

# Maintenance and Development of a Cooperatively Taught On-line Course in Quantitative Biology

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## Abstract

A current project I am working on is the revision of our Quantitative Biology course. Quantitative Biology is taught at the 200-level (sophomore) and is a mandatory part of the introductory curriculum for biology majors at Virginia Commonwealth University. It incorporates aspects of scientific inquiry, statistical analysis, experimental design, and analytical review and critique to provide students with a strong foundation for upper level classes. It is an asynchronous on-line course cooperatively taught by a rotating group of faculty (6 faculty out of a group of 12). We teach 8 sections, each with 50 students, every semester. The number of sections offered each semester is planned to increase. Further, each section is expected to have unique content. The revision process includes enlarging question pools, particular with new questions that push students to integrate ideas for a more challenging formative assessment experience; creating a resource database for instructors to facilitate easy set-up of the course in Blackboard and tracking of question alterations; creating a resource center for students seeking additional information; and integrating content learned from the QUBES Workshop on Lowering the Activation Energy. In particular, I am interested in developing a group project that will require students to do a self- and peer-evaluation of their work as part of the curriculum. Developing a database for resource management is critical so that improvements can be propagated in future iterations of the course. An offshoot of this project is to set up a knowledge-retention tracking system to assess student performance in subsequent classes to determine if information from Quantitative Biology is effectively retained.

Individual faculty teach sections of Quantitative Biology independently using a pool of shared resources, and create new content to add to the pre-existing database



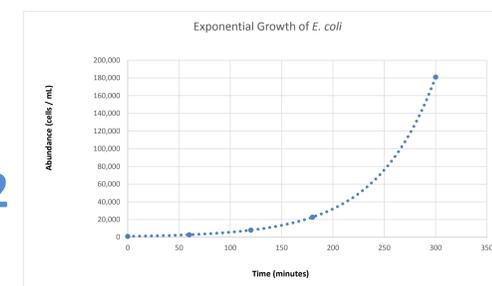
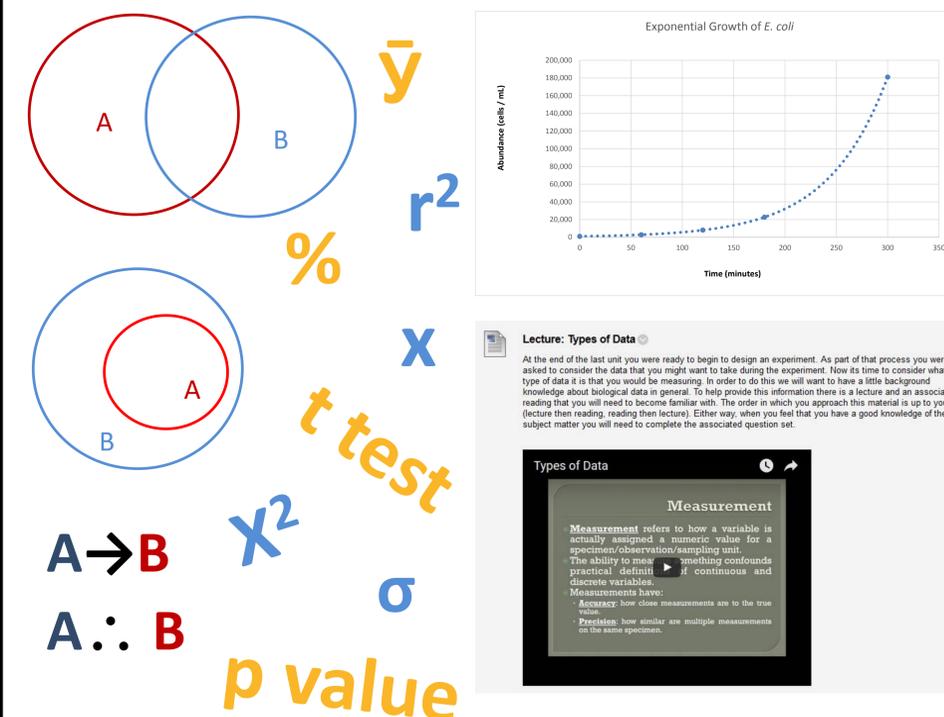
Blackboard serves as a content delivery system and provides interaction with students through live video office hours and discussion boards. Faculty garner feedback from students to further develop content to better accomplish learning objectives



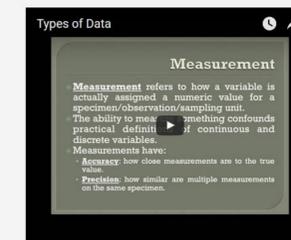
## Learning Objectives

Students should be able to answer the following questions after completing BIOL-200:

- What basic mathematical theories underlie the statistics and chemistry that biologists rely on?
- What is the meaning behind descriptive statistics such as percentages, means, standard deviations, and variances?
- What is the relationship between descriptive statistics and statistical tests like the t test, chi-squared analysis, correlation, and linear regression?
- What are the steps in writing a testable hypothesis and developing an experiment to test it using statistical analysis?
- How is logic applied in hypothesis testing and experimental design?
- What kind of data set is appropriate for a line graph, bar graph or scatter plot?



**Lecture: Types of Data**  
At the end of the last unit you were ready to begin to design an experiment. As part of that process you were asked to consider the data that you might want to take during the experiment. Now it's time to consider what type of data it is that you would be measuring. In order to do this we will want to have a little background knowledge about biological data in general. To help provide this information there is a lecture and an associated reading that you will need to become familiar with. The order in which you approach this material is up to you (lecture then reading, reading then lecture). Either way, when you feel that you have a good knowledge of the subject matter you will need to complete the associated question set.



## Probability Problem Set #2



**Unit II Exam - Part 2**  
Enabled: Adaptive Release  
Unit II Exam - Part 2:

## Teaching Resource Database

- Searchable database to store course materials
- Track authors and editors
- Allow course customization and re-use of edited materials
- Index system for all BIOL 200 teaching materials



Dr. Leslie Bulluck studies the relationship between reproductive success and plumage coloration in birds.



Dr. Scott Neubauer's research focuses on how global change impacts wetland nutrient cycling.



Dr. Ed Crawford's lab researches plant-population interactions within a restored wetland.



Dr. Bonnie Brown's research focus is on population structure and function using oysters in the Chesapeake Bay as a model system.

## Faculty Research Videos

These videos introduce students to active research programs within our department. Students use actual data from these research projects to answer questions in quantitative biology