

# Course Syllabus

## Biology 340: Biometrics

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### Course Outcomes

At the end of this course you should:

- Understand how to calculate and interpret basic probabilities.
- Understand how to interpret probability distributions for hypothesis testing, such as normal, student's t, binomial, Poisson, Chi-square, and F.
- Be able to construct a null and alternate hypothesis.
- Understand the meaning of statistical significance as it relates to a probability statement, and be able to correctly reject or fail to reject alternative statistical hypotheses.
- Understand the meaning of and be able to calculate the mean, median, mode, confidence intervals for the mean, standard deviation, standard error, and correlation coefficients.
- Know when to correctly use the following tests: t-test, ANOVA, regression, correlation, Chi-squared.
- Be able to perform, test the assumptions, and interpret the results for the following tests: t-test, ANOVA, regression, and Chi-squared.
- Be able to apply concepts learned in lecture to a real world situation.
- Use the programs Excel and R to calculate statistics and make graphs. You will also learn the basics of the SQL query language and be able to perform summary statistics with it.

### What is Biometrics?

Biometrics literally means the measurement of life. However, a more precise definition is "the application of statistical methods to the solution of biological problems" (Sokal and Rohlf, 1994). In this class, you will learn about how to assess project data and variables, analyze data and interpret the results.

### What I Expect from You

- Attend class and be on time! Although we have a book, it will be used like a lab manual and will not cover the breadth of information in the course. The material I present in lectures will deviate from and elaborate on the information in the book, and thus missing lecture means you will not be exposed to all material. There will be no way to make up missed material.
- Have a desire to learn. This class is one of the most important courses for your development as a scientist and citizen. Unlike all other classes you have or will take, an understanding of statistics is required to understand the published literature of any scientific discipline.
- Be an active learner. I will be using active learning techniques such as group work, interactive exercises and a Service Learning project to help you participate in your own learning.
- Do not expect this course to flow like a standard math class. Though statistics is a mathematical discipline, this course is not about the mathematics behind statistics, it is about the conceptual development and practical application of statistics that are useful for basic biological experiments (and basic research in general).
- Don't be intimidated by the computer work. Though it may seem like "computer programming", using command line software is actually just an easy and efficient way to run software. It is a skill that is quite useful and desirable in budding scientists or health professional.

## What You Should Expect from Me

- An open and engaging learning-environment.
- A professor that is invested in helping you learn the material in a way that will work for you, and is working to make this course relevant and applicable to pretty much anything you do in the future.
- A professor that is available to help you and is willing to work with you to find extra readings or extra learning materials to help you if you are struggling with any concepts. Come ask me if you need something extra!
- THINGS ARE SUBJECT TO CHANGE.... I work hard to tune the course to meet students needs, without compromising the course content. Therefore the syllabus and schedules should always be considered tentative and subject to change.

## Textbook

The textbook for this course is “Choosing and Using Statistics” by Dyson. It is available for purchase in the bookstore, but is also on electronic reserve.

## Grading

Grading is based on a combination of participation, assignments, exams, and a final project. Participation in class is essential, as all meetings will be a combination of lecture and lab. It will be assessed by attendance, in class assignments and assessments/quizzes. If you are going to miss class for any acceptable reason, it should be arranged with me ahead of time so I can make a plan with you for how you will be caught up, unless you miss class for illness.

|                            |              |
|----------------------------|--------------|
| <b>Class Participation</b> | <b>- 10%</b> |
| <b>Assignments</b>         | <b>- 25%</b> |
| <b>Mid-Term 1</b>          | <b>- 10%</b> |
| <b>Mid-Term 2</b>          | <b>- 10%</b> |
| <b>Final Project</b>       | <b>- 25%</b> |
| <b>Final Exam</b>          | <b>- 20%</b> |

If you need different accommodations for exams or have any accessibility issues with Canvas, please see me so we accommodate you.

Grades will be assigned on the following scale:

| <u>Letter</u> | <u>Percentage of points</u> |
|---------------|-----------------------------|
| A             | 100 - 93                    |
| A-            | 93 - 90                     |
| B+            | 89 - 86                     |
| B             | 85 - 82                     |
| B-            | 81 - 79                     |
| C+            | 78 - 76                     |
| C             | 75 - 72                     |
| C-            | 72 - 70                     |
| D+            | 69 - 67                     |
| D             | 66 - 64                     |
| D-            | 63 - 60                     |
| F/Z           | 59 and below                |