4 problems. Hand in paper copy of pdf made using Sweave</td>
</tr>
<tr>
<td>9/27/2019</td>
<td>Fri</td>
<td>R challenge</td>
<td>Organize code for R challenge</td>
</tr>
<tr>
<td>9/30/2019</td>
<td>Mon</td>
<td>Probability</td>
<td></td>
</tr>
<tr>
<td>10/4/2019</td>
<td>Fri</td>
<td>Hypotheses + Experimental design</td>
<td>Chapt. 6</td>
</tr>
<tr>
<td>10/7/2019</td>
<td>Mon</td>
<td>Catch up and review of questions for exam</td>
<td></td>
</tr>
<tr>
<td>10/11/2019</td>
<td>Fri</td>
<td>Intro to statistical inference, p-values, and errors</td>
<td>Chapt. 6, sections 6.6-6.8</td>
</tr>
<tr>
<td>10/14/2019</td>
<td>Mon</td>
<td>October Break - No Class!</td>
<td></td>
</tr>
<tr>
<td>10/18/2019</td>
<td>Fri</td>
<td>One-sample tests</td>
<td>Chapt. 7, sections 7.1-7.2</td>
</tr>
<tr>
<td>10/21/2019</td>
<td>Mon</td>
<td>Two-sample tests</td>
<td>Chapt. 7, section 7.3</td>
</tr>
<tr>
<td>10/25/2019</td>
<td>Fri</td>
<td>Mid-term exam</td>
<td>Written (15 minutes) and computer (1 hr).</td>
</tr>
<tr>
<td>10/28/2019</td>
<td>Mon</td>
<td>Speed Presentation: Project update - 2 min presentation using my computer. Explain one key result.</td>
<td>Send PPT slide by Sun, 10:27 @ 5:00pm. Provide one Powerpoint slide that has a title slide, your name, and one clear, central visualization with data analysis result</td>
</tr>
<tr>
<td>11/1/2019</td>
<td>Fri</td>
<td>One-way ANOVA</td>
<td>Chapt. 8, sections 8.1-8.2</td>
</tr>
<tr>
<td>11/4/2019</td>
<td>Mon</td>
<td>Visualizing ANOVA data (error bars and post-hoc tests)</td>
<td>Chapt. 11, sections 11.2-11.3</td>
</tr>
</tbody>
</table>
Electronic distraction devices, drugs, and other disabilities

In my classes we both agree not to text, chat, “do” Facebook or Instagram, recreationally watch YouTube videos, message, or do similar electronic gaming or distracting activities during class (laptops can be used for taking notes but please don’t violate the expectations above). Why? These activities are distracting to those around you. I think we both deserve respect in the classroom. If you ask me a question you certainly expect and deserve my full attention.

We also agree not to consume alcohol or other recreational drugs during class or come to class impaired by such activities. If either of us finds scheduling these activities (e.g., texting or doing drugs) around class time difficult then we should seek professional help (e.g., through the Lauderdale Center for Student Health & Counseling).

Additionally, those of us who teach at SUNY Geneseo will do our best to make reasonable accommodations for students with documented physical, emotional, or cognitive disabilities. In addition, we will do our best to accommodate challenges brought about through pregnancy,
parenting, or care giving. Students should contact the Office of Disability Services (585-245-5112) and me to discuss needed accommodations as early as possible in the semester. Note that I happily will help you to take exams in the Test Center (https://www.geneseo.edu/is/testcenter/main) during the regularly scheduled exam times.

Dishonesty

ALL WORK MUST BE YOUR OWN. Do not plagiarize from others, including classmates, previous classmates, and external sources. All code you provide that I didn’t write must be your own. That means, if asked, you could tell me what it all does. It’s okay to use external literature sources but cite them completely. Do not try to find code online that you think solves your problem but you have no idea what it does. The assignments and assessments are designed so that you can complete them yourself! Please see the College’s policy on academic dishonesty.

Minimum Competence in Biology

To graduate with a Biology major, students must attain a grade of C- or better in all required Biology courses (excluding Biology electives). A grade of C- must be achieved in any course before it may be used as a prerequisite for another course. A student may only repeat a required Biology course or related requirement once for major credit and the course must be taken at the next offering of the class (provided there are seats available). If a student does not earn at least a C- on the second taking of the class, she/he will not be able to complete the Biology major.

References
