

THE VIGRE PROGRAM

OVERVIEW

Vertical integration of teaching and research has been a tradition of the Department of Mathematics for many decades. In fact, the very term “vertical integration” has been in regular use to describe our programs since the early 1970’s.

It is departmental tradition that advanced seminars and graduate courses are a communal enterprise of tenured faculty, nontenured faculty, and graduate students. The form this has taken has intensified in recent years, with the introduction of year long topical seminars with a broad mixture of participants. Several new kinds of courses intermediate between our traditional basic first year program and our advanced graduate courses have also been introduced recently.

Undergraduate teaching too is based on vertical integration, with many classes taught jointly by people at several levels. Upper level undergraduate courses are taught by faculty members, often with the assistance of second year graduate students serving as “College Fellows”, a form of apprenticeship. Junior faculty and graduate students teach the lower level courses in small independent sections, often with the assistance of advanced undergraduates serving as tutors.

Moreover, at Chicago we have always understood the term “vertical integration” in a broader sense that goes beyond the core programs that are our central mission to embrace the outreach programs to Chicago area high school teachers, elementary school teachers, and mathematically talented pre-college students that Chicago has pioneered.

In a different direction, the Department has recently introduced a new Master’s program in Financial Mathematics, taught by members of the Departments of Mathematics, Statistics, and Economics and by professionals in the Chicago financial community.

Our VIGRE program offers some expansion and considerably greater integration of this variety of programs, along with the implementation of several new ideas. All VIGRE funding is used for the direct support of postdocs, graduate students, and undergraduate students. The support is restricted to U.S. citizens and permanent residents.

POSTDOCTORAL POSITIONS

On average, over the course of the VIGRE program, there will be six VIGRE Dickson Instructors in the Department of Mathematics. These

are three year positions at the same salary as all other Dickson Instructors. The teaching load is three courses per year. Two alternatives to regular teaching are offered on a voluntary basis, provided that other departmental teaching demands permit. VIGRE Instructors may organize and run seminars on the second year graduate level, and they may participate in the outreach programs of the department.

The VIGRE program provides summer support and travel funds for VIGRE Dickson Instructors.

GRADUATE STUDENTS

The primary aim of VIGRE support for graduate students is to enable advanced graduate students time off from teaching in which to fully focus on their research efforts. In view of the role played by graduate students in undergraduate teaching, this entails some expansion of the graduate program, with VIGRE supported first year graduate students and partially supported second year graduate students. First year students do no teaching, while second year students serve as apprentice teachers. VIGRE supported graduate students are strongly encouraged to participate on a voluntary basis in the outreach programs of the department.

The VIGRE program provides travel funds for graduate students to attend conferences or visit other institutions. Summer support is also provided.

As an offshoot of VIGRE discussions, advanced graduate students have initiated "GRAILS", an annual lecture series for incoming graduate students.

UNDERGRADUATE STUDENTS

The VIGRE program has allowed the University of Chicago to institute a new kind of REU program for its undergraduates, primarily mathematics majors. This program is organized and run by senior faculty members, who give lecture series and provide supervision. Study groups and research projects are carried out by groups of three to five undergraduates mentored by VIGRE supported Dickson Instructors and graduate students. The 1999 program featured topics in topology and geometry, representation theory, and dynamical systems and chaos. During the program, the undergraduate participants serve as counsellors in the summer outreach programs of the department.

The VIGRE program provides travel funds for undergraduates to attend conferences, and it provides funding for service in the academic year outreach programs. Summer internships at Argonne and individual REU support can also be applied for.

OUTREACH PROGRAMS

Postdocs and graduate students on a volunteer basis and undergraduate students as part of the summer REU program and on a volunteer basis during the academic year play essential roles in the following four programs. In the process, they are introduced to a wide variety of eye-opening teaching experiences at varying levels.

- (1) YSP: YOUNG SCHOLARS PROGRAM. This program brings large numbers of students in grades 7 through 12 to the University of Chicago for a summer mathematics enrichment program. There are three tracks, each with two rotating courses, at least one in mathematics and the other often in a related area of application in the physical sciences. Each course is accompanied by a computer laboratory. There is an accompanying Saturday morning academic year program.
- (2) SESAME: SEMINARS FOR ELEMENTARY SPECIALISTS AND MATHEMATICS EDUCATORS This is a three year, 270 hour, program for elementary school teachers in the Chicago Public Schools. It offers 90 hours of classroom instruction each year, 60 in the summer and 30 during the academic year. Participating teachers earn appropriate formal educational credit. The summer program is mainly focused on mathematics directly relevant to classroom teaching; the academic year program focuses more on mathematical enrichment.
- (3) SSC: SUMMER SEMINAR IN CALCULUS. Around 20 high school teachers and 20 high school students come to the University to participate in this program, which focuses on the calculus and its applications. One of the ideas behind the mix of teachers and students is to convince the teachers that calculus can be taught to high school students.
- (4) SEMINAR PROGRAM FOR HIGH SCHOOL TEACHERS. Around 20 high school teachers attend this summer program, which offers seminars in algebra and geometry, complementing the SSC program in calculus. The material taught is considerably more ambitious and demanding than the standard curriculum that these people generally teach.