

Syllabus for a proposed course in Experimental Mathematics

This course will introduce the students to the field of *Experimental Mathematics*. The use of computer algebra systems, such as Mathematica or Maple, has become commonplace in the teaching of Mathematics. One of the objectives of this course is to use these tools as an exploration to discover and study Mathematics.

There is no undergraduate text available yet, as this is one of the first times that such a course in being offered. Graduate versions are offered regularly at Rutgers University and other institutions. The instructor has obtained a grant from the CCLI (Course Curriculum, and Laboratory Improvement) component of the National Science Foundation to develop the material for this course. One graduate and two undergraduate students from Tulane will work the summer of 2007, under the instructor supervision, to develop projects and exercises to be distributed to the enrolled students.

The list of topics described below represent some of the material to be covered.

Topics to be covered

- (1) Introduction to the Mathematica language
- (2) Manipulation of lists and sets
- (3) Graphical representation of functions
- (4) Differentiation and rules of simplification
- (5) Symbolic integration
- (6) Manipulation of series
- (7) Factorization
- (8) Modular arithmetic
- (9) Arithmetical functions
- (10) Solution of differential equations
- (11) Constant identification: the PSLQ method
- (12) Recurrences
- (13) Difference equations

Prerequisites. The class will be made available to any student that has completed the Calculus sequence: Math 121, 122, 221.

Grading policy: the class will be graded by
Homeworks and projects 40%,
Tests 20%,
Final exam 40%