BME 5703 Statistical Methods for BME  
Fall, 2014

Catalog Description: This course covers statistical methods needed for experimental biomedical engineering research. Students will be acquainted with a variety of techniques for analyzing and modeling data arising in molecular, cellular, physiological, and pathological systems encountered in typical laboratory and clinical settings.

Credits: 03

Prerequisites: Knowledge of calculus, linear algebra and basic statistics is required. A previous course in statistical methods is expected, but not required. Students with only a basic understanding of statistics are expected to review the recommended texts during the first 2 weeks of the course.

Instructor: Kyle D. Allen, Ph.D.
Office: Room J389 BMS Building
Office Hours: By appointment; Friday, 9:00-11:00
Email: kyle.allen@bme.ufl.edu

Class Meeting: Monday, Wednesday, Friday on 6th Period (12:50 pm to 1:40 pm)

Required textbook and software:
- No textbook is required.
- Students are required to have a copy of Statistica
  - Student may rent a 6-month copy of Minitab at http://www.onthehub.com/statsoft/ ($25.00)
  Or
  - Student may buy a permanent copy of Minitab at http://www.onthehub.com/statsoft/

Resources and Recommended Texts:
Introductory texts if you need to brush up on the basics
Statistics for Non-statisticians – Ebook by Birgir Madsen

What this course will focus on
Statistics with applications to the biological and health sciences by Schork and Remington
Applied statistics and probability for engineers by Montegomery and Runger
A second course in statistics: Regression analysis by Mendenhall and Sincich

Software Use
All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

What you need for this course
1) Statistica
2) Review of Statistics Text 
   (if you think you are behind)

What you need to bring to class
1) Notebook
2) 3-ring binder or folder for handouts
   (There will be a lot of them)
3) Calculator or computer for lectures
4) Laptop (if available) for in class demos
Format:
This class is intended to be ‘applied statistics’ that emphasizes HOW things are done. The format will be 2-3 days of lecture describing WHY things are done a certain way, then 2-3 days of in class examples of how to APPLY these principles. Quizzes will be given to test a student’s understanding of the principles; homework will be given to test a student’s ability to apply those principles.

Course Content:
**I cannot guarantee that we will strictly follow the schedule below, but I will do my best. Due dates listed on the homework handouts are the true due dates; the dates listed below are the anticipated due dates.**

Section 1: Introductory Material
Aug 25-Sept 8: Review of Basic Statistics, Central Limit Theorem, Probability Testing (Z-test, student’s t, Chi-squared, F-test)
SECTION 1 QUIZ – Posted Sept 8, Due end of day Sept 12 (Sakai)
SECTION 1 HOMEWORK – Handed out Aug 29, Due Sept 12

Section 2: Analysis of Variance (ANOVA)
Sept 10-Sept 22: Types of Errors, Power Analysis, and Analysis of Variance
SECTION 2 QUIZ – Posted Sept 22, Due Sept 26 (Sakai)
SECTION 2 HOMEWORK – Handed out Sept 15, Due Sept 26

Section 3: Post-hoc testing
**NO CLASS SEPT 24 – Lecture will be provided on the web**
Sept 26-Oct 10: Post-hoc testing
SECTION 3 QUIZ – Posted Sept 10, Due Sept 17 (Sakai)
SECTION 3 HOMEWORK – Handed out Oct 6, Due Oct 17

Section 4: Univariate regression analysis
Oct 13-Oct 20: Univariate regression lectures
**NO CLASS Oct 22 & 24 – Lecture will be provided on the web**
SECTION 4 QUIZ – Posted Oct 20, Due Oct 24
SECTION 4 HOMEWORK – Handed out Oct 13, Due Oct 24

Section 5: Multivariate regression analysis
Oct 27-Nov 12: Multivariate regression lectures
SECTION 5 QUIZ – Posted Nov 10, Due Nov 14
SECTION 5 HOMEWORK – Handed out Nov 3, Due Nov 14

Section 6: Nonparametric methods
Nov 14-Dec 1: Nonparametric testing method lectures
SECTION 6 QUIZ – Posted Dec 1, Due Dec 5
SECTION 6 HOMEWORK – Handed out Nov 24, Due Dec 5

Oct 18: Assignment of Final Project Data Sets
Nov 22: Buffer day and last chance to discuss final project…

Dec 3-10: Project presentations (4 days, 3 groups per day)

**No Finals**

Grade Determination
10% Quiz Grades
60% Homework
20% Final Report
10% Participation

Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>F</th>
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<tbody>
<tr>
<td>Score</td>
<td>92.5-100</td>
<td>90.0-92.4</td>
<td>87.5-89.9</td>
<td>85.0-87.5</td>
<td>82.5-85.0</td>
<td>77.5-79.9</td>
<td>75.0-77.5</td>
<td>72.5-75.0</td>
<td>67.5-69.9</td>
<td>62.5-67.5</td>
<td>60.0-62.4</td>
<td>0-59.9</td>
</tr>
</tbody>
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* I will round your grade to the nearest tenth of a point; then, your letter grade will be assigned based on the above table. I very rarely curve grades. Typically, if the majority of the class is unable to answer a question, I will review the question and throw it out if it was unnecessarily difficult or confusing.
UF Grading Policy
Undergraduate students, in order to graduate, must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. Graduate students, in order to graduate, must have an overall GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Academic Honesty:
In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. A student-run Honor Court and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code. We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Policy on working together (Group work)
As peer-to-peer learning has been shown to enhance learning, students may work together on their statistics reports and final report. In fact, students are encouraged to work together on all coursework with the exception of the quizzes, but the work that is handed in for grading must be the individual’s work. The following policies on working together are in place:

- ‘Working together’ is defined as each specific student contributing intellectually to all sections of the report. Direct copying is against the honor code of this institution and is not allowed. If identified, all students involved – those that copied and those that allowed the copying to take place – will receive a grade of zero and will be reported to the university for review.
- If students select to work as a collective, each student will turn in their own work. Dividing the work amongst the group is strictly against the intent of this policy, is strongly discouraged as it does not support peer-to-peer learning, and will be considered copying if identified (see above).
- Students that are working together must disclose which students were working together on the title page of the homework.

Policy on attendance
I expect students to attend the class regularly. While attendance in class is not strictly required for full credit in the participation section of the course, I expect students to be in class, ready to learn, engaged, and overall contributors to the learning environment. This is clearly not possible if you fail to regularly attend class. In addition, attendance without participation will not necessarily result in full credit for participation.

Policy on late coursework
Unless prior arrangements have been made with the instructor, students will be deducted 15% (defined as 1.5 letter grades) per day for late coursework, with deductions occurring at the time associated with the due date.

Policy on grade corrections
Students will have 1 week after receiving a grade to challenge errors or grading mistakes. At 1 week after students have been informed of their grade, the grade will become final and will not be changed. In other words, ask about errors and grading mistakes early -- do not wait for the end of the semester. This policy is strictly enforced with no exceptions.

Students with Disabilities:
Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

UF Counseling Services
Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.