

Mathematical Studies

(This is an excerpt from a description written in 1988)

Course Description

It presents a unified and intensive presentation of Algebra, Analysis, and Geometry by a team of instructors. It is for capable and dedicated students who can allot a substantial amount of time to the study of Mathematics. It aims at providing a modern background in Mathematics for a career in pure or applied mathematics, science, or engineering.

The Purpose of Mathematical Studies

Mathematical Studies is intended to familiarize students with the most important basic concepts and habits of thought of contemporary Mathematics. There is increasing need for mathematical insight in the formulation of fundamental concepts and in the statement and solution of significant problems in the sciences, both natural and social. Students who complete Mathematical Studies should be able to understand this function of Mathematics, and later to make professional use of it. They should also be able to undertake graduate-level study of Mathematics immediately.

The emphasis in the program is on ideas rather than on routines. Since the Courses are so concentrated and comprehensive, we are able to present the material in an effective and integrated manner. Many of the ideas, once introduced, can be seen at work - often almost immediately - in the development of other, seemingly unrelated, topics. Important concepts and methods are often introduced several times, at increasing levels of generality and sophistication. The presentation is meant to be consistent with contemporary usage and to foreshadow material in more advanced courses.

Mathematical Studies deals with Mathematics as professional mathematicians understand the term. Students entering college are often familiar with a kind of Mathematics consisting of formulas and recipes and have a distorted view of the nature of the discipline; the transition to "real"

Mathematics often comes as a shock. We do what we can to soften this shock, but students should not be surprised or discouraged by it. In true Mathematics, "know-how" is never the essence of the matter, but at best a mere by-product of insight.

There is little use in these courses for memorization. The aim is insight, which, once achieved, is retained with minimal effort. All work in the course - lectures, discussion, homework, problem seminar, tests, papers - will require thought, and is intended to challenge and test understanding rather than rote-learning.

The Students

Mathematical Studies should be of interest not only to students who want to become professional mathematicians, but also to those who have a strong interest in the mathematical aspects of other disciplines. Even those who never use the specific knowledge they have acquired in this program may profit from the precision and discipline of thinking and the development of the imagination that it is meant to foster.

To qualify a student for success in Mathematical Studies, hard work and a strong motivation are necessary but not sufficient. It seems to take a certain special talent to understand Mathematics easily. This talent is difficult to describe. It is associated with clarity and precision; depth and subtlety of thought are more significant than a quick grasp of superficial patterns. It has very little to do with speed and accuracy of calculation, and is not always reflected in good grades in High School Mathematics. Students often discover whether they possess enough of this talent only while taking the first course of the Mathematical Studies sequence. We do our best to make sure that students have the opportunity of finding out whether they are comfortable in a program of this kind and to enable them to go on to other things without loss or delay if they are not.

Success of the Program

Mathematical Studies was instituted in 1971/72. Among the students graduating after having taken Mathematical Studies, a somewhat larger proportion than among students not having taken Mathematical Studies elected to go on to graduate study; those not going on to graduate study report a pattern of career choices quite similar to that of all graduates:

Systems Analyst, Software Engineer, Programmer, Actuary. There are some differences, however: we find a Director of Systems Development and a Manager of Information Systems, for example. We are also proud to see students from Mathematical Studies going to graduate schools of the first rank, such as M.I.T., Illinois, Michigan, Princeton, Stanford, Yale, Pennsylvania, and Chicago. One student, after being a recipient of a Churchill Scholarship at Cambridge, has completed an outstanding doctorate at Illinois and joined the faculty at Emory. Another, after completing a doctorate at Michigan, has held a distinguished post-doctoral position at Harvard and a tenured faculty position at Stanford. A third has completed a doctorate in Physics at Princeton and has held a post-doctoral appointment at the University of Florida.

We must hasten to point out that the Mathematical Studies program did not create talent where there was none before. It has, however, offered an exceptional opportunity for good students to grow to full realization of their potential.