Course number: 20 BME 4061
20 BME 7061
26 BE 7061
26 PH 7061
Spring, 2015
Course name: BIOSTATISTICS IN RESEARCH
Pre-requisite: Engineering Statistics, Introduction to Statistics,
Introduction to Biostatistics, or Equivalent
No. of credits: 3
Faculty: M B RAO
Office: 247 KETTERING LAB
Phone No.: 558-3602
e-mail address: marepalli.rao@uc.edu
Class hours: 9:30 – 10:50 Tuesdays and Thursdays
Lecture Room: Swift 519
Office hours: 11:00-12:00 Tuesdays and Thursdays
Old Chemistry 803C
+ 12:00-1:00 Tuesdays and Thursdays
247 Kettering Lab
+ By appointment
TAs: Lixia Zhang (26 BE 7061 and 26 PH 7061)

COURSE DESCRIPTION:
Sensitivity and Specificity. ROC Curves and Sample Size. Logistic
and Polytomous Regression. R package. Classification trees and
Analysis of Variance. Poisson Regression. Linear Regression.
Survival Analysis.
COURSE OBJECTIVES:
The main objective of this course is to present the basic methodology used in the analysis of data arising from biological, agricultural, and medical research. One of the highlights of the course is the presentation of examples culled from current research. Once the student completes this course successfully, he/she should be able to analyze a broad range of data coming from biological, engineering, and medical fields.

REFERENCE

INSTRUCTIONAL METHODS:
1. Lectures
2. Discussion of research problems
3. Presentation of some topical case-studies

EXAMINATIONS:

For those taking the class 20 BME 4061:
1. Mid-term examination (30%): March 17, 2015
   9:30 – 10:50
2. Final examination (40%): April 16, 2015
   9:30 – 10:50
3. Home work (30%): One homework sheet every week

For those taking the class 20 BME 7061:
1. Mid-term examination (30%): March 17, 2015
   9:30 – 10:50
2. Final examination (30%): April 16, 2015
   9:30 – 10:50
3. Home work (30%): One homework sheet every week
4. Project (10%) A data analysis project will be assigned in the eleventh week of the course.
For those taking the class 26 BE 7061 or 26 PH 7061:

1. Mid-term examination (30%): March 17, 2015
   9:30 – 10:50

2. Final examination (30%): April 16, 2015
   9:00 – 10:50

3. Home work (30%): One homework sheet every week

4. Project (10%): A data analysis project will be assigned in the eleventh week of the course.

Typically, the homework will be given once a week. It is due the following week on the same day the homework was given. I want to protect the teaching assistants who will grade your homework. Late submissions are tolerated for up to two days. One day late submission means losing 20% of the points allocated for the homework. Two day late submission means losing 40% of the points. However, you can drop one homework (supposedly the one with the lowest score) in the final grade.

**GRADES**

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<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90-100%</td>
<td>A</td>
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<td>80-89%</td>
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<td>70-79%</td>
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<td>60-69%</td>
<td>D</td>
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<td>Below 60%</td>
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**COURSE OUTLINE**

1. Statistical problems in biomedical research + R 2 weeks
2. Sensitivity, Specificity, and ROC curves 2 weeks
3. Logistic Regression 2 weeks
4. Polytomous Regression 2 weeks
5. Classification trees 1 week
6. Random forests 1 week
7. Analysis of Count Data 1 week
   a. Binomial Regression
   b. Poisson Regression
8. Analysis of Contingency tables 1 week
   a. Two-way contingency tables
b. Trends in a 2xk table
  c. Loglinear models
9. Analysis of variance 1 week
   a. Balanced data
   b. Repeated measures data
   c. Unbalanced data
   d. Checking the assumptions
   e. Binomial data and transformations
10. Linear Regression, 1 week
11. Methods of survival analysis 1 week

The order of presentation may not follow the route presented above. I may not be able to cover all the topics. I may include a topic or two suggested by the students.

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