Math 3680.001: Fall 2011

Meets: TR 8:00-9:20 in Discovery Park, Room B142.

Instructor: Professor John Quintanilla

Office: GAB, Room 418-D

Office Phone: x4043

E-mail: jquintanilla@unt.edu

Web page: http://www.math.unt.edu/~johnq/Courses/2011fall/3680/

Office Hours: TR 12:30-2:30, or by appointment. I'm fairly easy to find, and you're welcome to drop by outside of office hours without an appointment. However, there will be occasions when I'll be busy, and I may ask you to wait or come back later.


Strongly Recommended: Lecture notes for the semester are available at the UNT Copy Center for approximately $18.

Course Description: Descriptive statistics, elements of probability, random variables, confidence intervals, hypothesis testing, regression, contingency tables.

Prerequisite: Math 1710 and Math 1720 (may be taken concurrently).

Course Topics

The following chapters and sections of the textbook will be covered according to the projected schedule below. Dates may change as events warrant.

- Chapter 2: How to Describe and Summarize Data
  - 2.1 Variables and Data Sets
  - 2.2 Categorical Data
  - 2.3 Ordinal Data

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<thead>
<tr>
<th>Chapter</th>
<th>August 25</th>
<th>August 31</th>
<th>September 1</th>
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<tr>
<td>Chapter 2</td>
<td>2.1-9</td>
<td>2.10, 11</td>
<td>3.1-4</td>
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2.4 Ratio Data
2.5 Frequency Tables and Histograms
2.6 Grouped Data and Sturges' Rule
2.7 Stem-and-Leaf Plot
2.8 Five-Number Summary
2.9 Box Plot
2.10 The Mean
2.11 Variance and Standard Deviation

Chapter 3: Probability
3.1 Overview
3.2 Definitions
3.3 Probabilities of Events
3.4 Rules of Probability
3.5 Tree Diagrams
3.6 Bayes' Method

Chapter 4: Discrete Random Variables
4.1 Introduction
4.2 Basic Properties
4.3 Probability Histograms
4.4 Expected Value or Mean
4.6 Variance and Standard Deviation

Chapter 5: Random Variables for Success/Failure Experiments
5.2 Binomial Random Variables
5.3 Hypergeometric Random Variables

Chapter 6: Introduction to Hypothesis Testing
6.1 Overview
6.2 Two Types of Error
6.3 The Sign Test
6.4 Binomial Exact Test

Chapter 7: Continuous Random Variables
7.1 Basic Properties
7.2 Percentiles and Modes
7.3 Expected Value or Mean
7.5 Variance and Standard Deviation

Chapter 8: Normal Random Variables
8.1 Introduction
8.2 Normal Approximation of Binomial
8.3 Continuity Correction
8.4 Central Limit Theorem

Chapter 10: Two or More Random Variables

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<th>September 6: 3.5-6, 4.1-6</th>
<th>September 8: 5.2-3</th>
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<td>September 13: 6.1-2</td>
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<tr>
<th>September 20: Review</th>
<th>September 22: Exam #1</th>
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<th>October 4: 16.3-4</th>
<th>October 6: 8.1-2</th>
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<tr>
<td>October 11: 8.3-4, 11.1-3</td>
<td>October 13: 10.4, 11.4-5</td>
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<tr>
<th>October 18: Review</th>
<th>October 20: Exam #2</th>
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<tr>
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<td>October 27: 12.1, 2</td>
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<tr>
<th>November 1: 12.3, 13.1-2</th>
<th>November 3: 13.4-6</th>
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<td>November 8: 14.1-2</td>
<td>November 10: 14.3-4</td>
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<tr>
<td>November 15: Review</td>
<td>November 17: Exam #3</td>
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<tr>
<th>November 22: 15.1-5</th>
<th>November 24: Thanksgiving</th>
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<td>November 29: 15.6-9</td>
<td>December 1: Polling</td>
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<tr>
<th>December 6: Medical trials</th>
<th>December 8: Review</th>
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<tr>
<td>December 15: Final</td>
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Variables
  o 10.4 Linear Combination of Random Variables

- Chapter 11: Sampling Experiments and the Law of Averages
  o 11.1 Populations and Parameters
  o 11.2 Samples and Statistics
  o 11.3 Law of Averages for the Sample Count
  o 11.4 Law of Averages for the Sample Sum
  o 11.5 Law of Averages for the Sample Proportion
  o 11.6 Law of Averages for the Sample Mean
  o 11.7 The Z Statistic

- Chapter 12: The z and t Tests of Hypothesis
  o 12.1 The z Test
  o 12.2 Two-Sided z Test
  o 12.3 Bootstrapping and the t Test

- Chapter 13: Estimation with Confidence
  o 13.1 Difference between Confidence and Probability
  o 13.2 Two-Sided Confidence Intervals
  o 13.4 Bootstrapping and the t Curves
  o 13.5 Margin of Error and Sample Size
  o 13.6 Interval Estimate of Proportion

- Chapter 14: Two-Sample Inference
  o 14.1 Matched Pair Samples
  o 14.2 Independent Samples
  o 14.3 Welch's Formula
  o 14.4 Independent Samples with Equal Variances

- Chapter 15: Correlation and Regression
  o 15.1 Introduction
  o 15.2 Scatter Plots
  o 15.3 The Correlation Coefficient
  o 15.4 Fitting a Scatter Plot by Eye
  o 15.5 The Regression Line
  o 15.6 Estimation with Regression
  o 15.7 The Regression Paradox
  o 15.8 Testing for Correlation
  o 15.9 Correlation is not Causation

- Chapter 16: Inference with Categorical Data
o 16.1 Introduction
o 16.2 Comments on the Definition of $x^2$
 o 16.3 Testing Goodness of Fit
 o 16.4 Contingency Table Tests

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**Student Responsibilities**

- Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Center for Student Rights and Responsibilities to consider whether the student's conduct violated the Code of Student Conduct. The university’s expectations for student conduct apply to all instructional forums, including university and electronic classroom, labs, discussion groups, field trips, etc.
- You should read over this syllabus carefully, as I will hold you responsible for the information herein.
- Students will be expected to read the chapters carefully, including the examples in the book.
- Students will be responsible for obtaining any and all handouts. If you are not in class when handouts are given, it is your responsibility to obtain copies.
- **You should begin working now.** Frequent practice is crucial to the successful completion of a mathematics course. Cramming at the last minute will certainly lead to failure.
- **WARNING:** If you are in academic trouble, or are in danger of losing your financial support, or if your parent or guardian is expecting a certain grade at the end of the semester... start working today. I will refuse to listen to any pleas at the end of the semester. You will receive precisely the grade that you earn.

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**Grading Policies**

You may find the advice of former Math 3680 students helpful.

The following schedule is tentative and is subject to capricious changes in case of extracurricular events deemed sufficiently important to the upper administration.

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<tr>
<td>Final Exam</td>
<td>Thursday, December 15</td>
<td>27%</td>
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<td>8:00-10:00 am</td>
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<tr>
<td>Exam 1</td>
<td>c. Week 4</td>
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<tr>
<th>Grade</th>
<th>Percentage</th>
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<tr>
<td>A</td>
<td>90% and above</td>
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<tr>
<td>B</td>
<td>80% and below 90%</td>
</tr>
<tr>
<td>C</td>
<td>70% and below 80%</td>
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Cooperation is encouraged in doing the homework assignments. However, cheating will not be tolerated on the exams. If you are caught cheating, you will be subject to any penalty the instructor deems appropriate, up to and including an automatic F for the course.

Attendance is not required for this class. However, you will be responsible for everything that I cover in class, even if you are absent. It is my experience that students who skip class frequently make poorer grades than students who attend class regularly. You should consider this if you don't think you'll be able to wake up in time for class consistently.

The grade of "I" is designed for students who are unable to complete work in a course but who are currently passing the course. The guidelines are clearly spelled out in the Student Handbook. Before you ask, you should read these requirements.

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**Exam Policies**

- Unless announced otherwise, calculators will not be permitted for use on exams.
- I expect to give exams during the weeks above. However, these are tentative dates. I will announce the exact date of each exam in class.
- After exams are returned in class, you have 48 hours to appeal your grade. I will not listen to any appeals after this 48-hour period.
- I will not drop the lowest exam score; all will count toward the final grade.
- No make up exams will be given. For those students who miss an exam due to an Authorized Absence (see the Student Handbook), the final grade will be computed based only on those exams taken, together with homework/quiz scores and the final exam. Such students will be required to provide official written verification of such an absence.
- Students missing an exam for unauthorized reasons will receive 0 (zero) points on the exam.
- The Final Examination will be comprehensive in the sense that problems may come from any of the sections that will be covered during the semester.
- The grade of A signifies consistent excellence over the course of the semester. In particular, an A on the final is not equivalent to an A for the course.
- I reserve the right to test and quiz you on problems which are generalizations of material covered in the class and/or in the text. In short, the problems may not look exactly like the ones in the book.
- Everything that I say in class is fair game for exam material. You will be responsible for everything unless I advise you to the contrary.
Homework Policies

- Homework will be assigned every Thursday and will be due the following Thursday.
- I expect the assignments that you turn in to be written up carefully and neatly, with the answers clearly marked. You must show all of your work. Messy homework will not be accepted.
- Entire homework assignments will not be graded. Instead, only two or three representative problems will be graded per assignment. As a consequence, it will be possible to not do the entire assignment and still receive a perfect score on that particular assignment. Deliberately leaving homework uncompleted is highly unrecommended, however, as the law of averages will surely catch up with you as the semester progresses.
- When computing grades, I will drop the two lowest homework grades before computing the homework average. Therefore, in principle, you could get a 100% homework score and also not turn in two assignments during the semester. I have this policy in case you get sick, a family emergency arises, etc., during the semester. You will still be responsible for the material in such assignments during the examinations.
- Because of this policy, I will not give extensions on homework assignments, nor will I accept late assignments.

Note to TNT Students

- If you’re pursuing secondary teacher certification through Teach North Texas, then you may be aware that you will be required to construct a preliminary teaching portfolio in EDSE 4500 (Project-Based Instruction) and a final portfolio during your final semester of student teaching. Section 2 of this portfolio will ask you to demonstrate your knowledge of your content field. You may find that some of the assignments may naturally become artifacts toward part of this task, and so I encourage you to keep your work after the semester is over to make the eventual construction of your portfolio easier. You may even want to write (and save for later) a brief reflection on the artifact you select, rather than try to remember why the artifact you chose was important once you reach EDSE 4500.
- The specific indicators in the portfolio related to knowledge of mathematical content are as follows:
  - Reflect on one or more artifacts in which you state a mathematical theorem or conjecture and apply both formal and informal mathematical reasoning to the same conjecture.
  - Reflect on one or more artifacts that show your ability to describe a mathematical concept that can be represented in multiple ways and articulate the connections between its representations in clear, expository prose. Where relevant, identify appropriate technology for exploring the concept and explain limits the technology may place on the knowledge acquired.
  - Reflect on one or more artifacts that show your ability to generate a model of a natural phenomenon or describe an already existing model and evaluate how well
the model represents the situation, including consideration of the risks, costs, and benefits of the alternatives.

- Reflect on one or more artifacts that show your ability to identify a topic in your subject area and describe its connection with prerequisite topics, future topics, and other subjects.
- Reflect on one or more artifacts that show how you bring out the historical and cultural importance of your subject material, its contribution to large ideas, and its significance in today’s society. Include a specific lesson plan that incorporates the general history and cultural context of modern science or of mathematics as these fields have evolved.

- Just to be clear: the above is a suggestion for TNT students. This is NOT a course requirement for Math 3680.

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**Final Note**

In compliance with the Americans with Disabilities Act, I mention the following: It is the responsibility of students with certified disabilities to provide the instructor with appropriate documentation from the Dean of Students Office.