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Research-oriented education at the intersection of biology and mathematics: The undergraduate training in theoretical ecology research (UTTER) program

The goals of this NSF-funded research training program include enabling students from different academic disciplines to learn the concepts, language, and culture of another discipline, providing a substantive research experience at the intersection of ecology and mathematics, and encouraging members of underrepresented groups to pursue careers in biology and mathematics. Over two academic years, students take three special program courses, complete 4 semesters of a special seminar class, and take a summer research workshop. A team approach to teaching puts a biologist and a mathematician together in each class, so that instructors can meet biology and mathematics majors on their own terms and clarify critical terms and key concepts. Course activities are strongly project-oriented: topics are introduced that serve as course projects and provide open questions leading to research. Student research projects have also been enriched by seminars focused on mastering published research literature, which also provide guest visits by established researchers, and by workshops emphasizing research, analytical, computational, and presentation skills.

Many of the practices being developed will be carried into a new Mathematical Biology option for the undergraduate degree program in Mathematics, and can serve as a model for cross-fertilizing the disciplines of biology and mathematics. Assessments to date indicate that students are enthusiastic about team-taught, interdisciplinary coursework, opportunities to conduct research, and other enrichments of the academic experience.