

## Syllabus

**Instructor:** Dr. Alexander Krantsberg

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**Phone:** 703-845-6548

**Office:** Bisdorf, Room AA 352

**Class Time:** Wednesdays, 7:30 PM - 10:10 PM

**Classroom:** Bisdorf, AA 355

**Office hours:** Monday 3:30 PM-7:00 PM

Tuesday 5:00 PM-7:00 PM

Wednesday 3:30 PM-5:30 PM (AA 229), 6:00 PM- 7:00 PM

Thursday 5:00 PM-7:00 PM

### Important Dates

**August 20**

**September 1**

**September 8**

**September 9**

**October 13-14**

**October 30**

**November 26**

**November 27-28**

**November 29-30**

**December 3-9**

**December 10**

**Classes begin**

**Labor Day holiday. College Closed.**

**Last day to drop a class with a tuition refund.**

**Parking enforcement on "B" lots.**

**Non-instructional days. No classes. College offices open.**

**Last day to withdraw without grade penalty.**

**Non-instructional day. College closes at noon.**

**Thanksgiving holiday. College closed.**

**Non-instructional days. No classes. College offices closed.**

**Last week of classes**

**Final Exam**

### Course Content

(visit <http://www.nvcc.edu/academic/coursecont/summaries/MTH241.pdf> for details)

### Course Description

MTH 241 – Statistics I presents descriptive statistics, elementary probability, probability distributions, estimation, and hypothesis testing.

### Course Purpose

This course is to provide you with the necessary abilities in statistics and probability to understand the results of statistical studies and to perform descriptive and basic inferential studies within your areas of interest. Emphasis will be placed upon the use of the calculator and the computer to perform statistical computations.

### Prerequisites

MTH 152, or MTH 163, or MTH 182.

### Course Objectives

After completion this course, you should be able to:

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- Organize raw data into a frequency distribution.
- Compute measures of central tendency (means, median, modes) and interpret the results.
- Compute measures of variation (variances, standard deviations, quartiles) and interpret the results.
- Identify and graph symmetric and asymmetric distributions.
- Compute standard scores.
- Define the concept of probability.
- Compute probabilities of unions, intersections, and complements.
- Distinguish between the concepts of independent events and mutually exclusive events.
- Identify independent events and dependent events.
- Compute conditional probabilities.
- Compute probabilities with binomial and normal distributions.
- Determine probability distributions using random variables.
- Explain the differences between population means and variances and sample means and variances.
- Compute confidence intervals.
- Formulate null and alternative hypotheses.
- Compare and contrast z-tests and t-tests.
- Identify Type I and Type II errors.
- Use a statistical software package and graphing calculator to calculate sample means, standard deviation, and confidence intervals.
- Use a statistical software package to create appropriate graphs.

### Major Topics

#### A. Introduction to Statistics

#### B. Descriptive statistics

1. Organizing and displaying data
2. Measures of central tendency
3. Measures of variance
4. Types of distributions

#### C. Introduction to Probability

1. Events and their Probabilities
2. Finding the probability of the Union and Intersection of Events
3. Conditional Probability
4. Independent Events

#### D. Random Variables and Their Distributions

1. Discrete Random Variables (Binomial Distribution)
2. Continuous Random Distributions (uniform, normal)
3. Computation with Normal Curves
4. Central Limit Theorem

#### E. Sampling Distribution of the Sample Mean

1. Random Samples
2. Mean and Standard Deviation of the sample mean

#### F. Confidence Intervals

1. Population Mean
2. The Difference of Two Population Means

#### G. Hypothesis Testing

1. Population Mean
2. The Difference of Two Population Means

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### Textbook and other Resources

The following options are available. The first two are highly recommended.

1. Introductory Statistics, 9<sup>th</sup> Edition by Neil Weiss with MyStatLab Access Code.
2. Standalone MyStatLab Card. (Gives access to online resources including eTextbook.)
3. Introductory Statistics, 9<sup>th</sup> Edition by Neil Weiss.

**MyStatLab** provides course materials, animations, and multimedia textbook. You can get up to 10% extra points for homework for doing it using MyStatLab.

To use MyStatLab you need this **Course ID : krantsberg68017**.

( You can find MyStatLab Quick Start Guide for Students at

[http://help.pearsoncmg.com/xl/get\\_started/student/mmnd/mml/get\\_started\\_stu\\_mmnd\\_mml.pdf](http://help.pearsoncmg.com/xl/get_started/student/mmnd/mml/get_started_stu_mmnd_mml.pdf) )

### Calculator

A graphing calculator TI 83 or better is recommended.

### Grading Policy

#### Grading Categories

- Homework - 10%
- Quizzes - 15%
- Exams - 45 %
- Final Exam - 30 %

#### Course Grade

The course grade will be a letter grade:

- A - 90%-100%
- B - 80%-89.9%
- C - 70%-79.9%
- D - 60%-69.9%
- F - below 60%

No audits are given in this class. **The last day to withdraw with refund is September 8, 2014.** **The last day to withdraw without grade penalty is October 30, 2014.** You are responsible for doing all paperwork before these last dates.

#### Attendance:

It is very important to attend this class. If you miss no more than two classes, your lowest grade on homework, quizzes, or exams will be dropped. My experience shows that regular attendance and active class participation, in most cases, results in a passing grade.

#### Grading Assignments

##### Homework:

If you do your homework online using MyStatLab, all homework assignments are already there. Up to 10% increase of your grade is given for doing homework online.

If you do your homework on paper follow the assignments in the syllabus or on the lesson plans.

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Note: If your average grade on the tests is more than 70%, you will get a 5% extra credit for your homework.

**Quizzes:** We will have quizzes on most class days when there is no test. You can make up two quizzes.

### Tests:

There will be four tests, one hour each.

The tentative schedule for the tests is this.

- Test 1    September 3**
- Test 2    September 29**
- Test 3    October 27**
- Test 4    December 1**

Please let me know in advance if you are not able to attend the class on any of these days. You may make up a test within two weeks after the test. It is your responsibility to schedule the make-up test with me.

### Final Exam

The final exam is scheduled for **Wednesday, December 10, 2014 from 2:00PM to 4:00PM**. The exam will be comprehensive and cover all course material.

All Students are expected to attend the final exam. There is no make-up for the final.

### Exam and Test Policy

You may not share calculators during exams or quizzes. You may not use cell phones as calculators during exams and quizzes.

Cheating – receiving or giving unauthorized help- will result in a score of 0 on that exam.

### Classroom Behavior

You should silence cellular phones. No texting during class time.

### Inclement Weather or Other Emergency Events

If the college is closed, a text alert will be sent to cell phones registered on NOVA Alert, a notice will be posted on the College's website [www.nvcc.edu/emergency](http://www.nvcc.edu/emergency). You can also call the College Call Center at 703.323.3000.

### Special Needs and Accommodations

Please address with me any special problems or needs at the beginning of the semester. If you are seeking accommodations based on a disability, you must provide a disability data sheet, which can be obtained from the counselor for special needs, who is located in Bisdorf (AA) 229, phone (703) 933-1840. More information may be found at the following website: <http://www.nvcc.edu/current-students/disability-services/index.html>

### Veterans (Active Duty and Reserve)

Please contact me early to request schedule accommodations for missed classes. Accommodation can be made if you provide me with the reason and time to reschedule on a case-by-case basis. If missing more than one day consecutively, then I will discuss how to study the lessons that you will miss.

**Note: The syllabus is subject to change.**

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## Course Outline

(Subject to change at any time)

| Week | Date  | Section  | Assignment (due the following week)   |
|------|-------|--|---|
| 1    | 08/20 | 1.1 Statistics Basics<br>1.2 Simple Random Sampling<br>1.3 Other Sampling Design<br>1.4 Experimental Design  | pp.8-10:5,7,8,13,17,19,21<br>pp.14-15:37,42,43<br>pp.20-21:52<br>pp.27-30:61,68   |
| 2    | 08/27 | 2.1 Organizing Data Variables and Data<br>2.2 Organizing Qualitative Data<br>2.3 Organizing Quantitative Data  | pp.38-39:9,11,14<br>pp.48-50:15,19,21,25,33<br>pp.64-71:39,45,47,52,53,59,61,65,67,69,71,73,75,79,81,83,85,89   |
| 3    | 09/03 | <b>Test 1</b><br>2.4 Distribution Shapes<br>2.5 Misleading Graphs  | pp.76-79:99,101,102,103,107,108,113<br>pp.81-82:121,123,125   |
| 4    | 09/10 | 3.1 Measures of Center<br>3.2 Measures of Variation<br>3.3 The Five-Number Summary   | pp.97-101:2,5,8,11,13,15,17,19,21,23,25,29,31,35,39,54<br>pp.110-115:61,62,63,69,71,73,77,78,79,81,94,95,98<br>pp.124-127:112,116,120,121,123,125,127,131,133,134,137,139 |
| 5    | 09/17 | 3.4 Descriptive Measures for Populations<br>4.1 Probability Basics<br>4.2 Events   | pp.135-138:149,151,158,159,160,161,165,167,169<br>pp.149-152:3,7,9,13,15,19,20,21,22,23<br>pp.158-161:38,40,41,45,59,53,55,57,61  |
| 6    | 09/24 | 4.3 Some Rules of Probability<br>4.5 Conditional Probability<br>4.6 Multiplication Rule  | pp.166-168:68,69,72,73,80,82,83<br>pp.178-180:105,107,111,113,115,117<br>pp.185-189:124,125,127,128,129,131,133,137,139   |
| 7    | 10/01 | <b>Test 2</b><br>4.8 Counting Rules*<br>5.1 Discrete Random Variables  | *pp.171,173,175,181,185,189,191,194,196,199,201<br>pp.217-219:7,9,14,16   |
| 8    | 10/08 | 5.2 The Mean and Standard Deviation<br>5.3 Binomial Distribution<br>6.1 Normally Distributed Variables   | pp.222-224:21,23,24,26,29,30,33<br>pp.237-240:41,43,47,49,57,63,65,67,76,77,78<br>pp.260-262:2,5,7,11,13,15,18,21,23,28,30,31,35  |
| 9    | 10/15 | 6.2 Area Under the Standard Normal Curve<br>6.3 Working with Normally<br>6.5 Approximation to the Binomial Distribution  | pp.268-269:46,50,55,57,59,61,63,69,71,73,77<br>pp.276-278:84,85,89,93,95,97,101,103,105<br>pp.290-292:137,139,140,143,147,153   |
| 10   | 10/22 | <b>Test 3</b><br>7.1 Sampling Error<br>7.2 The Mean and Standard Deviation of the Sample Mean  | pp pp.301-302:1,8,11,17,25<br>pp.307-309:26,31,32,41,43,47,49,51,53   |
| 11   | 10/29 | 7.3 The Sampling Distribution of the Sample Mean<br>8.1 Estimating a Population Mean   | pp.314-317:62,63,65,69,71,73,75,82<br>pp.327-329:1,3,5,7  |
| 12   | 11/05 | 8.2 Confidence Intervals for One Population Mean ( $\sigma$ is known)<br>8.3 Margin of Error<br>8.4 Confidence Interval for One Population Mean ( $\sigma$ is unknown) | pp.335-337:13,21,25,27,29,31,33,35,39,44,45<br>pp.341-342:53,55,57,61,62,65,71<br>pp.350-353:75,81,83,87,79,91,93,95,97,101,106,109                                       |
| 13   | 11/12 | 9.1 The Nature of Hypothesis Testing<br>9.2 Critical Value Approach<br>9.3 P-value Approach<br>9.4 Hypothesis Tests for a Population                                   | pp.364-366:5,9,11,13,14,19,21,23,25<br>pp.371-372:33,35,37,41<br>pp.378-379:49,51,53,57,59,62<br>pp.388-390:67,68,69,71,75,77,85  |

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|    |              |   |  |
|----|--------------|---|--|
|    |              | Mean( $\sigma$ is known)  |  |
| 14 | 11/19        | 9.5 Hypothesis Tests for a Population Mean( $\sigma$ is unknown)<br>10.1 Sampling Distribution of the Difference between Two Means<br>10.2 Independent Samples (equals $\sigma$ )<br>10.3 Independent Samples (not equal $\sigma$ ) | pp.397-399:89,91,93,95,97,99,101,105,107<br><br>pp. 438-439:15,17,21,23,<br>pp.448-451:29,31,33,35,37,39,43,45,49,57<br>pp.460-463:63,65,67,69,71,75,77,81,83,85 |
| 15 | <b>11/26</b> |   | <b>Non-instructional day. No classes. College closes at noon.</b>  |
| 16 | <b>12/3</b>  | <b>Test 4</b><br>Review   |  |
| 17 | <b>12/10</b> | <b>Final Exam</b>   | <b>7:30PM – 10:00PM</b>  |