

STA 108: Elementary Introduction to Probability and Statistics

Course Number: STA 108

Course Title: Elementary Introduction to Probability and Statistics

Credits: 3:3

Prerequisites/Corequisites: None.

For Whom Planned: This course is intended for undergraduates in any discipline.

Instructor Information:

Instructor: Ms. Insuk Shim (i_shim@uncg.edu)

Office Hours: 11am–12pm on Monday through Friday or by appointment in Petty 108.

Bulletin Description: Survey of statistics intended for undergraduates in any discipline. Graphical displays, numerical measures, relationships between variables, elements of good data collection. Basic probability, introduction to inferential techniques including confidence intervals and significance testing. Emphasis on statistical literacy.

Student Learning Outcomes: STA 108 provides students an opportunity to appreciate certain concepts in fundamental mathematics, especially data analysis with a variety of applications. The emphasis is on abstract reasoning, not routine manipulations. STA 108 satisfies the Mathematics (GMT) requirement of the General Education Program. It is open to and appropriate for all undergraduate students, regardless of major. The General Education learning goals attached to the GMT marker are as follows:

- LG1 Foundational Skills: Think critically, communicate effectively, and develop fundamental skills in quantitative and information literacies.
- LG2 The Physical and Natural World: Understand fundamental principles of mathematics and statistics, and recognize their relevance in the world.

At the successful completion of this course, the student will be able to:

- SLO1 Reason in mathematical systems beyond data manipulation. (LG1, LG2)
- SLO2 Formulate and use mathematical models to solve real-world problems. (LG1, LG2)
- SLO3 Communicate mathematical solutions clearly and effectively. (LG1)

Course Objectives: This is an introductory course in statistics. It equips students with a basic knowledge of producing data (sampling, experimental design), describing data, and drawing conclusions based on probability about a population of interest using confidence intervals and tests of significance. At the end of this course, students should be able to analyze data and make appropriate inference from sample to population through the following channels:

- (1) represent data graphically
- (2) summarize and describe data numerically
- (3) describe the normal distribution, and calculate the probability using it
- (4) draw scatter plots, compute correlation coefficient and regression lines, use two-way tables
- (5) evaluate data production methods
- (6) compute probabilities using sample spaces and probability rules
- (7) compute confidence intervals

- (8) use tests of significance

Teaching Methods and Assignments for Achieving Learning Outcomes: Abstract reasoning (SLO1) and clear, effective communication (SLO3) are a part of every lesson and homework in this course. The student, through regular and frequent attention to the lessons and homework questions, will make progress on each of these learning objectives. The formulation and use of mathematical models in real-world problems (SLO2) are integrated in the application of the fundamental techniques covered in the course. Homework questions are designed to reinforce these mathematics learning objectives.

Examples of specific course content addressing the various learning goals:

- (1) Students are trained to analyze data sets and assess the sources of data to determine what inference is reasonable.
- (2) Analyzing data includes graphs and numerical summaries used to find patterns and relationships, variability and unusual observations.
- (3) Students must use the Normal distribution to model data sets such as sampling distributions under appropriate conditions.
- (4) Using probability and random phenomena, students step through the reasoning of statistical inference that have calculated levels of certainty.
- (5) We also learn to express conclusions from statistical inference in the setting of the real world problem.

Tests: There are four tests (Sep. 11, Oct. 2, Oct. 30, Nov. 25). If a student has a conflict with a test date, he/she should consult with the instructor BEFORE the test date in order to arrange an alternate test time. Test questions are multiple-choice but specifically designed to catch common errors in reasoning that lead to incorrect answers.

Online Homework: Homework will be available in StatsPortal>Assignments several days before the due date, so students can work around other obligations and religious observances. Homework exercises are not timed assignments, but must be submitted by 11:55 pm on the due date. Students will be able to resubmit these exercises to master the skills and concepts covered. But, only three attempts are allowed. At the end of semester two lowest homework grades will be dropped.

Online Quizzes: Quizzes will be also available in StatsPortal>Assignments several days before the due date. The time limit for most of these quizzes is 60 minutes; the time begins when you start the quiz and ends exactly one hour later. For example, if you stop working on the quiz, the StatsPortal clock continues ticking and will not allow you to access the quiz after one hour. Only one attempt is allowed. Quizzes must be submitted by 11:55 pm on the date they are due. Students should begin the quizzes early enough to allow sufficient time for possible problems (personal or technological issues). These problems will not be a valid excuse for failure to complete a quiz on time. On the other hand, if you don't wait until the last minute, you will have time to take appropriate action and submit the quiz. Two lowest quiz grades will be dropped.

Non-graded Homework: Assignments will include readings and exercises from the textbook. Check that homework from the textbook is done correctly. Answers for odd numbered exercises are in the back of the textbook. Solutions to selected even numbered exercises are in StatsPortal Resources. Much of the material is cumulative so it is important to keep up with the work of the class.

Evaluation and Grading: The primary student products are the tests and final exam. Due to the nature of the course, each test will address all of the SLOs. Specifically, SLO1 will be present in most of the questions. Several questions on each test will be designed to address SLO2 and SLO3. Since the final exam is cumulative, all of the SLOs will be addressed there. The student will demonstrate achievement of learning objectives through satisfactory completion of graded assignments and tests. The questions on graded assignments and tests are designed to evaluate each of the three learning objectives, and in this way the grade reflects the attainment of the objectives.

Four tests (12% each)	48%
HW (the lowest two will be dropped)	10%
Quizzes (the lowest two will be dropped)	12%
Final exam (cumulative)	30%

Letter grades are assigned on a 10 point scale.

A+ : 97–100	B+ : 87–89	C+ : 77–79	D+ : 67–69		
A : 93–96	B : 83–86	C : 73–76	D : 63–66	F : 0–59	
A– : 90–92	B– : 80–82	C– : 70–72	D– : 60–62		

Required Texts/Readings/References: Online access code to StatsPortal. This contains an electronic version (eBook) of the text. See announcements in Blackboard for access information.

Recommended:

David S. Moore, William I. Notz, and Michael A. Fligner, *The Basic Practice of Statistics*, 6th ed., W.H. Freeman, 2012.

Topical Outline/Calendar: See last page.

Academic Integrity Policy: You are expected to abide by the UNCG Academic Integrity Policy at all times, and any cases of academic dishonesty will not be tolerated. Each student is required to sign the Academic Integrity Policy on all major work submitted for the course.

I have abided by the UNCG Academic Integrity Policy on this assignment.

Signature _____ Date _____

More information can be found at

<http://sa.uncg.edu/handbook/academic-integrity-policy/>.

Attendance Policy: Attendance is not used in calculating the semester grade. However, poor attendance may affect the final grade. Students are responsible for all material covered in class, as well as announcements made in class.

Final Examination: Cumulative and required, Dec. 3, 8am–11am, location TBA (will be announced later).

Additional Information:

StatsPortal Tech Support: 1-800-936-6899

Calculator Required: Always bring a calculator to classes and tests. All students must have a “two-variable statistics” calculator (and instructions) with functions for correlation and the least-squares regression line as well as for the mean and standard deviation. The ideal calculator is either the TI-83 or TI-84. Other calculators will work, but it is important that

the calculator handle “two-variable statistics”.

StatsPortal>Resources>Student Resources>Technology Manuals has a TI-83/84 manual.

Resources in StatsPortal:

- (1) Statistical Videos: Video explanations of the concepts in StatClip Videos and Statistically Speaking Snapshots are provided for each chapter. Link is in Resources>Student Resources>Statistical Videos.
- (2) StatTutor: These lessons explain the statistical concepts graphically. Links are in the ebook margin and in Resources>Student Resources>StatTutor.
- (3) CrunchIt Software: Students may use CrunchIt, available in StatsPortal, particularly for analyzing larger data sets. Links are in the ebook and in Resources>Student Resources>Crunchit!.
- (4) Student Technology Manuals: Students may use any other software, Excel, Minitab, etc. The manual for these are in Resources>Student Resources>Student Technology Manuals.
- (5) Tables & Formulas: Useful formulas and Table A (Standard Normal Distribution), Table B (Random numbers), and Table C (t distribution). Link is in Resources>Student Resources>Tables & Formulas. For convenience in doing problems online and problems in the text, print Tables A, B, and C and keep them with your work.
- (6) Online Practice Quizzes: Click on the tab Study Plans to find pre-tests and post-tests for each chapter.
- (7) Interactive questions: Click on the tab LearningCurve to do additional assessment questions for each chapter.
- (8) Statistical Applets: Each applet simulates many cases to illustrate the important concepts graphically. Resources>Student Resources>Statistical Applets

Add/drop dates and holidays affecting this class:

- (1) The last day to adjust your schedule with absolutely no penalty is Friday, August 22nd.
- (2) Withdrawing from this course between August 23rd and October 10 will use 3 out of the 16 hour withdrawal limit and will be indicated on a transcript with a grade of WX.
- (3) Dropping this course after October 10 or in excess of the 16 hour limit will result in a grade of WF, which is equivalent to a grade of F for your GPA.
- (4) Labor Day holiday is September 1, Fall Break is October 11–14, and Thanksgiving holiday is November 26–30.

Students with Disabilities: You are responsible for contacting the OARS in 215 EUC (334-5440, <http://ods.uncg.edu>) and for filling out the necessary forms if you wish to have special accommodations. Without these forms the services provided by the OARS will not be available. OARS cannot schedule or reschedule tests without consent from the instructor.

Copyright Policy: Selling or purchasing notes from classes for commercial gain is a violation of the UNCG Copyright Policy. Any student who sells notes taken in class for commercial gain, or who purchases notes taken by another student for commercial gain, is in violation of this policy and, by extension, is committing a violation of the Student Code of Conduct.

<http://sa.uncg.edu/handbook/student-code-of-conduct/>

Free Tutoring: The Department of Mathematics and Statistics provides free walk-in tutoring in the Curry 210 beginning August 25. For the details, see

<http://www.uncg.edu/math/mathhelpcenter>

Student Success Center: Find more academic support at the Student Success Center.

<http://success.uncg.edu/>

Special Support Services: Tutoring may be available from Special Support Services.

<http://success.uncg.edu/sss/tutoring.php>

Assignment Schedule for STA 108-02 Fall 2014

It is possible that the course schedule can be slightly changed without notice.

Please always check the StatsPortal.

Date	Textbook Reading	Optional Practice Exercises in Textbook (Little bit of Extra credit will be given.)	Required HW/Quiz due at 11:55pm
8/19 T	Ch.1 Picturing Distributions with Graphs	1.1, 1.3, 1.5, 1.6, 1.7, 1.9, 1.11, 1.23, 1.25, 1.27, 1.29, 1.31, 1.33, 1.43, 1.44	Ch.1 HW 8/25 Monday
8/21 Th			Ch.1 Quiz 8/26 Tuesday
8/26 T	Ch. 2 Describing Distributions with Numbers	2.1, 2.3, 2.5, 2.7, 2.11, 2.12, 2.13, 2.25, 2.27, 2.29, 2.31, 2.33, 2.43, 2.45	Ch.2 HW 9/02 Tuesday
8/28 Th			Ch.2 Quiz 9/03 Wed.
9/02 T	Ch.3 The Normal Distribution	3.1 - 3.14 all, 3.27, 3.28, 3.29, 3.31, 3.33, 3.35, 3.37, 3.39	Ch.3 HW 9/08 Monday
9/04 Th			Ch.3 Quiz 9/09 Tuesday
9/11 Th	Test 1 (Ch. 1, 2, 3)	Old Tests from Spring 2012 and Fall 2012	
9/16 T	Ch.4 Scatterplots and Correlation	4.1, 4.3, 4.5, 4.7, 4.9, 4.10, 4.11, 4.13, 4.25, 4.26, 4.28, 4.34, 4.39, 4.40	Ch.4 HW 9/18 Thursday Ch.4 Quiz 9/19 Friday
9/18 Th	Ch.5 Regression	5.1, 5.2, 5.3, 5.5, 5.6, 5.9, 5.11, 5.13, 5.15, 5.17, 5.29, 5.31, 5.33, 5.36, 5.41	Ch.5 HW 9/25 Thursday
9/23 T			Ch.5 Quiz 9/26 Friday
9/25 Th	Ch.6 Two-Way Tables	6.1, 6.2, 6.3, 6.4, 6.7, 6.20, 6.21, 6.23, 6.25	Ch.6 HW 9/29 Monday Ch.6 Quiz 9/30 Tuesday
9/30 T	Ch.8 Producing Data: Sampling	8.1, 8.3-8.5, 8.7, 8.9-8.11, 8.13, 8.16, 8.28, 8.34, 8.38, 8.39, 8.41, 8.43, 8.44	Ch.8 HW 10/08 Wed. Ch.8 Quiz 10/09 Thursday
10/02 Th	Test 2 (Ch. 4, 5, 6)	Old Tests from Spring 2012 and Fall 2012	
10/07 T	Ch. 9 Producing Data: Experiments	9.1, 9.2, 9.3, 9.6, 9.7, 9.9, 9.11, 9.13, 9.14, 9.17, 9.18, 9.29, 9.38, 9.39, 9.43-9.46	Ch.9 HW 10/15 Wed. Ch.9 Quiz 10/16 Thursday
10/09 Th	Ch.10 Introducing Probability	10.1, 10.2, 10.5, 10.9, 10.11, 10.12, 10.13, 10.14, 10.15, 10.16, 10.17, 10.18, 10.31, 10.32, 10.33, 10.34, 10.35	Ch.10 HW 10/20 Monday
10/16 Th			Ch.10 Quiz 10/21 Tuesday
10/21 T	Ch.11 Sampling Distribution	11.1, 11.2, 11.3, 11.5, 11.7, 11.8, 11.9, 11.11, 11.12, 11.13, 11.23, 11.25, 11.27, 11.29, 11.31	Ch.11 HW 10/27 Monday
10/23 Th			Ch.11 Quiz 10/28 Tuesday
10/28 T	Ch.14 and review		
10/30 Th	Test 3 (Ch. 8, 9, 10, 11)	Old Tests from Spring 2012 and Fall 2012	
11/04 T	Ch. 14 Confidence Intervals: The basics	14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.8, 14.9, 14.19, 14.21, 14.23, 14.27	Ch.14 HW 11/07 Friday Ch.14 Quiz 11/11 Tuesday
11/06 Th	Ch. 15 Tests of Significance: The Basics	15.1, 15.3, 15.5, 15.6, 15.7, 15.9, 15.13a, 15.14, 15.17, 15.28-15.31, 15.33, 15.41-43	Ch.15 HW 11/13 Thursday
11/11 T			Ch.15 Quiz 11/14 Friday
11/13 Th	Ch.16 Inference in Practice	16.1-16.3, 16.5, 16.7-16.11, 16.13, 16.29, 16.31, 16.33, 16.35, 16.37a, 16.39, 16.43	Ch.16 HW 11/17 Monday Ch.16 Quiz 11/18 Tuesday
11/18 T	Ch.18 Inference about a Population Mean	18.1, 18.3, 18.4, 18.5, 18.7, 18.9, 18.11-14, 18.27, 18.29, 18.33, 18.39	Ch.18 HW 11/21 Friday
11/20 Th			Ch.18 Quiz 11/23 Sunday
11/25 T	Test 4(Ch. 14, 15, 16, 18)	Old Tests from Spring 2012 and Fall 2012	
12/02 T	No class. Reading Day: There will be a Final review session. Time and Location: TBA		
12/03 W	Final Exam from 8am – 11am		

STA 108: Explanation for GEC GMT Category Designation

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The content of STA 108 is delivered in different formats, but with the exception of minor differences necessitated by the difference of format, the types of activities and assignments used to facilitate student achievement of the learning outcomes are the same. Due to the large class sizes of STA 108, the predominant work products are multiple-choice quizzes and tests. The questions are carefully designed to ensure the successful student attains the three GMT learning objectives.