Course Summary: A study of fundamental theoretical background of statistical methods and their applications, covering the basic concepts of probability, estimation, testing and regression. After this course, you will be able to understand and speak the basic language of statistics and appreciate the strengths and limitations of each method and formulate conclusions accordingly. Finally, and most importantly, you will learn how to use open source software R: http://cran.r-project.org/.

Instructor
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Course webpage: All the lecture notes and class info (homework due dates, homework solutions) will be available through the class blog. We will be using Piazza for forum-type discussions throughout the quarter. All posts will be anonymous to the student users but not the TA’s and the professor. You will find basic class info on that webpage too.

Course Outline:
1 Probability Concepts: Events, Independence, Conditional Probability
2 Probability Concepts: Random Variables, Density, Distribution Functions
3 Probability Theory: Central Limit Theorems
4 Statistical Concepts: Estimation, Testing
5 Statistics Theory: Mean Squared Error, Asymptotic Theory, Likelihood Ratio
6 Linear Regression: Linear model, Least Squares Fit, Parameter Estimation
7 Bootstrap: Sample Splitting

Time Permissible:
• Nonparametric Regression: Logistic Regression
• Missing Data

**Required Textbook:**
FREE PDF version is available at http://www.openintro.org

**Computation:** It will be very useful to have a pocket calculator with a memory and a square root key and a statistics key. Calculators will be used during the exams. Software package for this class is flexible. It can be either R, S-plus or excel or any other packages. When needed, I will demonstrate the examples through R. Preceptors will teach R for all those who are unfamiliar with it and they will cover details of examples used during lectures.

**Homework:** Homework assignments will be handed out weekly. You will typically have a week in which to work on a homework. Late homework will not be accepted since solutions might be posted online or covered in recitation. Each homework will contribute towards approximately 2% of the final grade and a random subset of the questions will be graded. Thus it is a bad strategy not to turn in homework and not to work out all the problems. The lowest grade among all homework assignments will be taken out of the grading system and all others carry equal weight. You are allowed and are encouraged to work with other students on the homework problems, however, verbatim copying of homework is absolutely forbidden. Therefore each student must ultimately produce his or her own homework to be handed in and graded.

**Grading:**
The final grade will be made up as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Midterm Exam I</td>
<td>20%</td>
<td>approximately February/05/2014</td>
</tr>
<tr>
<td>Midterm Exam II</td>
<td>20%</td>
<td>approximately February/26/2014</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
<td>March/19/2014 7:00-10:00pm</td>
</tr>
</tbody>
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The grading scheme will be curved and it will be scaled to the best student in class according to the grading policy above. Exceptional students will be awarded with extra points for completing additional challenging problems. Those points will be combined as a percentage of 10% added to the final grade. Each challenging problem that was solved on the exam will carry additional 3 % added to the final grade. Average student will not be affected by those extra points.
Attendance: Attendance of the class is required. The class covers many conceptual issues and statistical thinking that are not covered in the text book. They will appear in the midterm and final exams.

Exams: The exams will be in class and might allow usage of textbook and/or lecture notes/cheat sheets. Usage of calculators is encouraged.

Academic integrity: Collaboration and discussions are allowed and are encouraged in this class, but copying or letting others copy your work amounts to plagiarism. Although I expect high academic awareness in this class, if such plagiarism occurs I will take the following action: a grade 0 will be assigned to all involved in the incident where cheating occurred and I will report the incident to the Academic Senate which will then decide appropriate course of action.