Biostatistics for Biology Majors (BIOL 214) syllabus.

Fall 2026

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}}\ e^{-\frac{1}{2}\left(\frac{y-\mu}{\sigma}\right)^2}$$

I. Basic course information:

Lecture instructors:

Section 001 (M/W/F 10:30 - 11:20): Professor **Sarah Qureshi,** *squresh@gmu.edu*
Section 002 (M/W 4:30 - 5:45): Professor **Arndt Laemmerzahl**, *alaemmer@gmu.edu*
Section 003 (T/R 7:20 - 8:35): Professor **Durwood Moore,** *dmoore25@gmu.edu*
Sections DL1/DL2: Professor **Marieke Kester**, *mkester2@gmu.edu*
- both sections are online and asynchronous except for exams.

Course coordinator: Arndt F. Laemmerzahl

Office: Exploratory Hall, 1206
Phone: 993-5608. ***Please do <u>not</u> leave voice mail***.
Email: *alaemmer@gmu.edu*. The best way of getting in touch.

Office hours: see web page.

Course web page: *http://mason.gmu.edu/~alaemmer/bio214/main.html*

This page will have homework assignments and other useful information posted. It also has lecture notes for Professor Laemmerzahl's lecture as well as a text based on the lecture notes.

Lecture instructors may also make extensive use of Canvas and/or have their own web page. You will be informed about this by your lecture instructor.

II. Books, manuals, etc.

Text: There is no text to purchase for Biology 214. Instead, we will use the lecture notes available on the course web page. There are also lecture notes on the web page, but these are slowly getting out of date (the text is regularly updated).

Note *that if you wish to use the notes/text on the exams, you will need to print them off (sorry!).*

The only electronic device you are allowed to use on exams is a calculator.

No tablets, no computers, no phones, no watches, no smart glasses, etc.

Software: R statistical software - available at *http://www.r-project.org/*

This is open source software and is free. It is also better than most other non-free statistical software, and is available for Windows, Mac-OS, and Linux.

Please follow the instructions on the course web page to install this software.

Instructions for using R will be available during lecture, recitation, and through the notes.

Note that R can be a bit of a pain to use until you get used to it. Nevertheless, you will need to learn some basic R. *Important: despite what some people say,* ***Excel is NOT a statistical package*** *and you are not allowed to use Excel for any actual analyses.*

We will also be using RStudio (*https://posit.co/downloads/*); this is a convenient interface for R. The free version is more than powerful enough (the paid version is for large corporations that need extra support).

Calculator: You will need a calculator that has statistical functions.

Chances are that if you own a "fancier" (e.g. scientific) calculator it will include these functions. There are some TI's available for under $20.00 that will do (try the TI-30X IIS). I'm not endorsing TI, I just happen to know that model will do everything you need. You can use whatever brand you wish, but it is *your responsibility* to figure out how it works.

You may ***not*** use your phones on exams, so yes, you do need a separate calculator.

III. Exams (and quizzes):

Two regular exams and a final (but see comment on quizzes and attendance). Your lower regular exam will count for 15% of your grade, your higher regular exam will count for 30% of your grade. Please note that ***there is no possibility of a makeup exam under <u>any</u> circumstances****. The final is worth either 25 or 30% of your grade depending on whether or not your instructor grades on attendance or gives quizzes (*see note on quizzes and attendance below*).

(*In case of a <u>real emergency</u> you must let your instructor know before the exam or <u>no later than 12 hours after the exam.</u>)

Exam I: Wednesday September 30 / Thursday, October 1 / Friday, October 2
Exam II: Wednesday November 4 / Thursday, November 5 / Friday November 6

(The on-line sections will be on a similar schedule which will be announced in class)

Final exam times:	MWF	10:30 - 11:20	Wednesday 12/9 @ 10:30 a.m.
	MW	4:30 - 5:45	Wednesday 12/9 @ 4:30 p.m.
	TR	7:20 - 8:35	Tuesday 12/15 @ 7:30 p.m. ***(note time!)***
	On-line classes		TBD in class.

Some comments on exam structure:

Exams will have both an closed book and open book part.

For the closed book part you are not allowed to use anything (***no calculator!***) except something to write with.

For the open book part you may use anything written. The only electronic device you are allowed to use is a calculator (*no phones, computers, tablets, watches, smart glasses, etc.*).

Also note the following:

You need to make sure you know how your calculator works.

You will still need to show all the steps in each problem. *You will not get full or partial credit if you just write down an answer your calculator spits out!*

Generally, exams are not cumulative, but you may need to know some of the material covered by a previous exam to understand the material on the current exam. This is particularly true of the final, which is partly cumulative.

Attendance and Quizzes: Some instructors may encourage attendance by giving pop quizzes. If they do, then 5% of your grade will come from quizzes, and the final will be worth 25%. *You will be informed of this by your instructor before any quiz is given.*

As an alternative to pop quizzes, some instructors may grade on attendance. In this case your instructor will provide the details. If attendance is graded directly this will be worth 5% of your grade and the final will will be worth 25%.

IV. Homework & Recitation.

Recitation is an important part of the course, and is worth 25% of your grade. It is an opportunity for you to ask questions, get personal attention, and learn how to use R:

0) All recitations (except those specifically marked in the schedule of classes) are live and in person.

1) You will be given a math assessment on the first day of recitation. Please do the best you can - it's designed to let you know if you need help with basic mathematical principles. This is worth 1% of your grade.

2) You will be given homework assignments every week. All problems will need to be completed by the following recitation. About half of these will be discussed in class, the other half will be handed in and graded. You will not know which are which.

Each student will present <u>at least</u> two homework problems during the course of the semester. You will be selected at random to present a homework problem.

Depending on the size of your recitation section and other factors, you may need to present more than two homework problems (*possibly up to six, for very small classes*).

The total number of homework presentations will be worth 6% of your grade in BIOL 214 (see below for a breakdown of recitation).

3) ***If you are not present when you are called up for your presentation, you will get a "0" for your presentation for that day.***

4) Late homework assignments are penalized as follows:

On time: **full points/credit** possible (each homework is worth 1.5 points (= 1.5%)).

Late:	Same day:	**-0.5 points.**
	Following day until the following recitation:	**-1.0 points**.
	After the following recitation:	**-1.5 points** (so, 0 points)**.**

Exception: the last homework assignment must be handed in on time or you will get no credit.

Warning: all outstanding/incomplete assignments or other issues involving recitation must be resolved by your last day of recitation. No exceptions.

Your instructor may make exceptions for unusual or unforeseen circumstances, but it is your responsibility to contact your instructor about this.

5) Other comments about homework:

E-mailed homework will not be accepted.

If your printer is not working, please use a campus printer ("my printer wasn't working" is not an excuse for late assignments).

6) The remainder of your time in recitation is an opportunity to use/discuss R or statistical concepts.

You will often need to use of R to solve homework problems. If you do not know how to use R, you will not be able to do all the problems. ***Not knowing how to use R (or claiming "R is not working") is NOT an excuse for not doing a homework problem.***

Some ideas or concepts in statistics can be difficult, and recitation may be a good time to go through some of these.

7) Your recitation instructor will provide you with more details about recitation.

8) Copying answers from other students or from previous classes is a violation of academic integrity (see below)! Using or getting help from any form of AI is also (obviously!) a violation. (Note that AI can and does make mistakes!). We are also well aware of sites like Chegg (or similar) and we do monitor these - please don't do anything stupid.**

****If you do need help talk to your recitation instructor or use the free tutoring service.**

9) To summarize, grading for recitation is as follows:

1 math assessment (in class)	= 1%
12 homework assignments at 1.5% each	= 18%
2 - 4 presentations (depending on class size)	= 6% overall
Total	= 25% of your grade in Biology 214

V. Grading

Your final grade will be based on your percent out of 100. The following grading scale will be used:

96-100 = A+	90 - 95 = A	86 - 89 = B+	80 - 85 = B
76 - 79 = C+	70 - 75 = C	60 - 69 = D	0 - 59 = F

You will notice that (-) grades are not used.

VI. Miscellaneous

Academic integrity: **if you are caught cheating, you will be reported to academic integrity. No arguments. Although quite rare, they have expelled people for a first offense. Cheating has skyrocketed in the last few years - but many students have been caught as well.**

It should be obvious that using ChatGPT or other types of AI is a serious violation, and will be dealt with accordingly.

Please don't cheat - *it goes on your record!*

You are responsible for information and announcements presented in class and/or through e-mail. Not being in class or not checking your e-mail is not an excuse. Make sure your GMU e-mail is working - this is *your* responsibility!

Please do not be disruptive in class. No one is forcing you to be in class. If you want to have a conversation, use your phone, etc., please do it outside of class or you may be asked to leave.

Missed class : if for some reason class is canceled, then the following class will cover the material for the missed class. This is particularly important should an exam day be canceled for whatever reason (the exam will take place during our next scheduled class).

If you are having problems please see your instructor. Your instructor is here to help you learn this material ***and*** help you pass this class. They will do what they can to make sure that you make it through this class successfully. *Please don't wait too long if you are having difficulties.*

Finally, please try to be in class. You've probably heard it a million times already, but it's particularly true in this class. ***You will almost certainly not do well if you are absent too often.***

VII. Learning outcomes:

- Understand basic measures for central tendency and spread.
- Know the basics of probability.
- Become familiar with some vary basic probability distributions.
- Be able to construct and interpret confidence intervals.
- Be able to carry out basic hypothesis tests such as various T-tests, MWU-tests, χ^2, etc.
- Understand the basics of correlation and regression.
- Understand basic concepts such as p-values, power, types of error, α, β, etc.

VIII. Tentative course outline:

Week of	***Lecture topic***	***Recitation topic***
August 24	Introduction (chapter 1) Data organization (chapter 3)	Introduction Math assessment
September 31	Descriptive statistics (chapter 4) Samples and populations (chapter 5)	Installing R Measuring experiment
September 7	***No class on Monday (Labor Day)*** Probability (chapter 6) Conditional probability (chapter 6)	Homework discussion
September 14	Binomial distribution (chapter 6 and 7) Normal distribution (chapter 7)	Homework discussion
September 21	Normal distribution (cont., chapter 7) Other distributions (chapter 8)	Homework discussion
September 28	Parameters and estimates (chapter 8) **Exam I (Wed/Thurs/Fri)**	Homework discussion
October 5	Sampling distributions (chapter 9) Confidence intervals (chapter 10)	Homework discussion
October 12	***No classes Monday*** Hypothesis tests (chapter 11)	Homework discussion
October 19	Hypothesis tests (chapter 11) Two sample tests (chapter12)	Homework discussion
October 26	Assumptions (chapter 13) MWU test (chapter 14)	Homework discussion
November 2	Paired tests (chapter 15) **Exam II (Wed/Thurs/Fri)**	Homework discussion
November 9	One sided tests (chapter 16) Goodness of fit tests (chapter 17)	Homework discussion
November 16	Contingency table tests (chapter 18) Correlation (chapter 19)	Homework discussion
November 23	***No class / Thanksgiving***	***No class***
November 30	Regression (chapter 20) Review	Homework discussion ***(last recitation)***
December 7 (Monday only)	Review (***only*** if we don't finish everything the week of December 2nd).	***No recitations anymore***

Final exam times:	MWF 10:30 - 11:20	Wednesday 12/9 @ 10:30 a.m.
	MW 4:30 - 5:45	Wednesday 12/9 @ 4:30 p.m.
	TR 7:20 - 8:35	Tuesday 12/15 @ 7:30 p.m. ***(note time!)***
	On-line classes	TBD in class.

VIII. Information that applies to all classes at GMU:

(Some of this is repetitive, but important. It applies to ***all*** your classes at GMU.)

Academic integrity (see above for more details)

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit to those people in the proper, accepted form. When doing homework, the work must be yours. It is totally unacceptable to copy the work of another student in this course in any form.

GMU email accounts

Students must use their Mason email accounts—either the existing "MEMO" system or a new "MASONLIVE" account to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.

USEFUL CAMPUS RESOURCES:

Writing center:

A114 Robinson Hall; (703) 993-1200; http://writingcenter.gmu.edu

University libraries ("Ask a Librarian")

http://library.gmu.edu/mudge/IM/IMRef.html

Counseling and psychological services (CAPS):

(703) 993-2380;
http://caps.gmu.edu

University policies:

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.

Disability Resource Center

If you are a student with a disability and you need academic accommodations, please contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.