The Ross Program at Ohio State University

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"Think deeply of simple things"

In 2006, the Clay Mathematics Institute continued its support of summer programs for talented high school students who excel in math by sponsoring, in part, the Ross Program at Ohio State University and PROMYS at Boston University. Both of these programs are distinguished for offering the best pre-college learning experiences available to American students with a special aptitude for mathematics by immersing them in the creative world of mathematical discovery.

The Ross program at Ohio State University is an eight-week intensive summer course in mathematics for bright young students. Spurred by the launch of Sputnik and the subsequent surge of interest in science education, Dr. Arnold Ross founded his program at Notre Dame in 1957. The program moved with Dr. Ross to Ohio State in 1964 and has run every summer since then.

The central goal of this program has always been to instruct and encourage students in the art of abstract thinking and to inspire them to discover for themselves that abstract ideas are valuable and important. Beginning students who do well are invited back for a second summer, and may return as junior counselors or counselors in subsequent summers. Returning students and counselors also take advanced courses, which vary from year to year.

For the past several years, CMI employed instructors and counselors in the Ross Program. This made it possible for the University to recruit top-ranking mathematics professors and graduate students to teach and coach the work of the enrolled students. In 2006, 35 students were involved in the number theory course (23 first-year students, 8 second-year students, and 4 undergraduates). These participants were assisted in their mathematical work by eight Junior Counselors and seven Counselors.

The first-year students (mostly 14 to 18 years old) take the basic course in number theory, which Daniel Shapiro reported to be "elementary but fast-paced." Each summer's session starts with the Euclidean algorithm and congruences, then moves on to prime factorization, Gaussian integers, quadratic reciprocity, Möbius inversion, polynomial rings, geometry of numbers, etc. Students are expected to work through these ideas (with proofs), guided by the extensive problem sets.

"To discuss the number theory problems, students broke into three seminars taught by retired Ohio State University professor Robert Gold and his colleague Jim Brown, a postdoc at Ohio State, and Stefan Patrikis, one of the senior counselors. Students with a bit more experience also participated in a Topics Seminar designed and run by the Counselors. Junior Counselors and Counselors attended the two advanced courses: Combinatorics taught by Professor Kenneth Supowit, and Sums of Square taught by me," explained Shapiro.

In addition to these eight-week courses and seminars, there were several "colloquium style" lectures. The lecturers in 2006 were Ray Pierrehumbert (University of Chicago, geophysical sciences), Paul Pollack (Ph.D. student at Dartmouth), Tom Weston (University of Massachusetts–Amherst), David Pollack (Wesleyan University), Glen Whitney (Renaissance Technologies), and Susan Goldstine (St. Mary's College of Maryland).

For each of the past several years, the Ross Program has also offered a three-week component for in-service high school mathematics teachers. These teacher-participants join the others in the number theory lecture, but have separate workshops and seminars. A geometry course was introduced in 2006 for alumni of the teacher program. There were 19 teacher-participants involved in the number theory course, and 8 joined the geometry course. These efforts were supported by funds from the Park City Math Institute and the Math Department's VIGRE grant from the National Science Foundation.

"Next summer we will host a 50th Anniversary Reunion/Conference, held on July 20–22, 2007," Shapiro reported. "We will use this event to help demonstrate how influential the Ross Program has been on the American mathematical community. It should also provide us with some fund-raising opportunities."

Daniel B. Shapiro is Professor and Vice Chair of the Department of Mathematics at Ohio State University. He was a student in the program in the 1960s and took over as director when Dr. Ross stepped down in 2000 at the age of 94.