**COURSE TITLE: INTRODUCTION TO STATISTICS**

**COURSE NUMBER: BIOL-860**

**TERM OFFERED: 2169 FALL 2016**

**INSTRUCTORS: S. ARNOTT**

**CO-ORDINATOR: S. ARNOTT**

**OUTLINE OF TOPICS**:

This is a course designed to introduce students the foundations of statistical approaches with application using real biological data. Each student will bring a laptop to class. Half of each session will consist of a lecture by the faculty instructor, followed by a student presentation of homework, and a hands-on interactive session using the R software environment for statistical computing and graphics.

**METHOD OF INSTRUCTION:**

Students taking this course will develop skills in using R for analyzing and graphing biological data. Emphasis will be placed on fundamental understanding of statistics and the initial approaches to take when confronted with complex biological data. Students will learn basic techniques for describing data and the foundations of hypothesis testing under a framework of normal error distributions.

Sessions (12 sessions)

Lecture topics:

1. Use of statistics in Biology
2. Graphing
3. Graphing
4. Descriptive statistics – measures of central tendency
5. Probability distributions
6. Probability distributions
7. T-tests
8. Type I/Type II errors and power analysis
9. Chi-square
10. F-test
11. Correlation
12. Experimental design and pseudoreplication

Session Structure (45 minutes lecture, 45 workshop):

Workshops would consist of student presentation of homework assignments and practical experience applying statistical techniques in R. A typical session will involve a 45 minute lecture by the faculty instructor, followed by a student presentation of the assigned homework, and a group-learning exercise to analyze data using the statistical program, R.

**EVALUATION:**

Homework presentation: 25%

Participation: 15%

Homework assignments: 60% (5% each)

**RECOMMENDED TEXT AND REFERENCE MATERIAL**:

Quinn, GP & Keough, MJ. 2002. Experimental design and data analysis for biologists. Cambridge University Press.

**PREREQUISITE AND ASSUMED BACKGROUND**: None

**OTHER INSTRUCTIONS FOR STUDENTS:**

**ENROLMENT**: Limited to 12 students