

**AP Statistics  
Course Syllabus  
2014-2015**

**Course:** AP Statistics or MATH 2830 Introductory Statistics (for CU Succeed)

**Start/End Dates:** August 19, 2014 thru May 21, 2015

**Days/Times:** Semester 1 Block 6 – Semester 2 Block 1

**Location:** Erie High School room C207

**Instructor:** Beth Cerrone

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**Academic Dishonesty:**

Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed in the Catalog and on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, go to <http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/policies/Pages/DefinitionofAcademicDishonesty.aspx>.

This course assumes your knowledge of these policies and definitions. Failure to adhere to them can result in possible penalties ranging from lowering a grade on an assignment to dismissal from the University; so, be informed and be careful. If this is unclear to you, ask me. The College of Liberal Arts and Sciences (CLAS) Ethics Bylaws allow the instructor to decide how to respond to an ethics violation, whether by lowering the assignment grade, lowering the course grade, and/or filing charges against the student with the Academic Ethics Committee.

**Student Code of Conduct:** As members of the University community, students are expected to uphold university standards, which include abiding by state civil and criminal laws and all University policies and standards of conduct. These standards are outlined in the student code of conduct which can be found at: <http://thunder1.cudenver.edu/studentlife/studentlife/introduction.html>

**Required Textbooks/Calculators:**

Bock, David E., and Richard D. DeVeaux. *Stats: Modeling the World*. Boston: Pearson/Addison-Wesley, 2007.

TI 83/84 or 83+/84+ are the recommended calculators for this course.

## Course Description:

Basic statistical concepts, summarizing data, probability concepts, distributions, confidence intervals, hypothesis testing. Prereq: intermediate algebra. Semester Hours: 3 to 3

## Learning Outcomes:

Students who complete this course successfully will:

- Be able to produce convincing oral and written statistical arguments, using appropriate terminology, in a variety of applied settings.
- Know when and how to use technology, including the TI 83 or TI 84 and computer applications such as Microsoft Excel and other statistical software, to aid them in solving statistical problems.
- Choose and use a variety of statistical techniques for:
  - Producing data
    - Surveys
    - Experiments
    - Observational studies
    - Simulations
  - Analyzing data (graphical and numerical summaries)
  - Modeling data
    - Probability
    - Random variables
    - Sampling distributions
  - Drawing conclusions from data
    - Inference problems
    - Confidence intervals
    - Significance tests
- Critically evaluate published results by being aware of ways in which statistics can be improperly used to mislead, confuse, or distort the truth.

## Evaluation/Grading Procedures

Assessments (tests/quizzes/project)	60%
Classwork and homework	15%
Final exam	25%

## Grading Scale:

A	90.0 – 100%
B	80.0 – 89.9%
C	70.0 – 79.9%
D	60.0 – 69.9%
F	below 60.0%

## **IF you choose to do CU Succeed:**

**CU Succeed Final Exam: The final exam is mandatory. Not taking the final exam will result in a score of zero on the exam. Having the final rescheduled is extremely rare and is not permitted for reasons such as a plane ticket that was purchased earlier or attendance at weddings.**

The incomplete policy of the math department at UC Denver is strictly enforced. Incompletes are given only in situations in which a student has: **(1)** Successfully completed 75 percent of the course (i.e is passing the course)**(2)** Special circumstances (verification may be required) that preclude the student from attending class and completing graded assignments, and **(3)** Made arrangements to complete missing assignments with the original instructor. A CLAS Course Completion agreement is required.

## **Topics/Schedule of Activities**

You will be expected to read the chapters before class, so that we can devote our time to discussion, investigations, and activities with less time lecturing.

### **Introduction:**

Time Frame: Week 1

BVD Chapters: 1-2

Topics Covered:

- What is Statistics and why do we care?
- What is data?

### **Unit III: Collecting Data (sampling and experimentation)**

BVD Chapters: 11-13

Time Frame: Weeks 2-6

Topics covered:

- Designing surveys via various methods
- Bias in surveys
- Randomization and representative samples
- Experimental design:
  - Control
  - Random assignment of treatment
  - Replication
  - Placebo & blinding
  - Blocking and matched pairs
  - Confounding and lurking variables
  - Statistically significant difference (introduction)
- Observational studies

### **Unit I: Exploring and Understanding Data**

BVD Chapters: 3-6

Time Frame: Week 7-12

Topics covered:

- Describing and displaying categorical data
- Introductory discussion of independence
- Describing and displaying quantitative data

- Summary statistics for quantitative data
- Outliers
- The normal distribution
- The effect of linear transformations to data sets on summary statistics
  - To include but not limited to: boxplots, dotplots, stem plots, back-to-back stem plots, histograms, frequency plots, and parallel boxplots.

## **Unit II: Regression**

BVD Chapters: 7-10

Time Frame: Weeks 13-18

Topics covered:

- Displaying and describing scatterplots
- Analyzing two-variable quantitative data:
  - Correlation and the coefficient of determination
  - Least-squares regression
  - Slope and y-intercept
  - Residuals and residual plots
  - Outliers and influential points
- Transformations to achieve linearity

## **Unit IV: Probability**

BVD Chapters: 14-17

Time Frame: Weeks 19-24

Topics covered:

- Basic probability principles including complement, independence and mutually exclusive
- Simulating probability scenarios
- Addition, multiplication and conditional probability rules
- Random variables:
  - Expected value and standard deviation
  - Rules for transforming and combining random variables
- Binomial and geometric distributions
- Sampling distributions for means and proportions

## **Unit V: Inference for Proportions**

BVD Chapters: 18-22

Time Frame: Weeks 25-30

Topics covered:

- Confidence intervals for one and two proportions
- Hypothesis testing for one and two proportions
- Type I and II errors and power

## **Unit VI: Inference for Means**

BVD Chapters: 23-25

Time Frame: Weeks 30-31

Topics covered:

- Confidence intervals for one and two means (with t)
- Hypothesis testing for one and two means (with t)
- Confidence intervals and hypothesis testing for matched pairs means (with t)

## **Unit VII: Inference for Counts and Slope**

BVD Chapters: 26-27

Time Frame: Weeks 32-33

Topics covered:

- Chi-square goodness-of-fit
- Chi-square for homogeneity and for independence
- Confidence interval for slope
- Hypothesis testing for slope

### **Review for the Exam**

Time Frame: Week 34

- Review for the AP exam

### **Cumulative Project**

Time Frame: Weeks 35-38

- Cumulative projects

### **Assignments**

All daily assignments are given from the questions at the end of each chapter. Questions will be assigned based on the need of the overall class. There will also be daily tickets to leave. A ticket to leave will consist of a question or two in regards to the topic being covered that day, used to make sure that learning objectives are being met.

### **Assessments**

There will be a major assessment at the end of each unit. All major assessments will be of a form similar to the AP exam. This consists of AP-like multiple choice questions and AP-like free-response questions. Released exams will be used throughout the year in order to prepare students for the AP exam.

### **Investigations**

There will be investigations throughout the year, at least one biweekly. Investigations are designed so that you may construct your own knowledge. Participation is necessary and expected.

### **Unit Projects**

Each unit will be concluded with a project. The purpose of the unit projects is to articulate your discovery of statistical knowledge and present your knowledge in a way that demonstrates mastery. The projects will generally involve a written portion and a presentation.

### **Cumulative Project**

The main purpose of cumulative course project is for you to demonstrate that you are able to develop and conduct a statistical study, and then use the data collected to make sound connections and judgments between the design and the results of the experiment. You will also be expected to analyze the collected data and make inferences. You will be expected to complete a written portion in which you will explain your methods and

justify your decisions. You will also present your findings to your fellow classmates.

### **Resources**

The following resource list is meant to be a guideline of resources being used. It is not meant to limit the resources used.

“Agile Mind.” Agile Mind. Agile Mind, Inc, and The University of Texas at Austin. 28 Feb 2007

Bock, David E., and Richard D. DeVeaux. *Stats: Modeling the World*. Boston: Pearson/Addison-Wesley, 2007. (And all ancillary materials)

College Board. *AP Statistics Free Response Problems*. New Jersey: College Board, 2006.

Levine-Wissing, Robin and David Thiel. *AP Statistics: (REA), New 3<sup>rd</sup> Edition*. New Jersey: Research and Education Association, 2007.

Other resource materials used come from newspapers, select journals, AP workshops and institutes and the World Wide Web. Students often use data sets they have collected.

Peck, Roxy, Chris Olsen and Jay Devore. *Introduction to Statistics and Data Analysis*. Belmont: Brooks/Cole—Thomson Learning, 2004. (And all ancillary materials)

Rossman, Allan J., Beth L. Chance and J. Barr von Oehsen. *Workshop Statistics; Discovery with Data and the Graphing Calculator*. Emeryville: Key Curriculum Publishing, 2002.

Scheaffer, Richard L., Ann Watkins, Mrudulla Gnanadesikan and Jeffrey A. Witmer. *Activity Based Statistics*. New York: Springer-Verlag, 1996.

Watkins, Ann, Richard L, Scheaffer, and George W. Cobb. *Statistics in Action: Understanding a World of Data*. 1<sup>st</sup> ed.. Emeryville: Key Curriculum Press, 2007. (And all ancillary materials)

Yates, Daniel S., David S. Moore and Daren S. Starnes. *The Practice of Statistics*. New York: W. H. Freeman, 2003. (And all ancillary materials)

## Course Descriptions from 2013-2014 CU Denver Catalog

### **MATH 1070 - Algebra for Social Sciences and Business**

Topics in algebra designed for students who intend to take business calculus. Functions, graphs, scatter plots, curve-fitting, solving systems of equations, polynomial and rational functions, and selected other topics. Note: Graphics calculator required. No co-credit with MATH 1110 or MATH 1130. Prereq: intermediate algebra and satisfactory score on the placement exam. **Semester Hours:** 3 to 3

### **MATH 1080 - Polynomial Calculus**

A one-semester course in single-variable calculus. Topics include limits, derivatives, differentiation rules, integration and integration rules. Emphasis is on applications to business and social sciences. Note: No knowledge of trigonometry is required. Semester Hours: 3 to 3

### **MATH 1110 - College Algebra**

Topics in algebra designed for students who intend to take the calculus sequence. Functions, domains, ranges, graphs, data scatter plots and curve fitting, solving equations and systems of equations, polynomial functions, rational functions, and selected other topics. Graphic calculators and/or computer algebra systems are used extensively. Applications are emphasized. Note: No co-credit with either MATH 1070 or 1130. Prereq: intermediate algebra. Semester Hours: 3 to 3

### **MATH 1120 - College Trigonometry**

Topics in trigonometry, analytic geometry, and elementary functions designed for students who intend to take the calculus sequence. Angles and trigonometry functions of acute angles, analytic trigonometry, fundamental trigonometric functions and identities including hyperbolic trigonometry, parametric equations, and polar coordinate system. Graphic calculators and/or computer algebra systems are used extensively. Applications are emphasized. Prereq: MATH 1110. No joint credit with MATH 1130. Semester Hours: 3 to 3

### **MATH 1130 - Precalculus Mathematics**

Condensed treatment of the topics of College Algebra (Math 1110) and College Trigonometry (Math 1120). Prereq: satisfactory score on the placement exam. No co-credit with MATH 1070, 1110 or 1120. Semester Hours: 4 to 4

### **MATH 1401 - Calculus I**

First course of a three-semester sequence (MATH 1401, 2411, 2421) in calculus. Topics covered include limits, derivatives, applications of derivatives, and the definite integral. Note: No co-credit with MATH 1080. Prereq: MATH 1120 or 1130 and satisfactory score on the placement exam. Semester Hours: 4 to 4

### **MATH 2411 - Calculus II**

The second of a three-semester sequence (MATH 1401, 2411, 2421) in calculus. Topics covered include exponential, logarithmic, and trigonometric functions, techniques of integration, indeterminate forms, improper integrals and infinite series. Prereq: MATH 1401. Semester Hours: 4 to 4

### **MATH 2421 - Calculus III**

The third of a three-semester sequence in Calculus (MATH 1401, 2411 and 2421). Topics include vectors, vector-valued functions, partial differentiation, differentiation, multiple integration, and vector calculus. Prereq: MATH 2411. **Semester Hours:** 4 to 4

### **MATH 2830 - Introductory Statistics**

Basic statistical concepts, summarizing data, probability concepts, distributions, confidence intervals, hypothesis testing. Prereq: intermediate algebra. Semester Hours: 3 to 3