

College: Liberal Arts and Sciences

Department/Program (s): Mathematics, Statistics, Physics (MSP)

Degree (s) Offered:

BA/BS Mathematics
BA/BS Physics
MS Mathematics
PhD Mathematics

Triggers:

None for mathematics/statistic degrees
BA/BS Physics majors (20.2)
BA/BS Physics graduates (2.8)

Brief Description of Each Degree:

The Department of Mathematics and Statistics (M/S) and the Department of Physics merged into the Department of Mathematics, Statistics, and Physics since the last review of these programs. The department chair is the former chair of the M/S Department, while the former chair of the Physics Department is the Director of Physics. University and Department data used in this review appear accurate, but is still separated between the two former departments, M/S and Physics. The MSP department is largely a service department, where 95.2% and 96.6% (5-year average) of SCH produced by the M/S and Physics departments, respectfully, are taken by non-majors.

The M/S Department produces a 5-year average of 23,875 credit hours per year, the highest of any other department in the university. The tenure/tenure track (T/TT) faculty account for 30.5% (using 5-year average fall data) of the credit hours produced. Most all lower division courses are taught by GTAs and Instructors. The Physics Department produces a 5-year average of 5,489 credit hours per year. The tenure/tenure track (T/TT) faculty account for 80.8% (using 5-year average fall data) of the credit hours produced.

BA/BS Mathematics - The program offers a Bachelor of Arts degree in Mathematics, Bachelor of Science degree in Mathematics, Bachelor of Science degree with emphasis in Statistics, and Bachelor of Science with emphasis in Computer Science. Undergraduate math majors can go on to careers or studies in fields including medicine, law, teaching, engineering, business, industry, computer programming, and science. The program has averages 46 fall majors, with an increasing trend, and 8 graduates over the past 3 fiscal years. Majors are high quality students, having an average ACT score of around 25.5, well above the university average of 22.7.

BA/BS Physics – The program is designed to provide a broadly based, flexible program in undergraduate level physics which will prepare students for graduate study in physics or a

related discipline or for physics-related employment in academic, industrial, or governmental positions. The undergraduate program is also committed to providing the physics instruction needed by programs in other sciences, engineering, education, and health professions, as well as in the liberal arts. The curriculum includes traditional core physics courses and also provides students the opportunity to explore areas of individual interest through special projects. The program has averages of 17 fall majors, with an increasing trend, and 2.7 graduates over the past 3 fiscal years. Majors are high quality students, having an average ACT score of around 28, far above the university average of 22.7. An update on plans for increasing program majors and graduates was not provided.

MS Mathematics - The 33 hour program is designed to be either used as preparation for further study at the PhD level or for acquiring the mathematical and statistical background needed for a variety of professions in business, industry and education. There is a thesis and a non-thesis option. The program has averages 22.3 fall majors and 7.3 graduates over the past 3 years. Majors are high quality students, having an average incoming GPA of around 3.63, above the university average of 3.48.

PhD Mathematics - The Ph.D. program in applied mathematics is concentrated in the areas of partial differential equations, computational mathematics, probability, and statistics. It was developed specifically to support the state's growing technology-dependent industries. Although most doctoral graduates pursue careers in academia, about 1/3 of the graduates are employed in business, government or industry. The program has averages 15.3 fall majors and 2 graduates over the past 3 years. Majors are high quality students, having an average incoming GPA of around 3.77, above the university average of 3.63. A new concentration was added to this degree program in 2012 (applied mathematics-physics) in an effort to bolster the research profile of the newly created Department of Mathematics, Statistics, and Physics and to assist in the recruitment of PhD students who desire a physics focus.

Assessment of Learning Outcomes (for UG and GR):

BA/BS Mathematics – The program has a single learning outcome on demonstrated competency in core courses. An additional goal on understanding of material is provided, which is dependent on major and graduation plans. The assessment tool of the core courses is a comprehensive exam given to all students in the program. Targets are not set and results are not provided. Annually, they hire a consultant to assess a core course, and have consistently received superior ratings. Student satisfaction data is not provided. The program is not accredited.

BA/BS Physics - The program has a single learning outcome on proficiency in physics. The outcome is assessed by each major taking the GRE in Physics at the time of graduation. Targets are set for performance, but there is not a target for the percent of students who meet the performance target. Results indicate that students are meeting the performance target. Student satisfaction data is not provided. The program is not accredited.

MS Mathematics – The program has four learning outcomes that are appropriate to the discipline. Assessment tools are GPA for one outcome, and a comprehensive exam for other outcomes. Performance criteria and targets are provided. Results indicate that targets are mostly being met. Student satisfaction results show that graduating majors are quite satisfied with the program. The program is not accredited.

PhD Mathematics – The program has four learner outcomes, appropriate to the program. Performance criteria are provided and targets are set. Results show that graduates are generally meeting the performance expectations. Student satisfaction data is not provided. The program is not accredited.

Placement of Graduates (types of positions, starting salary):

BA/BS Mathematics – Placement and salary statistics are not provided.

BA/BS Physics – Placement and salary statistics are not provided.

MS Mathematics – Placement data shows that graduates are finding jobs in the field. Salary data are not provided.

PhD Mathematics - Placement data shows that graduates are finding jobs in the field. Salary data are not provided.

Faculty Resources:

M/S - The M/S faculty members are productive in terms of scholarship, teaching, and service. 89% of the faculty have graduate faculty status. In calendar year (CY) 2010, the twenty departmental faculty members published 16 journal articles and 4 conference proceedings, and generated nearly \$2.2M in external funding. In CY 2009, the 22.5 faculty members published 18 journal articles and 3 conference proceedings, and generated nearly \$1.8M in external funding. In CY 2008, the 22.5 faculty members published 31 journal articles and 4 conference proceedings, and generated nearly \$950K in external funding. The M/S Department is in top five of math departments in the nation for the concentration of math articles generated (# math articles/# university articles) averaged over 2003 – 2007. The 5-year average fall SCH per T/TT faculty is 154.6. Departmental faculty members are also involved in service to the university and profession.

Physics - The M/S faculty members are productive in terms of scholarship, teaching, and service. In calendar year (CY) 2010, the 6.7 departmental faculty members published 32 refereed journal articles and 5 conference proceedings, and generated \$58K in external funding. In CY 2009, the faculty members published 28 journal articles and 15 conference proceedings, and generated \$6K in external funding. In CY 2008, the faculty members published 27 journal articles and 16 conference proceedings, and generated \$6K in external funding. The 5-year average fall SCH per T/TT faculty is 352.3, which is high and remarkable given the

number of journal articles produced. Three of the faculty have won teaching awards. Departmental faculty members are also involved in service to the university and profession.

Sources of External Support:

Mathematics – Over \$4.9M in external funding over the past three years. Sources of the external funding were not provided

Physics – \$70,000 in external funding over the past three years. Sources of the external funding were not provided

Conclusions and Recommendations:

Commendations:

- The MSP Department provides a good service to the university through math, statistics, and physics instruction to university students.
- Learner outcomes for the MS and PhD in Mathematics are good and appropriate.
- Physics uses a good external assessment of its learner outcome.
- Department faculty are very productive in terms of scholarly output.
- Mathematics and statistics programs are no longer triggered.
- Physics faculty are very productive in producing SCH.

By April 1, 2013 (send to the Office of the Provost):

- Document that the program review process is a part of a continuous improvement approach involving all departmental faculty.
- The learning outcomes for both UG programs (and general education courses) should be further developed and a revised assessment process needs to be implemented to include the following for all programs (one learning outcome for each of the UG programs is not sufficient):
 - Learning Outcomes: Statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire through their program (e.g., graduates will have the ability to explain information presented in mathematical forms).
 - Assessment Methods: Direct measures used to identify, collect, and prepare data to evaluate the achievement of learning outcomes (e.g., quantitative literacy evaluated by a rubric, not grades or other indirect measures).
 - Targets: Expectations of students to achieve the desired outcome to demonstrate program effectiveness (e.g., 90% of students will demonstrate at least the benchmark performance on a project).
 - Results: Actual achievement on each measurement (e.g., 94% of the students achieved at least the benchmark performance on the project).

- Analysis: An evaluation that determines the extent to which learning outcomes are being achieved and leads to decisions and actions to improve the program. The analysis and evaluation should align with specific learning outcomes and consider whether the measurement and target remain valid indicators of the learner.
- Add additional learner outcomes to the Bachelor degrees. These should indicate the knowledge and skills required for successful employment or admission into graduate school. For example outcomes focused on quantitative literacy in terms of interpretation, calculation, application/analysis, etc.
- Document program changes that occurred through assessment of student learner outcomes.
- Provide an update on plans for increasing majors and graduates in the physics program.
- Address concerns of the Graduate School in terms of the assessment process for the graduate programs.

Prior to the next review in 2015:

- Include the new university exit and alumni surveys in assessment plan. This will include placement data, salaries, and student satisfaction.
- Given the high scholarly output of the department faculty, the department is strongly encouraged to increase the number of PhD students and graduates.
- Department may want to address the seemingly large difference in the teaching loads and responsibilities between the Physics and the M/S faculty.