CORE CURRICULUM COMPONENT APPLICATION
Sam Houston State University

PART I – Course Information

Course Type
☒ Existing/Restructured
☐ New Course Proposed Fall 2013
  If new, have you submitted a Form B to the SHSU Curriculum Committee?   ☐ Yes ☐ No

Course Prefix & Number: MATH 1369

Texas Common Course Number (TCCN Matrix)**:** MATH 1342

Course Title: Elementary Statistics

Course Catalog Description (Copy and paste from online catalog for existing courses):
This is a survey course in elementary statistics designed to acquaint students with the role of statistics in society. Coverage includes graphical descriptive methods, measures of central tendency and variation, the basic concepts of statistical inference, the notion of estimators, confidence intervals, and tests of hypotheses. Also offered as STAT 1369.

Course Prerequisites: Passing score on the Math TSI Assessment or equivalent.

Available Online?
☐ Yes, currently developed in online delivery mode
☐ Anticipated development in online delivery mode (Semester, Year: _____)
☒ No

Number of Sections to be Offered per Academic Year: 14

Estimated Enrollment per Section: 30

Course Level (freshman, sophomore): freshman

Designated Contact Person (for follow-up communication purposes): Dr. Melinda Holt or Dr. Stephen Scariano

E-Mail Address: mholt@shsu.edu; scariano@shsu.edu
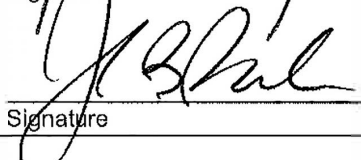
Phone: 4-4859 or 4-1506

Approvals		
Department Chair: _____		2-9-17
Signature		Date
Academic Dean: _____		2-9-17
Signature		Date

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PART II – THECB Foundational Component Areas

See Appendix for full description of each component area.

Select Component Area: II. Mathematics

In one paragraph, describe how the proposed course will fulfill the core and skill objectives of the component area:
Elementary Statistics is an introduction to the science of statistics: collecting data, summarizing data graphically and numerically, and using mathematical models to describe natural and physical phenomena. In particular, students completing this course will be able to apply statistical methods to study patterns and relationships that exist within data and understand the importance of doing so. They will employ numerical and graphical functions to model and draw inferences about real-world scenarios, naturally drawing connections between statistics and other disciplines. This requires the ability to critically analyze and appropriately interpret results using appropriate technological tools, such as the graphing calculator, Microsoft Excel or other statistical software products. Such analyses and interpretations require written, oral, and visual communication.

PART III – Course Objectives & Student Learning Outcomes (SLO)

Insert the applicable course objectives stated as student learning outcomes (e.g., Students completing the course will be able to…) that support the core component area objectives. Please reference the component rubric for additional information on core component area objectives.

Objective/SLO 1: Students completing this course will understand patterns and relationships that appear in data through graphical and numerical descriptive statistics as well as inference methods, such as confidence intervals and tests of hypotheses.

How will the objective be addressed (including strategies and techniques)?
Students will learn and apply the definitions and properties of descriptive measures through mathematical formulas and graphical representations. In addition, they will learn inference methods, along with the appropriate application of each. For example, students will learn when to report a mean and when to report a median based on the shape of the data as it appears in a histogram.

Describe how the objective will be assessed:
This objective will be assessed through embedded questions on exams and/or in-class worksheets. Instructors will incorporate a common subset of problem types in one of the exams of each section. As an example, instructors will include a question that requires students to select the more appropriate measure of center based on the shape of the data.

Objective/SLO 2: This course naturally involves the understanding of key statistical concepts. Students that complete the course will be able to apply statistical methods to model real-world

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situations. They will also be able to represent data verbally, graphically, numerically and symbolically.

How will the objective be addressed (including strategies and techniques)?
The goals of the course are to teach students how and when to apply descriptive, graphical, and inferential statistical methods to solve real-world problems. Thus, these will be addressed throughout the course through lectures, homework assignments, exams, and group discussions. For example, students will examine data from a study conducted within a different field, such as biology, geology, or medicine. They will learn to describe the major features of the data including center, variation, distributional shape, and potential outliers. These features will be described graphically through histograms or stemplots, numerically through means and medians, and symbolically through appropriate common notation.

Describe how the objective will be assessed:
This objective will be assessed through embedded questions in homework, quizzes, exams and/or in-class worksheets. Instructors will incorporate a common subset of problem types in one of the exams of each section. As an example, instructors will include a question that requires students to compare and contrast the strengths and weaknesses of competing data descriptions.

Objective/SLO 3: Students will use appropriate technology to solve statistical problems and judge the reasonableness of their results in context. They will produce and interpret graphs, and will generate descriptive and inferential statistics using technology, such as the graphing calculator, Microsoft Excel, or other software products.

How will the objective be addressed (including strategies and techniques)?
This course will prepare students to produce and interpret models through graphs, stemplots, distribution tables, and contingency tables. They will also use technology to draw inferences by producing results, such as confidence intervals and tests of hypotheses. The course will also teach students to evaluate the limitations of statistical inference through exposure to the concepts of confidence levels and Type I/II errors.

Describe how the objective will be assessed:
This objective will be assessed through embedded questions in homework, quizzes, exams, and/or in-class worksheets. Instructors will incorporate a common subset of problem types in one of the exams of each section. As an example, students will be asked to use technology to graph a set of data and check its shape for the symmetry necessary to use a confidence interval based on a Student's t distribution. They will then be asked to calculate and interpret the appropriate confidence interval in context.

Objective/SLO 4:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:

Objective/SLO 5:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:

PART IV – THECB Skill Objectives

Address each of the THECB skill objectives required within the component area. Explain how the skill is addressed, including specific strategies to address the skill(s). *Address ALL skill objectives associated with the selected Component Area. (See Appendix)*

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1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

How will the skill be addressed (including specific strategies, activities, and techniques)?
The science of Statistics includes each of the following elements:

- Formulation of a research question (demonstrating creative thinking and inquiry);
- Data collection and analysis of information.
- Use of descriptive statistics (demonstrating analysis and synthesis of information).
- Use of Inferential statistics (demonstrating evaluation of information).

To assess the skills above, instructors will incorporate a common subset of problem types in one exam. Students will be provided a poorly designed study or data collection procedure. They must then assess the possible presence of sampling bias, non-response issues, leading questions, and/or confounding variables. On one exam, students will be given a case study in which they must formulate appropriate research hypotheses, select the necessary statistical analysis procedure and draw inferences. All classroom discussion, homework assignments, group work, quizzes, and exams will progress through these phases and the associated critical thinking skills.

Example question: A researcher wants to find out to what extent local residents participate in recreation and entertainment activities that are available in their community. She selects a simple random sample of numbers from the telephone directory and proceeds to call these numbers during the 6 p.m. to 9 p.m. time period. If the line is busy or if there is no answer, she uses the next number on her list as a replacement. Do you believe that her results will be biased? If so, name at least two possible sources of bias.

2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication

How will the skill be addressed (including specific strategies, activities, and techniques)?
Communicating the major features of a data set and the results of inference procedures is critical to the success of an elementary statistics student. This communication includes visual communication by choosing the appropriate type of graphs to produce, such as barcharts

versus stemplots. Students are also routinely asked to explain the choice of a procedure and to explain its outcome, both verbally in the classroom and in writing. For example, on one exam, students will be given an exercise in which they must recognize the need to test for an increase in the population mean.This must be translated into a formal set of hypotheses. To test these hypotheses, the student must conduct a t-test. To do that requires the data to appear roughly symmetric, which is determined and communicated visually through a histogram. Once the t-test is conducted, the results must be interpreted in both statistical terminology and in plain language both orally and in writing. Near the end of the semester, students will be assigned a case study to analyze in groups. Each group will identify the research question, apply appropriate graphical and numeric statistical methods, and present the results in a brief PowerPoint presentation to be evaluated by the instructor and classmates following an established rubric (see attached). This "capstone" project will naturally also assess both Critical Thinking and Empirical/Quantative Skills.

Example question: A cigarette manufacturer advertises that its new low-tar cigarette "contains on average no more than 4 milligrams of tar." Suppose that tar content follows a normal distribution. You have been asked to test the claim using the following sample information: n = 25, with a mean of 4.10 mg and standard deviation 0.14. Use a 5% level of significance and check any assumptions necessary for the test.

3. <u>Empirical and Quantitative Skills</u>: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

How will the skill be addressed (including specific strategies, activities, and techniques)? This entire course is based on development of empirical and quantitative skills. Students successfully completing Elementary Statistics will be able to summarize both categorical and numerical data and to demonstrate its major features, such as center and variability. They will be asked to calculate mean and variance and express them graphically on a histogram. In turn, they must use the data to make appropriate inferences using mathematical equations, such as those for confidence intervals or tests of hypothesis. Lastly, they must understand the limitations of statistical methods, discussed through concepts like Type I/II errors and confidence level. Students will be given a set of hypotheses and they must decide which error (Type I or Type II) is least desirable and discuss the impact of that decision on the choice of the test's significance level. In addition, the concept of confidence interval encompasses the impact of the selection of confidence level. Students will be required to interpret the meaning of "95% confidence." This requires an understanding and communication of the idea that, of 100 intervals created through repeated sampling, approximately 95 are expected to contain the true value of the target parameter.

Example question: The EPA sets the maximum safe level of lead contained in tap water to be 15 parts per billion. They are concerned that the average level in a certain community is too high and thus unsafe. Describe a Type I and a Type II error in this situation. Which would you consider worse? Explain. What does that suggest for a choice of alpha?

4. <u>Teamwork</u>: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

How will the skill be addressed (including specific strategies, activities, and techniques)?

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5. Personal Responsibility: to include the ability to connect choices, actions and consequences to ethical decision-making

How will the skill be addressed (including specific strategies, activities, and techniques)?

6. Social Responsibility: to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

How will the skill be addressed (including specific strategies, activities, and techniques)?

PART V – SHSU Core Curriculum Committee Requirements

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1. Using a 15-week class schedule, identify the topics to be covered during each week of the semester. Provide sufficient detail to allow readers to understand the scope and sequence of topics covered.

Week 1	Introduction to Statistical Science/Scientific Methods for Obtaining Data
Week 2	Summarizing and Presenting Categorical Data: Constructing Distributions and Graphs
Week 3	Summarizing and Presenting Quantitative Data: Constructing Distributions and Graphs
Week 4	Numerical data summaries: Measures of location, 5-number data summary w/application
Week 5	Numerical data summaries: The Concept of Variation; Measures of Variation and Relative Position - Exam I
Week 6	Introduction to Probability and its Basic Laws.
Week 7	Linking Measures of Location and Variation: Empirical Rule and Chebyshev Rule w/application
Week 8	Discrete Distributions, Expected Values and The Normal Distribution and its Properties
Week 9	Sampling Distributions and the Central Limit Theorem w/application - Exam II
Week 10	Confidence Intervals for a Population Mean w/technology applications
Week 11	Hypothesis Testing for a Population Mean w/technology applications
Week 12	Confidence Intervals and Hypothesis Testing for a Population Proportion w/technology applications-Exam III
Week 13	(continuation of Week 12 topics)
Week 14	Correlations and Simple Linear Regression w/application
Week 15	(continuation of Week 14 topics) PowerPoint Presentations

2. Attachments (Syllabus Required)

Syllabus Attached?   ☒ Yes   ☐ No

Other Attached?   ☐ Yes   ☒ No   If yes, specify:

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Appendix: THECB Component Area Descriptions and Skill Requirements

I. Communication (Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience.)

II. Mathematics (Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.)

III. Life and Physical Sciences (Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.)

IV. Language, Philosophy, and Culture (Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.)

V. Creative Arts (Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art.)

VI. American History (Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role.)

VII. Government/ Political Science (Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations.)

VIII. Social and Behavioral Sciences (Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human.
Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture.)

Required Skill Objectives

Foundational Component Areas	Skill Objectives					
	Critical Thinking	**Communication**	**Empirical & Quantitative**	**Team Work**	**Social Responsibility**	**Personal Responsibility**
Communication	✓	✓		✓		✓
Mathematics	✓	✓	✓			
Life and Physical Sciences	✓	✓	✓	✓		
Language, Philosophy & Culture	✓	✓			✓	✓
Creative Arts	✓	✓		✓		
American History	✓	✓			✓	✓
Government/Political Science	✓	✓			✓	✓
Social and Behavioral Sciences	✓	✓	✓		✓	

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Syllabus: MATH/STAT 1369
Elementary Statistics
spring 2017
Class time: MWF 1369.02 9-9:50

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Instructor: Mrs. Cathy Lockwood
Office Location/Phone: LDB 428→936-294-3232
Email: cathyl@shsu.edu or cll011@shsu.edu
Office Hours: TTH 9-11 am and all others by appointment.

Tutoring hours for the Math Center in F104:
Sunday: 2:00 p.m. to 7:00 p.m.
Monday – Thursday   8:00 a.m. to 9:00 p.m.
Friday   8:00 a.m. to 3:00 p.m.

Required Materials

- ❖ Textbook: In this course, we will use a program called Connect Math. An E-book is available on the Connect Math website. A purchase of the textbook is not required if you would rather use the E-book.
- ❖ To register for Connect Math go to the following website, click **Sign up now** use the course code below to register for our course. www.connectmath.com Course Code**: V3HC6-GP6UH**
- ❖ If you would like to also purchase a hard copy of the textbook, this is the book we will use: *Elementary Statistics: A Brief Version with Formula Card, A Step by Step Approach, 7th Edition* by Allan G. Bluman ISBN: 9781259345289
- ❖ Graphing calculator: TI-82, 83 or 84.

Course Objective: Upon completion of this course, the student will be able to
1. Understand and construct graphical summaries of data,
2. Understand and compute numerical and tabular summaries of data,
3. Construct and interpret confidence intervals,
4. Construct and interpret tests of statistical hypotheses,
5. Realize the limitations of statistics in the real world.

Course Description:

Introduction to Statistics covers the fundamentals of statistical concepts such as the organization and description of data, basic probability principles, some discrete and continuous probability distributions, sampling distribution, point estimation, confidence interval estimation, hypothesis testing, small sample inferences, comparing two treatments, and simple linear regression. We will focus on the real world problems from different field such as medical science, social sciences, life sciences, business & engineering among others to provide necessary background on data analysis techniques.

 Homework/Quizzes: Homework is online through Connect Math. There will be a brief (5-10 minutes) quiz most weeks, which will come directly from the homework. **NO** *make-up quizzes will be given. Late work will* **not** *be accepted.*

Exams/Project: There will be three major exams, a comprehensive final exam, and a mandatory comprehensive group PowerPoint project.

If you must miss class:
a. Students who miss a scheduled exam must contact the instructor within 24 hours of the scheduled exam.
b. Exams will only be made up if the university excuses the absence and thus you are able to provide **written** verification.
c. Student athletes who anticipate missing a class, exam, or assignment due to a University sponsored athletic event must provide appropriate documentation and notification **PRIOR** to the absence.
d. Make up exams will not be given if the exam has already been graded and passed back. I usually return exams within a week.
e. You are responsible for obtaining all handouts and/or announcement information.
f. Some materials are available ahead of time on our class website.

Grading Plan and Letter Grade

A	900-1000
B	800-899
C	700-799
D	600-699
F	Below 599

➢ *Major Exams***:**   **500 pts**
➢ *Final exam***:**   **200 pts**
➢ *Quizzes/homework/projects:*   *300 points*
     1000 points

Notes:

Miscellaneous Information:
a. Cheating is a most serious offense - I will not hesitate to press for the most severe consequence allowed by the University. YOU WILL ALSO RECEIVE an "F" FOR THE CLASS.
b. I will use the class website on blackboard to post grades, review materials including practice test, and a copy of quizzes after they have been taken in class. Periodically we will also have online assignments that count as quizzes.
c. Issues that are not addressed politely and respectively will not be addressed.
d. No hats, headphones, or sunglasses are permitted during Exams or quizzes.
e. No work, no credit, therefore, show all work. My rule of thumb is, if I cannot do it in my head, it is likely neither could or did you.
f. Your cell phone needs to be turned off or on silent, not vibrate. Most importantly, it must be out of sight during class. A cell phone out during an exam will be considered cheating. You may not use your cell phone as a calculator.
g. Please check your campus email regularly or forward your campus email to an email that you check regularly.
h. Be respectful of the student around you at all times.
i. Make sure you have read the syllabus carefully because you are responsible for what lies within it.

• **Recording Devices:** Recording devices, such as cameras, audio recorders, or video recorders may not be used without prior approval of the instructor.

• **Electronic Devices:**
http://www.shsu.edu/dotAsset/6d35c9c9-e3e9-4695-a1a1-11951b88bc63.pdf
The use by students of any device that is performing the functions of a telephone, text messages, or pager during class-time is prohibited. Arrangements for handling potential emergency situation uses of devices must be approved by the instructor in advance. Any use of a telephone, text messages, pager, PDA, or any device that performs these functions during a test period is prohibited. These devices should not be present during a test, or if present should be stored securely is such a way that they cannot be seen, heard, or used by a student. The visible presence of such a device during the test period will result in a zero for the test and/or an F in the class. Use of these devices during a test is considered de facto evidence of cheating.

Attendance Policy:
http://www.shsu.edu/dotAsset/b719129b-9593-424f-9d5a-920e2eda6890.pdf
- Catching up due to an unexcused absence is not my responsibility; it is yours.
- In the chance that you miss it is a good idea to have exchanged emails and/or phone numbers with your classmates on the first day of class.
- **IMPORTANT:** If you leave early without letting me know before class that there is a valid reason that you need to leave, then whatever was turned in that day (homework, quiz, extra credit…) will not be counted for credit.
- In cases where you do need to leave early and have let me know, please sit close to the door so as not to disrupt anyone on your way out.
- Attendance will be taken daily.

Academic Dishonesty:
http://www.shsu.edu/dotAsset/728eec25-f780-4dcf-932c-03d68cade002.pdf
All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including, but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials.

Classroom Rules of Conduct:
https://netreg.shsu.edu/mirror/codeofconduct.html
Students will refrain from behavior in the classroom that intentionally or unintentionally disrupts the learning process and, thus, impedes the mission of the university. Cellular telephones and pagers must be turned off before class begins. Students are prohibited from using tobacco products in class, making offensive remarks, reading newspapers, sleeping, talking at inappropriate times, wearing inappropriate clothing or engaging in any other form of distraction. Inappropriate behavior in the classroom shall result in a directive to leave class. Students who are especially disruptive also may be reported to the Dean of Students for disciplinary action in accordance with university policy.

Student Absences on Religious Holy Days Policy
http://www.shsu.edu/dotAsset/0953c7d0-7c04-4b29-a3fc-3bf0738e87d8.pdf
Section 51.911(b) of the Texas Education Code requires that an institution of higher education excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

University policy 861001 provides the procedures to be followed by the student and instructor. A student desiring to absent himself/herself from a scheduled class in order to observe (a) religious holy day(s) shall present to each instructor involved a written statement concerning the religious holy day(s). This request must be made in the first fifteen days of the semester or the first seven days of a summer session in which the absence(s) will occur. The instructor will complete a form notifying the student of a reasonable timeframe in which the missed assignments and/or examinations are to be completed.

Disabled Student Policy: 811006
 http://www.shsu.edu/dotAsset/187f9029-a4c6-4fb4-aea9-2d501f2a60f3.pdf
It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should register with the Office of Services for Students with Disabilities located in the Lee Drain Annex (telephone 936-294-3512, TDD 936-294-3786, and e-mail disability@shsu.edu). They should then make arrangements with their individual instructors so that appropriate strategies can be considered and helpful procedures can be developed to ensure that participation and achievement opportunities are not impaired.

   SHSU adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. If you have a disability that may affect adversely your work in this class, then I encourage you to register with the SHSU Services for Students with Disabilities and to talk with me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. NOTE: No accommodation can be made until you register with the Services for Students with Disabilities.

Visitors in the Classroom: Unannounced visitors to class must present a current, official SHSU identification card to be permitted in the classroom. They must not present a disruption to the class by their attendance. If the visitor is not a registered student, it is at the instructor's discretion whether or not the visitor will be allowed to remain in the classroom.

Additional Information: All information on this syllabus is subject to change. All changes will be announced in class.

Schedule for the semester:

week	material to cover
1	Introduction to Statistical Science & Scientific Methods for Obtaining Data
2	Summarizing and Presenting Categorical Data: Constructing Distributions and Graphs
3	Summarizing and Presenting Numerical Data: Constructing Distributions and Graphs
4	Summarizing and Presenting Numerical Data: Numerical Summaries of location and variance
5	Exam I – continuation of week 4 topics
6	Introduction to Probability and its Basic Laws.
7	Empirical Rule and Chebyshev Rule
8	Discrete Distributions and Expected Values & The Normal Distribution and its Properties
9	Sampling Distributions and the Central Limit Theorem w/application - Exam II
10	Confidence Intervals for a Population Mean w/technology applications
11	Hypothesis Testing for a Population Mean w/technology applications
12	Confidence Intervals and Hypothesis Testing for a Population Proportion w/technology applications –Exam III
13	(continuation of week 12 topics)
14	Correlations and Simple Linear Regression w/application-Begin PowerPoint Presentation
15	Continuation PowerPoint Presentation and prepare for final exam