STAT 218 Recertification proposal (2011-2012) example

Course description

(ACE 3) STAT 218. Introduction to Statistics (3 cr) Lec 3. Prereq: Removal of all entrance deficiencies in mathematics. Credit toward the degree may be earned in only one of: CRIM 300 or ECON 215 or EDPS 459 or SOCI 206.

The practical application of statistical thinking to contemporary issues; collection and organization of data; probability distributions; statistical inference; estimation; and hypothesis testing.

Original Certification Proposal

Outcome(s)

SLO3: Use mathematical, computational, statistical, or formal reasoning (including reasoning based on principles of logic) to solve problems, draw inferences, and determine reasonableness.

1. Describe opportunities students should have to learn the outcome. How is the learning objective embedded in the course?

The goal of this course is to take students with minimal prior exposure to statistical reasoning to a place where they could draw appropriate conclusions from data. A successful student in this course will have the numerical literacy skills necessary to objectively evaluate data-driven conclusions presented in popular media. To achieve this goal, STAT 218 covers three major subject areas, all of which build on each other: data collection, descriptive statistics, and statistical inference. Data collection focuses on strategies for collecting the appropriate data to answer a specific, testable question. As part of this process, a student needs to be able to formulate a question in the form of a testable hypothesis and identify the population from which to draw the data to test their hypothesis. Descriptive statistics focus on summarizing data in a meaningful way. This includes both numerical and graphical summaries. The student will learn which summaries are appropriate for different types of data, and for answering the specific hypothesis posed. They also use these data summaries to determine if particular data points could reasonably be expected. Statistical inference focuses on using the data collected and the descriptive statistics calculated to draw conclusions to the population of inference. Students must select the appropriate statistical procedure based on the data they collected and the hypothesis being tested. Students must determine if the data they collected/observed is reasonable under the assumptions of the procedure and the hypothesis. Once they have determined reasonableness, they draw appropriate inferences based on their conclusions.

2. Describe student work that will be used to assess student achievement of the outcome and explain how the students demonstrate the knowledge and skills specified by the outcome.
Student learning will be assessed via traditional homework and tests. There will be either two or three hourly exams (depending on instructor) and a final exam. On the final exam, students are given a data set (already collected) and a description of a scientific problem. The students must formulate appropriate hypotheses, carry out the appropriate statistical procedure and draw conclusions based on their results. Students will also participate in hands-on classroom activities. In groups, they formulate a testable hypothesis, determine how to collect data to answer that question, collect the data, test their hypotheses and draw appropriate conclusions.

3. As part of the ACE certification process, the department/unit agrees to collect and assess a reasonable sample of students' work and provide reflections on students’ achievement of the Learning Outcomes for its respective ACE-certified courses. Please comment on your plans to develop a process to collect and evaluate student work over time for the purpose of assessing student success for this ACE outcome.

Every fall and spring semester, there are about 15 sections of STAT 218. We will collect a random sample of at least three final exams from each of four randomly selected sections, and the Statistics Curriculum Committee will provide reflections on student achievement. We will archive the final exams collected, as well as the curriculum committee’s reflections. A library of hands-on activities used in the classroom will be maintained for instructor use and assessment.

Reinforcements

What Outcome(s) or skill(s) will be reinforced in this course?

Writing

An important component of this course is to teach students to communicate the results of their analysis to those unfamiliar with statistics. That is, to translate their results from “stat-speak” into English. Different instructors assess this skill in different ways. Typically instructors have the students complete an end-of-course project, in which the students must write a paper detailing the scientific question they tested, how they collected the data, the statistical analysis, and their conclusions. Other instructors have their students write critiques of popular articles that mention statistical results.

Critical Thinking

Critical thinking is an integral part of the subject matter of statistics. Hypothesis testing requires students to identify the real world problem being investigated, to identify and use the appropriate statistical procedures, and finally to draw conclusions from the statistical results. There is considerable emphasis on how statistical decision making is used in the real world. The students are required to show their work so the instructor can follow their thought processes. Moreover, students need to demonstrate their understanding of the assigned problems and express their conclusions in writing. One aspect which is emphasized is the ability to critically analyze published results based upon the data presented.
Recertification Proposal

1. Please indicate the semesters the course has been taught as an ACE certified course.

   Fall 2009 (1098), Spring 2010 (1101), Summer 2010 (1105), Fall 2010 (1108), Spring 2011 (1111), Summer 2011 (1115), Fall 2011 (1118)

2. What have assessment data revealed about how the course helps students achieve the designated Student Learning Outcome(s)? (You might be able to complete this textbox by copying information found in the Summary & Conclusion sections from your Department/Program ACE Assessment Report.)

   From our examination of the final exams, we do believe that STAT 218 is successfully addressing ACE Outcome 3. SLO-3 asks students to use statistical reasoning to solve problems, draw inferences, and determine reasonableness which are precisely the learning objectives of introductory statistics courses. All instructors are giving students the opportunity to achieve this outcome, and are focusing their own final exams on assessing student achievement of the outcome.

   Students ranged from demonstrating near proficiency to high proficiency on the outcome, with most students demonstrating proficiency. The most pervasive shortcoming for the course was in translating the statement of the scientific problem into either a testable hypothesis or an appropriate confidence interval. Students, for the most part, could complete the mechanics of the statistical procedure they chose. Most students were able to use the results of their analysis to draw appropriate inferences, but some did not demonstrate the ability to communicate their results in context.

   In addition to examining the random sample of final exams, we also investigated the grade distributions for all sections of the course. We found that the overwhelming majority of students earn some form of A, B or C in the course. Based on the final exams we examined, any student earning a C or higher has demonstrated that they have achieved SLO-3.

3. How have those assessment data been used to help the course meet the certified Student Learning Outcome(s)? (You might be able to complete this textbox by copying information found in the Summary & Conclusion sections from your Department/Program ACE Assessment Report.)

   One issue we did see in the assessment process was inconsistency across sections in terms of grade distributions. While we do believe that as long as instructors are consistent within a section, this inconsistency across sections is not overly problematic, we do plan on discussing this in Teaching Assistant training, which all graduate student instructors must attend prior to the fall semester. It will also be discussed in the Statistics TA Preparation course that all new TAs take prior to their first semester of teaching, and we will include some rubric-construction activities that will allow the novice instructors some supervised practice with grading.
The TA Preparation course places a strong emphasis on writing, and communication of statistical ideas. The assessment data also reinforced that this should be a continuing emphasis.

4. If your assessment plan does not include collection of student work from all sections each time the course is taught, indicate how your department ensures that all sections are taught in accordance with the ACE plan.

   STAT 218 is not a standardized course, and each graduate student instructor has his/her own syllabus, assignments and tests. To ensure that students in all sections are being given the opportunity to demonstrate their achievement of SLO-3, faculty course coordinators review all syllabi, mid-term and final exams from every section. In addition, final grade distributions were examined for all sections.

5. If the response in the original proposal for ACE certification indicated that the assessment process was still being developed, the UCC/ACE subcommittee expects an explanation of the process. (May be referenced in the Methods section of the Department ACE Assessment Report.)

N/A