

Rowan University  
Department of Mathematics

**Syllabus**  
**STAT 02.280 – Biometry**

**CATALOG DESCRIPTION: STAT 02.280 - 4 s.h.**

Prerequisites: Calculus I (MATH 01.130) and one of the following: either a) prerequisites Introduction to Evolution and Scientific Inquiry (BIOL 01.104) and Introduction to Genetics (BIOL 01.106), b) the co-requisite Biology 3T (BIOL 01.202), or c) prerequisites Biology I (BIOL 01.100) and Biology II (BIOL 01.101)

This laboratory course begins with elementary data analysis (descriptive statistics) for one and two variables, probability and sampling distributions. It uses the normal and  $t$ -distributions to introduce the concepts of estimation and hypotheses testing. It includes inference for simple linear regression and correlation, basic analyses of variance, nonparametric tests and chi-square tests. Emphasis is placed on experimentation and the application of statistical methods to the biological sciences. Computer software is used regularly in data manipulation, statistical analyses, and formal presentation of results.

**OBJECTIVES:**

This laboratory course will serve as an introduction to statistical methods, with an emphasis on biological examples and applications. Students will gain experience using statistical software (JMP or equivalent) throughout the course. Upon completion of the course, students will be able to:

- distinguish between data types and produce appropriate graphical displays.
- interpret and compare the shape, center, and variability of distributions.
- develop sampling protocols that minimize bias.
- perform calculations involving conditional probability and probability distributions.
- recognize the importance of the relationship between sampling distributions and inferential statistics.
- construct and interpret confidence intervals to estimate parameters including a single mean, difference in means, proportion, and regression line slope.
- select and perform the appropriate parametric or nonparametric hypothesis test for a given dataset.

**CONTENT:**

1. Descriptive Statistics

Types of data and graphing techniques (bar graphs, pie charts, etc.)  
Distributions and histograms  
Measures of center and variability  
The normal distribution  
Scatterplots  
Correlation  
Least squares line and descriptive simple linear regression

## 2. Basic Probability & Sampling Distributions

Basic probability (complementary events and the additive rule)  
Conditional probability and independence  
Random sampling  
Sampling distributions  
The Central Limit Theorem

## 3. Basic Statistical Inference

Confidence intervals and hypothesis tests for population proportions  
 $t$  confidence interval for mean and difference in means  
1-sample, 2-sample, and paired  $t$ -tests  
Type I and II errors  
Tests for normality

## 4. More Advanced Inference

Chi-square tests (including goodness of fit, independence and homogeneity)  
Inference in simple linear regression  
Nonparametric tests  
One-way ANOVA  
(optional) Two-way ANOVA and Randomized Block ANOVA  
(optional) Randomization/permutation tests

### **TEXTBOOK(s):**

- Baldi, B. and Moore, D.A. 2018. The Practice of Statistics in the Life Sciences, Fourth Edition, W.H. Freeman.
- Samuels, M.L., Witmer, J.A., and Schaffner, A.A. 2015. Statistics for the Life Sciences, Fifth Edition, Pearson Education.