

MATHEMATICS/STATISTICS 498-499
UNDERGRADUATE RESEARCH EXPERIENCE I (2)
UNDERGRADUATE RESEARCH EXPERIENCE II (1)
(EFFECTIVE FALL 2007)

PREREQUISITE: Approval of the department chair. Math/Stat 498 is required for 499.

CATALOG DESCRIPTIONS: **498 Undergraduate Research Experience I (2)** Introduction to research methodologies and tools including LaTeX and MathSciNet. Presenting mathematics in written and oral formats. Ethics in research. This course includes substantial directed individualized study leading to the preparation of a significant paper. Cannot receive credit for both Math 498 and Stat 498. Grading on a pass or fail basis.

499 Undergraduate Research Experience II (1) The presentation of mathematics works in both oral and written formats. This course will finalize the significant paper began in Math/Stat 498 and based on the students' individual research. This will require that it be presented at a regional or national meeting. Grading on a pass or fail basis.

OBJECTIVES: The student will:

1. Become familiar with MathSciNet.
2. Write a paper using LaTeX.
3. Present talks to local and regional audiences.
4. Discover mathematics that is new (at least to the student).

TEXT: The text(s) will be determined by the course coordinator and individual student advisors (so may be different for each of the students). These will not be ordered by the department through the bookstore.

These two course encapsulate the **Personalized Undergraduate Research Experience (PURE)**. These courses should introduce students to basic research methodologies and tools such as MathSciNet and LaTeX. They should also give the student valuable experience writing and presenting mathematics or statistics, to prepare them to continue learning in the future.

Course Procedures

Each student hoping to participate in the Personalized Undergraduate Research Experience should submit a PURE proposal to the Chair of the Department by the last day of classes of the Spring semester, junior year.

A successful PURE proposal will include:

- A description of the area or problem proposed for study. The area or problem must have a sufficient mathematical or statistical component.
- A preliminary bibliography of references to support the study.
- The name of at least one faculty member who has indicated a willingness to supervise your PURE work.

The students should register for Mathematics or Statistics 498, Personalized Undergraduate Research Experience, for the fall semester of their senior year.

At the end of the fall semester, they will each present their work in progress in a 40 minute oral presentation followed by 20 minutes of questioning. The entire department will be invited to attend these talks. Following the presentations, the PURE Committee will meet and make one of the following decisions:

- The PURE work should stop and they should not pass 498.
- The PURE work should not continue, but that they should pass 498.
- The PURE work should continue, and they should enroll in 499 next semester to finish.

To pass Math/Stat 499, they must present their work in a short format locally, then regionally, and finally in written form using the LaTeX template provided by the department. After each student's paper is submitted, they will be asked to defend their work before the PURE committee. The committee will meet and make one of the following decisions.

- The PURE paper or presentation(s) were not adequate and you should not pass 499.
- The PURE work was adequate, and you should pass 499.
- The PURE work was exceptional; you should pass 499.

The PURE Coordinator

Each fall the chair will assign one individual to be the "gatekeeper" for the PURE. Their duties will extend through both fall and spring semester, but the bulk of the work should be done in the fall. They will be the teacher of record in both 498 and 499 courses.

The coordinator must regularly meet with the students in seminar form to introduce MathSciNet, interlibrary loan and LaTeX; to discuss the basics of mathematical writing and presenting, and to have the student(s) present their work to the other students (as preparation for the official presentation to the department and PURE committee). The coordinator should also meet individually with the students to make sure progress is being made, that presentations (local and regional/national) are being planned and prepared, and help with the mechanical preparation of the paper and presentations (slides, PowerPoint, LaTeX).

In these duties it is the coordinator's goal to oversee the mechanical aspects of the research project, check the progress of the student/research advisor pairs, and address as early as possible any potential problems. It is not required that the coordinator intercede with the mathematical aspects of the capstone project, or that they be an expert in PowerPoint/Latex... but they are to facilitate solutions to problems that the students have.

The PURE Advisors

The PURE advisor and the student must work out a project that is of sufficient depth and breadth and yet may be completed in the senior year. They should oversee the actual research, meeting regularly with the student, and keeping the PURE coordinator apprised of the progress. The advisor will serve on the PURE committee.

The capstone coordinator and advisors should be able to offer advice on how to present material in both 'paper' and 'talk' formats. Therefore advisors should have a relatively recent record of research and presentations. The advisor should make sure that they are sufficiently informed about the topic to perform adequately as a mentor. They must also have the time to work with the student(s), so it is not recommended that new faculty members be PURE advisors or that any one faculty member have several PURE advisees. The department chair will appoint the advisors in consultation with the PURE coordinator and the previous year's PURE committee.

The PURE Committee

The PURE coordinator will serve as the chair of the PURE committee. The other members will be the department chair, those serving as research supervisors in the current and previous two years, as well as the upper division course coordinators.

The committee will meet in the fall after hearing the student presentations and determine if the students may continue to the second semester. This decision should consider:

- the student's mastery of the subject

- the quality of the writing done so far
- the quality of the oral presentation,
- the student's response to questions,
- the independence and reliability shown in the work with the advisor,
- and the quality of the leadership given by the advisor.

In the spring they will meet again to approve (or disapprove) the final project and presentations.