

Permanent Status for Math 114 – Mathematical Modeling

This course meets for 3 contact hours a week and is worth 1.0 credits. It is an upper-division class.

Course Description: This course is an introduction to the formulation, analysis, and interpretation of results of mathematical models in the study of real-life problems chosen from the various areas of natural sciences, social sciences, economics, and business. Topics have been selected from several areas of mathematics that produce the richest interdisciplinary models: differential and difference equations, matrices, probability and statistics. They expose the student to continuous, discrete and stochastic examples of modeling. The complexity of the models will range from a single variable and a single equation as in the case of curve fitting to the chaotic surprises of a system of two differential equations.

Course Rationale: We are attempting to modernize our course offerings and make them more attractive to non-mathematics majors as well as mathematics majors. Mathematical modeling is the study of using mathematical methods and tools to research, study, and solve real-life problems. It has applications to many areas of science, business, and economics. While some of our currently offered courses involve addressing real-life problems, we presently we do not have a course that is specifically designed to address the methodology of solving a variety of social, scientific, and economic problems using mathematical methods. We believe students with economics, business or science majors will find MATH 114 useful and attractive and will be able to apply these methods to solve problems in their area of study. This course will be less traditional, with more emphasis on group work and developing the student as an independent learner than a standard math course may be.

Prerequisites: Math 28 (*Calculus II with Applications*) or Math 38 (*Calculus II*) with a C- or better.

Audience: We hope to have 15 students or more enroll in the class. These students would generally be mathematics minors and students majoring in mathematics, physics, chemistry, biology, environmental science, health science, psychology, economics, or business administration. In the two times the class has been offered it has been taught to 14 and 18 students. In both cases the large majority of the class was math minors, with 2 majors on each occasion.

Course Schedule and Syllabus: attached. The schedule and syllabus attached are the ones used for the Fall of 2010.

Review of experimental offering The course has been successfully offered twice, in the fall of 2008 and 2010. As mentioned above we attracted many math minors and the number of students in the class was considerably higher than is typical for an upper division math class. We have attracted more minors to the department and part of this may be attributable to the addition of this course. In its first incarnation the class ran on a MWF for an hour. We observed that with the amount of group work and student interaction the 90 minute time period was more appropriate and the course ran more successfully on the TTh schedule. The use of the

computer package LaTeX to typeset mathematics projects that were handed in was recommended in the first course and required in the second. A significant proportion of the work completed in the class was not in the traditional lecture form, but rather had students working independently through worksheets. The instructions given to students regarding these worksheets are included as well as two examples of these worksheets.

Implementation Costs There are no additional costs related to the introduction of this course and no courses are being removed from the curriculum.

Math 114
Mathematical Modeling
Prof. Jones
Fall 2010

Instructor – Prof. Chris Jones. My office is Galileo 106A and my e-mail address is cjones@stmarys-ca.edu. My office phone number is 8047.

Book – A first course in mathematical modeling by Giordano, Fox, Horton and Weir. We will use the 4th edition, make sure you have the correct edition, older versions do differ

Grading –	Individual Projects	30%
	Group Projects	15%
	Final	25%
	Homework	30%

This course will likely differ significantly from any math course you have taken in the past. Fewer than half the classes will take place in the traditional lecture format. A large number of classes will require you to present solutions and models at the board. This will be both in groups and individually.

Tests/Exam We will have just one exam during the semester. This will take place on the Thursday of exam week from 9am-11am. Please note that this is the last day of finals, keep that in mind when booking your trips home for the holidays. Early finals will not be given.

Homework This will be collected once a week, in weeks 2 through 11. You are permitted and encouraged to work together on homework, however any work you hand in should be written yourself and consist of your own work. Homework will be given on Thursdays, and will be collected on the following Thursday.

Individual Projects On Thursdays from weeks two through ten you will be required to present individual projects. The details of these projects are contained on a separate sheet.

Groups Projects The final three weeks of the semester (not including thanksgiving week) you will be required to present (both written and orally) projects that you will find on the cd that came with the book. In the week beginning Nov. 8th each group will choose a project from the “UMAP” options on the CD. In the week beginning Nov. 15th each group will choose a project from the “ILAP” selection, and in the week beginning Nov. 29th, you will do a project from the mathmodels.org selection. The groups will remain consistent throughout these three weeks. You may wish to choose groups with fellow students of similar interests, so you can pick topics that fit with your major/minor.

Blackboard – We have blackboard site on which the assignments will be posted.

Office Hours - MWF 9am-11am or by appointment. Students are strongly encouraged to come to office hours. I also live on in the dorms on campus and if you wish you may make an appointment to see me for extra help in the evenings, or just stop by. I live in Assumption Hall room 222. In addition to all this we have a student math center, which you are **strongly** encouraged to attend. This will be on a Sun-Thurs from 7-9pm, in Galileo 110.

Honor Code

SMC has established an academic honor code that asks students to pledge to do their own work in their own words, without seeking inappropriate aid in preparing for exams or assignments. The pledge reads as follows: "As a student member of an academic community based in mutual trust and responsibility, I pledge: to do my own work at all times, without giving or receiving inappropriate aid; to avoid behaviors that unfairly impede the academic progress of other members of my community; and to take reasonable and responsible action in order to uphold my community's academic integrity." This course operates under the premises of the academic honor code, including the expectation that you will work to uphold high standards of integrity. I am available to discuss issues of academic integrity and any questions you might have about the relationship between the policy and this course. To understand the academic honor code in full, please see the most recent Student Handbook.

"I sincerely... believe... in the general existence of moral instinct. I think it the brightest gem with which the human character is studded, and the want of it as more degrading than the most hideous of the bodily deformities."

Thomas Jefferson

Student Disability Services

Student Disability Services extends reasonable and appropriate accommodations that take into account the context of the course and its essential elements, for individuals with qualifying disabilities. Students with disabilities are encouraged to contact the Student Disability Services Director at (925) 631-4164 to set up a confidential appointment to discuss accommodation guidelines and available services.

Additional information regarding the services available may be found at the following address on the Saint Mary's website: <http://www.stmarys-ca.edu/academics/academic-advising-and-achievement/student-disability-services.html>

Learning outcomes

At the conclusion of this course you will...

Understand the main concepts of mathematical modeling.

Be able to apply a variety of techniques of mathematics to a range of applied problems.

Better communicate in the language of mathematics, both orally and in written form.

Have a greater appreciation of the vast scope of mathematics.