Biostatistics for Biology Majors (BIOL 214) syllabus.

Spring, 2020

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

I. Basic course information:

Lecture instructors:

MWF morning class: Professor Jimmy Ngo, jngo8@masonlive.gmu.edu
TR morning class: Professor Leanna Sealey, lsealey@masonlive.gmu.edu
MW late afternoon class: Professor Arndt Laemmerzahl, alaemmer@gmu.edu

On line class: Professor Marieke Kester, mkester2@gmu.edu

Course coordinator: Arndt F. Laemmerzahl

Office: Exploratory Hall, 1209
Phone: 993-5608. Please do not leave voice mail.
E-mail: alaemmer@gmu.edu. The best way of getting in touch.

Office hours: see course 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 Arndt Laemmerzahl's lecture section.

Lecture instructors may also make extensive use of blackboard 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 for Biology 214. Instead, we will use the notes available on the course web page (see link above).

Note that if you wish to use the notes on the exams, you will need to print them off as you are not allowed to use e-readers or devices with internet access on exams.

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 commercial 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 be required to learn 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.**

**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 calculators available for under $20.00 that will do (e.g., try the TI-30X IIS). You can use whatever brand you wish, but it is your responsibility to figure out how it works.

You can 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). Your lower regular exam will count for 15% of your grade, your higher regular exam will count for 25% of your grade. Please note that **there is no possibility of a makeup exam under any circumstances***. The final is worth 25% of your grade.

(*In case of a real emergency you must let your instructor know within 12 hours of the exam.)

**Exam I:** Wednesday, February 19 / Thursday February 20 / Friday February 21  
**Exam II:** Wednesday, April 1 / Thursday April 2 / Friday April 3

**Final exam times:**  
MWF 9:30 - 10:20  
TR  9:00 - 10:15  
MW 4:30 - 5:45  
On-line class  
Monday 5/11 @ 7:30 a.m.  
Thursday, 5/7 @ 7:30 a.m.  
Wednesday 5/6 @ 4:30 p.m.  
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 you may use anything except devices with internet access (no phones, computers, e-readers, smart watches, 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 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 also partly cumulative.

**Quizzes:** If attendance becomes a problem, pop quizzes may be given. You will be warned ahead of time should pop quizzes become necessary. If they do, then 5% of your grade will come from quizzes, and the final will drop in value to 20%. Some instructors may implement quizzes regardless.
IV. Homework & Recitation.

Recitation is an important part of the course, and is worth 35% of your grade (see below). It is an opportunity for you to ask questions, get personal attention, and learn how to use statistical software. Recitation has two main parts, and a few minor parts:

1) 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 lead at least two homework discussions during the course of the semester. You will be selected at random to lead a discussion.

Depending on the size of your recitation section and other factors, you may need to lead more than two homework discussions.

2) If you are not present when you are called up for your presentation, you will get a “0” for your presentation.

3) Late homework assignments are penalized as follows:

   On time: full points/credit possible (each homework is worth 2 points (= 2%).)

   Late: Same day: -0.5 points.
   Following day until the start of the following recitation: -1.0 points.
   During the following recitation: -1.5 points.
   After the following recitation: 0 points.

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

*Warning: all outstanding/incomplete assignments 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.

4) 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).

5) The remainder of your time in recitation is an opportunity to use/discuss R. As the semester progresses you will need to make 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 failing to do homework assignments.

6) There will be two or three short unannounced quizzes. Quizzes will be fairly simple and based on that week's homework assignment. They may also include aspects of R (in fact, you may have a quiz based entirely on R).
7) On occasion, we may also carry out a simple experiment that will help you understand the material from lecture. Be prepared to spend just a little time doing things like rolling dice, counting beans, etc.

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

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

<table>
<thead>
<tr>
<th>Assignment Type</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 homework assignments at 2% each</td>
<td>24%</td>
</tr>
<tr>
<td>2 - 4 presentations (depending on class size)</td>
<td>5% overall</td>
</tr>
<tr>
<td>2 - 3 quizzes</td>
<td>6% overall</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35%</strong> of your grade in Biology 214</td>
</tr>
</tbody>
</table>

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

_Honor code:_ if you are caught cheating, you will be taken to the honor committee. No arguments. Although quite rare, they have expelled people even for a first offense.

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. Tentative course outline (may change as the semester progresses):

<table>
<thead>
<tr>
<th>Week of</th>
<th><strong>Lecture topic</strong></th>
<th><strong>Recitation topic</strong></th>
</tr>
</thead>
</table>
| Jan. 20 | Introduction / Data organization | Introduction  
|         |                    | Measuring experiment |
| Jan. 27 | Descriptive statistics  
|         | Samples and populations | Installing R |
| Feb. 3  | Probability / Conditional probability  
|         | Binomial distribution | Homework discussion |
| Feb. 10 | Finish probability / Normal distribution | Homework discussion |
| Feb. 17 | Normal distribution / Other distributions  
|         | Review               | Homework discussion |
|         | **Exam I (Wed/Thurs/Fri)** |                      |
| Feb. 24 | Parameters and estimates  
|         | Sampling distributions | Homework discussion |
| March 2 | Confidence intervals  
|         | One sample t-test / hypothesis tests | Homework discussion |
| March 9 | **No classes - spring break** | **No classes - spring break** |
| March 16| Two sample tests | Homework discussion |
| March 23| Two sample tests | Homework discussion |
| March 30| Goodness of fit tests.  
|         | **Exam II (Wed/Thurs/Fri)** | Homework discussion |
| April 6 | Contingency table tests. | Homework discussion |
| April 13| Correlation | Homework discussion |
| April 20| Regression | Homework discussion |
| April 27| Catch up/review | Homework discussion |
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

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.