

Proposed Creation of the Minor in Statistics

Executive Summary

1. A brief summary of the proposed new degree.

In June 2004 the Department of Statistical Science (DSS) was created from the Institute of Statistics. The existing masters and doctoral degrees were transferred to the new department at that time. The major in Statistics which establish the first undergraduate degree in statistics offered by the Department of Statistical Science and Baylor University was created in June 2005. The department expects to add it first majors for the fall 2006 semester. The department proposes to add the minor in Statistics at this time.

Justification:

- *The proposed minor will provide the Baylor University undergraduate students with another minor option.*

The department has already had a number of inquiries into the possibility of the minor in statistics. Students from other disciplines and especially those that wish to continue their graduate education have expressed an interest in having additional statistics courses on their undergraduate transcript.

- *The proposed minor will broaden the potential pool of recruits for graduate studies in statistics and other sciences at Baylor.*

Well trained undergraduate students in statistics are ideal candidates for graduate studies in many fields. These students will be attractive candidates for graduate programs at Baylor University and other Tier I research institutions.

- *The proposed program will attract outstanding high school students.*

In addition to being a fruitful recruiting ground for graduate programs at Baylor and elsewhere, this new minor will allow the department and the university to attract bright high school (HS) students who have been introduced to statistics through the increasingly available AP Statistics courses. It is well known that the better academically qualified HS seniors are selecting universities based upon their AP credit policies and undergraduate majors. Currently, Baylor University is not able to compete with other institutions in attracting students who have had a solid introduction to statistics through HS AP Statistics courses. The new minor would allow Baylor University to attract and recruit these students by giving them another option to their degree plan.

2. How does this new degree fit into the overall mission of the University?

The proposed minor in statistics will have a positive impact on Baylor University in many ways. Some have been mentioned above. Undergraduate programs in statistics are a somewhat new phenomenon but in the last 10-15 years Tier I research universities have

recognized the need for solid statistical training earlier in a student's academic career. The trend among the larger research universities with Ph.D. programs in statistics is to offer undergraduate degrees in statistics as well. Universities with the best Ph.D. programs are aggressively recruiting HS students as statistics majors.

The National Science Foundation (NSF) recently commissioned a workshop entitled "Statistics: Challenges and Opportunities for the 21st Century". An international group of over 50 statisticians from academia and industry were gathered together to discuss current challenges in research and education. Below we have included excerpts from the executive summary they produced. Note especially paragraphs d and e.

- a. The field of statistics has made profound contributions to society over the past century. Its impact is felt across virtually all branches of science, medicine, industry and government.
- b. Statistics is itself a science – the science of learning from data. It is grounded in a still growing core of knowledge that reflects its roots in probability and mathematics and also the more recent influence of computer science. Statistics both draws from these roots and feeds back to them new mathematical and computational questions. Statistics is also an unusually interdisciplinary field. Indeed, applications are its lifeblood: they stimulate research on new theories and methods while providing valuable outlets for established techniques. Among the highest priorities for statistics today is adapting to meet the needs of data sets that are so large and complex that new ideas are required, not only to analyze the data, but also to design the experiments and interpret the experimental results. These problems are often the source of the widespread interdisciplinary collaborations – from astronomy to public policy to zoology – which statisticians engage in today.
- c. Statistics is hard to pigeon-hole. Historically it falls under mathematics, yet most statisticians would agree that statistics is not a branch of mathematics. Modern statistics is also close to computer science, especially machine learning, yet most statisticians would agree that statistics is not a branch of computer science. Statistics is a science in itself, and attempts to group it here or there ultimately exacerbate misunderstandings about the field.
- d. The growth of AP statistics courses in high schools, the burgeoning enrollments in undergraduate statistics courses, and major improvements in computing technology for data analysis underscore the need for reevaluation of the entire K-16 approach to statistical education.
- e. Workshop participants pointed repeatedly to shortages in the pipeline of students and unmet demand from key industries and government laboratories and agencies. The long-range solution to this problem must lie in improvements to the education systems, starting even in elementary school and continuing into high school and undergraduate school.

Historically, the training of statisticians began in graduate school. As the NSF workshop participants concluded, however, this is increasingly inefficient and insufficient given the needs of modern research—not to mention the need for the United States to maintain its technological and scientific advantages in the world economy. Baylor's 2012 vision clearly speaks to both of those needs, and will more completely contribute to their fulfillment by training statistical scientists starting at the undergraduate level.

3. *What type of demand is driving the proposal?* See Section 2.

4. *Would this new degree require additional faculty appointments?*

The new minor would not require any new courses or faculty.

5. *Would the new degree require major resources?*

The minor will not require any additional major resources.

6. *What impact might the new degree have on other departments or unit within the University?*

The proposed minor will provide the Baylor University undergraduates with a new degree option. We anticipate this option will be attractive to students in the sciences who plan to continue their studies at the graduate or professional level. The minor will provide a viable option for students with majors outside the college of Arts and Science, whereas currently a separate major across colleges is prohibitive.

Requirements for Minor in Statistics

Eighteen (18) semester hours including the following:

- A. STA 2381 and STA 3381
- B. Additional Statistics (12 semester hours) from any STA course that counts toward the major in statistics.
- C. A grade of “C” or better in the STA courses used for the minor.

Statement of rationale for the proposal.

See the above justification.

Additional documentation may be needed when the final proposal is sent for administrative approval:

- a. *Evaluation of library resources. What is needed is a summary of the adequacy of the library resources, not a listing of the holdings. Indicate if you plan to acquire additional library resources to support the new program.*

The current library resources are adequate and this minor does not require any additional library resources.

- b. *Faculty issues (department support of proposal; indicate if additional faculty will be needed)*

The current pool of statistics faculty is adequate and no additional faculty are required for the minor.

- c. *Courses (Indicate if new courses will be needed. If courses from other departments are required on the program, include letters of support from the chairs of the other departments.)*

No new courses are needed.

d. Student interest and demand for the new major/minor

The department has already received inquiries about the minor from a number of students from other disciplines and colleges. They feel that additional training in statistics will enhance their ability to enter the better graduate programs and professional schools in their disciplines.

e. Present curricula offered by the department and how the new major/minor would tie into the existing programs

see d. Mathematics currently has a statistics option for their BS in math. This minor could overlap with their major (perhaps this issue needs to be addressed as a separate issue. I would favor making this minor prohibitive to those with using the above math option as their major).