MATH 376 – Mathematical Statistics
Spring 2018
MWF 2:00 - 2:50 PM, Swords 359

Syllabus (1/24/18)

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Office Hours: Monday & Wednesday 1-2 PM, Tuesday 1-3 PM, Thursday 10:30 AM-12:30 PM, and by appointment.

Course Home Page: http://math.holycross.edu/~dbd/math376/math376.html


Prerequisites: MATH 375.

Intended Audience: This course is designed for sophomore, junior, and senior mathematics majors or statistics minors.

Introduction to Mathematical Statistics: The primary concern in Mathematical Statistics is statistical inference. In Probability, we learned about a small number of important discrete probability distributions and continuous probability distributions. We were concerned with random variables obtained by sampling these distributions. This included functions of those random variables, which are in turn random variables. We wanted to understand the probability that a random variable would take a certain value or set of values in the discrete case or lie in a range in the continuous case. So from a knowledge of the underlying distribution, we derived properties/probabilities of samples. In Mathematical Statistics, the problem is reversed. We will use the probability distributions of finite sets of random samples to make inferences about the statistics of the underlying distribution of the population. We will derive good estimators, constructed from the samples, for the statistics of interest and analyze the goodness of the estimators.

Topics Covered: We will cover Chapters 6 through 10. As time permits at the end of the semester, we will cover additional material from the text or other sources. However, we will cover the material in slightly different order than it is presented in the text.

Class Format: In addition to lectures, there will be five or six group assignments during the semester, roughly one every two weeks. We will devote one class to each of these.

Homework: There will be weekly homework assignments except during the weeks of hour exams. These will be due on Wednesdays. The five or six group assignments will be due roughly a week after they were assigned. These will not be due on Wednesdays. Homework assignments will be
posted on the course web page.

**Colloquium Reports:** There will be 7 to 9 colloquium talks this semester. These are 50 minute late afternoon lectures by a guest speaker on a subject of their choice. Three or four of these will be by candidates for a position in applied mathematics the department is hiring for. You should attend four of these talks over the course of the semester. For each talk you should write up a brief report, less than a page typed, that (1) summarizes the presentation, (2) comments on how understandable it was to you, (3) how interesting it was to you, and (4) if they are a job candidate, would you want to take a course from them if they were hired. Your reports should be submitted within a week after the talk. If you are unable to attend four of these lectures because of other commitments (athletic practice for example), please talk to me about alternative activities you might do.

**Exams:** There will be two hour exams, one during the week of March 12 to March 16 and one during the week of April 16 to April 20. These will be in the evening and will last 90 minutes. We will set a date for these during the first week of class. If you are unable to take the test at the decided upon time, you may take it during the day in the same week. These will focus on definitions, examples, statements of theorems, and short proofs. Sample tests will be posted on the course web page.

**Final Exam:** The final exam will be a comprehensive exam given during exam period. It will be similar in style to the hour exams. A sample final exam will be posted on the course web page.

**Grading:** There are several components to the course grade.

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Collaborative Assignments</td>
<td>10%</td>
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<tr>
<td>Colloquium reports (4)</td>
<td>5%</td>
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<tr>
<td>Midterm Exams (2)</td>
<td>40%</td>
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<tr>
<td>Final Project</td>
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<td><strong>Total</strong></td>
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**Academic Honesty:** The Department of Mathematics and Computer Science adheres to the College’s policy on Academic Honesty, which may be found in the College Catalogue. In addition, the department has formulated the attached statement intended to amplify the policy as to how it might apply in mathematics and computer science.

**Semester Schedule**

Homework will be assigned on the due date of the preceding assignment.

- Wednesday, January 31, Homework #1 due
- Wednesday, February 7, Homework #2 due
- Wednesday, February 14, Homework #3 due
- Wednesday, February 21, Homework #4 due
- Wednesday, February 28, Homework #5 due
- Week of March 12, Hour Exam #1, TBA in an evening.
- Wednesday, March 21, Homework #6 due
- Wednesday, March 28, Homework #7 due
- Friday, April 6, Homework #8 due
- Week of April 9, Hour Exam #2, TBA in an evening. Tentatively covering through Section 4.1
- Wednesday, April 18, Homework #9 due
- Wednesday, May 2, Homework #10 due
- Final exam during exam period. Time and date TBA by the registrar.