

Statistics

Sierra Nevada

College



“Empowering students as architects of their own learning.”

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| Course Code & No. – Section: | MATH 251 – Sections 1 and 2 |
| Course Title (Credits): | Statistics (4) |
| Term & Year: | Fall 2015 |
| Course Ref. Nos. (CRN): | Section 1: 10003 Section 2: 10011 |
| Instructor: | Dr. Steve Ellsworth |
| Office Phone: | 775-831-1314 x7457 |
| Cell Phone: | 775-742-9480 |
| Email: | sellsworth@sierranevada.edu |
| Office: | TCES 225 |
| Office Hours: | Or by appointment (text to schedule) |
| Class Meeting Times: | Section 1: MW 4:00PM-5:45PM Section 2: MW 8:00AM-9:45AM |
| Location: | TCES 206 |
| Prerequisites: | MATH 101 or MATH 110, or approval of the instructor |
| Required Text: | <i>Elementary Statistics</i> , 12 th ed, Mario F. Triola, ISBN: 0321836960 |
| Required Computer Programs: | 1. Minitab Express Lease 2. Microsoft Office or Open Office |
| Moodle Site: | http://sncmoodle.sierranevada.edu/course/view.php?id=310 |

Course Description

An introductory statistics course covering sampling, experimentation, exploratory data analysis, statistical inference, and drawing conclusions from data. Single variable data sets, paired data, and categorical data. Laws of chance and probability theory.

Student Outcomes

The learner will experience/participate in/explain and perform the following: preliminary data analysis; descriptive statistics; probability theory; inferential statistics for single through multiple samples using some parametric and nonparametric methods; regression and correlation, and use of technology to ease the burden of discovery and computation with emphasis on interpretation; use of standard statistical tables; data collection, analysis and presentation of both and oral and written reports of procedures and findings.

The learner will be able to make better, informed decisions under conditions of uncertainty and variability and will:

- Use data to objectively analyze academic questions and improve decision making;
- Present data or results informatively;
- Apply statistical concepts to disciplines of interest;
- Understand data when it is presented and ask useful and probing questions and respond appropriately.

Course and SNC Mathematical Goals

- A sense of number and the ability to discern whether a proposed numerical answer to a problem is reasonable – the ability to think correctly about numbers and to use data to make intelligent decisions in life.
- The ability to use mathematical knowledge to confront unfamiliar problems both in concrete and abstract situations – modeling a mathematical problem in several ways to facilitate a solution.
- The ability to discuss the mathematical ideas involved in a problem with other people and to write coherently about mathematical topics and their interrelations.
- General reasoning powers – understanding of mathematical implication and knowledge of why various mathematical statements follow from more basic ideas.
- General algebraic proficiency – the ability to manipulate algebraic expressions -- an understanding of the interrelationships between the symbolic, numeric, and graphic representations of real-world phenomena.
- The ability to visualize, compare, and transform problems geometrically – an understanding of the connections between algebra and geometry.
- An understanding of the uses of mathematics in other disciplines and the use of technology in the solution of mathematical problems.
- The ability to gather, organize, display, and summarize data – the ability to draw conclusions or make predictions from data.

The Mathematical Association of America's (MAA) Committee on the Undergraduate Program in Mathematics (CUPM) in developing future mathematics curriculum has made the following preliminary recommendations:

- Students should achieve mastery of rich and diverse set of mathematical ideas and should experience mathematics as an engaging field with contemporary open questions.
- Students should be able to think analytically and critically, to formulate and solve problems, and to interpret their solutions. They should understand and appreciate the value and validity of careful reasoning, precise definition, and close argument.
- Students should have experience applying knowledge from one branch of mathematics to another and from mathematics to other disciplines.
- Students should be able to use a variety of technology tools.
- Students should be able to communicate mathematics both orally and in writing; they should be able to read mathematics.

Tentative Schedule

NOTE – topics, exam date, and any other aspect of the class schedule are subject to change upon notification by instructor. The Course Announcements section of the Moodle course website and in-class announcements will be used to alert students of changes to the syllabus.

Section One – Fundamentals of Statistics

| CLASS DATES | CLASS TOPICS | TRIOLA CHAPTERS |
|--------------------|--|----------------------------------|
| M 8/17, W 8/19 | Course Introduction, Statistical and Critical Thinking Minitab Express Introduction | 1-1, 1-2 |
| M 8/24, W 8/26 | Types of Data, Data Collection, Design of Experiments | 1-3, 1-4 |
| M 8/31, W 9/2 | Frequency Distributions and Histograms Statistical Graphing, Measures of Center | 2-1, 2-2, 2-3, 2-4, 3-1, 3-2, |
| W 9/9 | Measures of Variation, and Position Measures of Relative Standing | 3-3, 3-4 |
| M 9/14, W 9/16 | Measure of Relative Standing, Exam I | 3-4 |

Section Two – Probability and Distributions

| CLASS DATES | CLASS TOPICS | TRIOLA CHAPTERS |
|--------------------|---|------------------------|
| M 9/21, W 9/23 | Fundamentals of Probability – Addition and Multiplication Rules. | 4-1, 4-2, 4-3, 4-4 |
| M 9/28, W 9/30 | Fundamentals of Probability – Counting, Combinations, Permutations, Simulations | 4-5, 4-6, 4-7 |
| M 10/5, W 10/7 | Random Variables and Discrete Probability Distributions The Standard Normal Distribution | 5-1, 5-2, 6-1, 6-2 |
| M 10/12, W 10/14 | Applications of the Normal Distribution, Sampling Distributions and Estimators The Central Limit Theorem, Assessing Normality | 6-3, 6-5 |
| M 10/19, W 10/21 | Assessing Normality, Exam II | 6-6 |

Section Three – Hypothesis Testing

| CLASS DATES | CLASS TOPICS | TRIOLA CHAPTERS |
|--|--|------------------------------|
| M 10/26, W 10/28 | Hypothesis Testing, Testing a Claim About a Mean | 8-1, 8-2, 8-4 |
| M 11/2, W 11/4 | Two Sample Procedures | 9-1, 9-3, 9-4 |
| M 11/9 | Two Sample Procedures | 9-1, 9-3, 9-4 |
| M 11/16, W 11/18 | Correlation and Regression | 10-1, 10-2, 10-3 |
| M 11/31, W 12/2 | Goodness of Fit, Contingency Tables, ANOVA, Exam III | 11-1, 11-2, 11-3, 12-1, 12-2 |
| T 12/8 11:30AM-2:30PM R 12/10 6:30PM-9:30PM | Final Exam | |

Methods of Assessing Student Outcomes

Students will be assessed on the basis of their graded performance on three exams, one final, and a variety of assignments.

Grading Policy

- The course is graded on a straight scale: (A 93-100, A- 90-92, B+ 87-89, B 83-86, B- 80-82, C+ 77-79, C 73-76, C- 70-72, D+ 67-69, D 63-66, D- 60-62, F 0-59) unless a shift downward in the scale is appropriate (based on performance of the entire class).
- Grades on all work will be posted in Moodle. It is your responsibility to check the grades to make sure that there are no errors. Please contact your instructor if there is an incorrect or missing grade.

Point summary:

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| In-class exams (3 @ 200 pts. each) | 600 pts. |
| Final exam | 200 pts. |
| Assignments – From <i>Triola</i> , In-class, and CPAs (Rescaled based on % accrued for entire semester) | 200 pts. |
| TOTAL | 1000 points |

Assignment Grading Rationale

20 point system (Points may be doubled for larger assignments)

20 points

- All portions of the assignment are completed
- It is obvious that a high-quality and in-depth effort was put into the assignment
- If any answers or computations are incorrect they are not major mistakes or do not hinder understanding of the material
- Interpretations are relevant and concise, and yet have enough information to convey an understanding of the material
- It is obvious that no answers were simply copied from another student or group, although answers may be similar from students or groups that work together

15 points

- All portions of the assignment are completed or possibly only a few very minor components are not completed
- A quality effort was put into the assignment but it may lack some depth and understanding
- There are at least one or a few errors that result from a misunderstanding of the material
- Interpretations are mostly relevant but there may be some lack of understanding of the material
- It is obvious that no answers were simply copied from another student or group, although answers may be similar from students or groups that work together

10 points

- The assignment is most likely not completed
- The effort put into the assignment cannot be described as quality work
- There are at least several errors that result from a misunderstanding of the material
- Interpretations are frequently irrelevant and there is often a misunderstanding of the material
- It is obvious that no answers were simply copied from another student, although answers may be similar from students who work together

5 points

- The assignment is not completed
- The effort can be described as minimal and half-hearted
- There are multiple errors that result in a misunderstanding of the material
- Interpretations are mostly irrelevant and there is a clear misunderstanding of the material
- It is obvious that answers were simply copied from another student or group

0 points

- The assignment was not turned in or basically no real work was put into it.

Important Class Notes

- You must bring a laptop with Minitab Express and Excel (or Open Office) on it in order to take an exam – it is very important that you accept this responsibility. The exams and homework require the use of these programs, so they are integral aspects of the class. It is absolutely essential that you have access to a computer with Minitab Express and a spreadsheet program at all times during the course.
- You may use one 8.5x11 sheet of paper with notes (front and back) during the exams. Note sheets from prior exams in the course may also be used. All three note sheets can be used during the final. No photocopies (like from the text) are allowed unless approved by the instructor. The Formulas and Tables insert from Triola text may also be used. If your text does have one you may use copies of it (with no text written on the copies). No Internet connections from laptops are allowed during the exam (disable wireless access during exams). ***Any violations of these rules will result in failing the course.***
- There are no makeup exams. If an exam must be missed for a legitimate reason and arrangements are made with the instructor all of the points from a missed exam can be added to the final. So if one exam is missed the final becomes worth 400 points. Not being ready for an exam is not a legitimate reason to miss an exam.
- It is ***strongly*** recommended that you take very good notes during class sessions and that you study these notes extensively for the exams. If you need tips on how to take good notes ask your instructor or visit the Office of Academic Services and Instructional Support.
- Laptops and cellphones ***absolutely*** may not be used in class for personal use such as observing videos, instant messaging, texting, checking e-mail, doing assignments for other classes or browsing the web. If you bring a laptop to class it must be closed unless approved by the instructor. Cellphones must be turned off and put away, meaning that they are not allowed to be put on the desks during class. Since attendance is not absolutely required for the course you have the freedom to laptop work and cellphones outside of the classroom during the class period. If you have to use your cellphone please excuse yourself from the class in a nondisruptive manner. Each violation of this rule may result in the loss of up to 50 points from the overall class score.
- If you have an A or A- in the course prior to taking the final you can opt out of taking the final. You must contact the instructor prior to the final in order to get approval to opt out of it.

Keys to Success in Statistics

- Make absolutely certain that you are prepared for the course. MATH 101 or MATH 110 is the prerequisite for the course. Students without either of these prerequisites must have approval from the instructor or an advisor to take the course.
- Have or develop an intellectual curiosity in how statistics can be used in applied in real-world situations.
- Don't always think that ideas are important only if they apply to your life.
- Become proficient in Minitab Express and your spreadsheet program. Spend time exploring them on your own initiative.
- Avoid the temptation not have or maintain Minitab Express and a spreadsheet program on your laptop.
- Attend office hours and review sessions as much as possible.
- Take great notes in class.
- Don't expect to understand all of the material right away in class.
- Be persistent. Don't be passive.
- Work with other students who are as serious (or more serious) than you about learning.
- Ask questions during the exams and final.
- Don't miss classes and/or blow off homework and in-class activities because these are major reasons why some students struggle in the class.
- Don't fall behind because there is a very low probability that you will recover in the course.

ADA Accommodations

In accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, students with a documented disability are eligible for support services and accommodations. If a student wishes to request an accommodation, please contact the Director of Academic Support Services, Henry Conover, at (775) 831-1314 x7534, hconover@sierranevada.edu or go to the OASIS offices on the third floor of Prim Library within the first week of the semester.

The SNC Email System

The SNC email system is the official communication vehicle among students, faculty members and administrative staff and is designed to protect the confidentiality of student information as required by the Family Educational Rights and Privacy Act of 1974 Act (FERPA). Students should check their college email accounts daily during the school year.

Students have a right to forward their SNC e-mail to another e-mail account (for example, @hotmail or @gmail). However, confidentiality of student information protected by FERPA cannot be guaranteed for SNC e-mail forwarded to an outside vendor. Having email redirected does not absolve a student from the responsibilities associated with official communication sent to his or her SNC email account.

Sanctions for Cheating and/or Plagiarism

The Honor Code

The faculty of SNC believes students must be held to high standards of integrity in all aspects of college life in order to promote the educational mission of the College and to encourage respect for the rights of others. Each student brings to the SNC community unique skills, talents, values and experiences which, when expressed within the community, contribute to the quality of the educational environment and the growth and development of the individual. Students share with members of the faculty, administration and staff the responsibility for creating and maintaining an environment conducive to learning and personal development, where actions are guided by mutual respect, integrity, responsibility and trust. The faculty and students alike must make diligent efforts to ensure high standards are upheld by their colleagues and peers as well as themselves. Therefore faculty and students accept responsibility for maintaining these standards at Sierra Nevada College and are obligated to comply with its regulations and procedures, which they are expected to read and understand.

Consequences of Violating the Student Honor Code

SNC students and faculty share the responsibility for maintaining an environment of academic honesty. Thus, all are responsible for knowing and abiding by the SNC Faculty/Student Honor Code published in the current SNC Catalog. Faculty are responsible for presenting the Honor Code and the consequences of violating it to students at the start of their classes AND for reporting all incidences of academic dishonesty to the Provost. Students are responsible for knowing what constitutes CHEATING, PLAGIARISM and FABRICATION and for refraining from these and other forms of academic dishonesty. Violations of the Honor Code become part of a student's academic record.

- 1st Offense: Student receives a zero for assignment/exam and counseling with faculty on the honor code, consequences for violating the honor code, and the value of academic honesty in learning.
- 2nd Offense: Student fails course and receives counseling with faculty on the honor code, consequences for violating the honor code, and the value of academic honesty in learning.
- 3rd Offense: Student is expelled.

The Sierra Nevada College Mission Statement:

Sierra Nevada College graduates will be educated to be scholars of and contributors to a sustainable world. Sierra Nevada College combines the liberal arts and professional preparedness through an interdisciplinary curriculum that emphasizes entrepreneurial thinking and environmental, social, economic and educational sustainability.

The Core Themes:

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|-----------------|---------------------------|
| Liberal Arts | Professional Preparedness |
| Entrepreneurial | Thinking Sustainability |