

## **Experimental Study Group**

The Experimental Study Group (ESG), now in its 35th year, continues to offer undergraduates at MIT innovative opportunities in teaching and learning. In keeping with our original mission, ESG provides first-year students at MIT with personalized instruction in the core subjects within a close-knit and informal community environment. This includes flexibility in pace and scheduling and small classes where students can easily ask questions and get to know fellow students and instructors. Over the years, students have consistently said that ESG's small-group learning and community atmosphere were some of the most rewarding aspects of their MIT education. We are also able to offer flexibility and individualized attention to students with unusual educational needs, such as international students.

In the past 11 years, ESG has served as a center for educational innovation in the undergraduate program by offering a series of hands-on, interactive seminars in a variety of subjects not regularly offered at MIT. These seminars provide all MIT undergraduates with the opportunity to participate in the ESG style of learning (small, interactive classes). Non-ESG students who take these seminars frequently say that these seminars are the only opportunity they have had since their freshman year to participate in a small interpersonal class with a hands-on focus. We are therefore strongly committed to continuing these seminars and promoting their growth by working closely with various parts of MIT, outside sources, and our own alumni to secure funding for these seminars. This year we were able to run 13 seminars through a combination of funds from the dean of the School of Science, Residential Life and Student Programs, Sandia Labs, and funds from our own alumni.

ESG also offers approximately 30–35 undergraduates each year the opportunity to assist staff in teaching the core subjects. All student instructors receive midterm and end of term evaluations from freshmen and meet regularly with staff members for supervision. New student instructors participate in a weekly teaching seminar (SP231) run by senior ESG staff. Experienced student instructors who have demonstrated excellent teaching skills are able to develop their own pass/fail seminars under faculty supervision or work relatively independently in teaching core subjects.

We are proud of our history of educational experimentation and will be working over the next few years to substantially increase faculty and alumni involvement with ESG and to export successful ESG educational experiments to the regular curriculum and to educational settings outside of MIT.

### **Student Statistics**

We had the highest number of students applying to ESG first term in our history (85) and had to waitlist 31 students. Sixty first-year students enrolled for one or more terms in ESG this year. Some 52% of our students were female, 23% were underrepresented minorities, and 15% were international students (including countries as diverse as Vietnam, France, Malaysia, Kenya, China, Tanzania, Japan, and Greece). Seventeen

upperclassmen took one or two core science or Humanities, Arts, and Social Sciences (HASS) subjects in ESG. Eighty-seven upperclassmen who were not former ESG students participated in our undergraduate seminar program (along with 32 upperclassmen who had been in ESG as freshmen). We employed 33 undergraduates (who collectively maintained an impressive 4.6 grade point average) as teaching assistants, graders, and student instructors in our program, and 2 graduate students (who had been in ESG as freshmen) as teaching assistants. We also employed 12 upperclassmen to develop their own six-unit undergraduate seminars.

### **Staff and Faculty**

ESG's administration was headed by Professor Alexander Slocum and included associate directors Dr. Peter Dourmashkin and Dr. Holly Sweet and program coordinator Graham Ramsay. The physics staff was headed by Dr. Dourmashkin (senior lecturer) and included Toby Ayer '96, David Custer '82, graduate student David Zych, and Andrew Thomas '03. The mathematics staff was headed by Dr. John Lewis (senior lecturer) and included Dr. Jeremy Orloff, Craig Watkins, and three ESG alumni: Alicia Hardy '03, Glenn Iba '74, and Nirav Shah '01. Dr. Patricia Christie headed the chemistry and biology offerings at ESG. ESG offered several HASS subjects to its students. In the fall term, Mr. Custer taught 21W730 Expository Writing and Dr. Lee Perlman taught 24.00 Problems in Philosophy. In the spring term, Dr. Perlman taught SP2H1 History and Philosophy of Greek Mathematics.

### **Academic Initiatives**

Because of ESG's small size and experimental educational focus, it provides an ideal environment in which staff, faculty, and students can develop new subjects and new approaches to existing subjects. This year we offered eight new undergraduate seminars, half of them developed and taught by undergraduate students under staff and faculty supervision. New seminars included the following: SP240 Composing a Life, SP242 Gender Issues in Academia, SP243 Images of Romantic Love in International Film, SP244 Identity and Personality, SP245 Awareness, SP246 Current Events and Social Issues, and SP274 Special Topics in Mathematics. SP240 was team-taught by instructors from different disciplines: Dr. Sweet is a licensed psychologist and Mr. Ramsay is a professional photographer. Student work from this seminar was publicly exhibited at the Wiesner Student Art Gallery at the end of the term and an article about the seminar appeared in the April 28 edition of *Tech Talk*.

Professor Slocum, working closely with staff from the Athletics Department, developed a version of 8.01 in the fall that linked sports to basic physics principles so that students could learn to "feel" the physics that helps them to develop their instincts and insights in that area. Under the guidance of Coach Halston Taylor (in scuba and track and field) and Coach Noah Riskin (in gymnastics), students participated in different sports events to learn how fundamental physical laws can play a role in their execution. This subject will be repeated again in the fall of 2004, and course materials are being developed into a textbook.

In the spring term, Mr. Shah and Mr. Custer taught fast versions of 18.03 and 8.02 respectively, which finished in approximately half the term. The fast versions were student initiated because of student desire to immerse themselves in the subjects. Student evaluations of each subject were very positive and the experiment will be repeated next spring. Other new educational offerings in the spring included Dr. Perlman's new HASS subject SP2H1 The History and Philosophy of Greek Mathematics.

## **Awards**

ESG gave its own set of annual cash awards, including the Peter and Sharon Fiekowsky Community Service Award (now in its 5th year) and the Todd Anderson Excellence in Teaching Award (now in its 7th year). Both Mr. Fiekowsky and Mr. Anderson are graduates of MIT and have established funding for annual ESG prizes. This year Claudia Gold '06 and Susannah (Suki) Dorfman '05 received the Fiekowsky Award for community service to ESG. The Anderson Award was given to graduating seniors Rachel Dillon, Megan Dybvig, Erica McEvoy, and Daniel Zaharapol, all of whom have demonstrated excellence in teaching at ESG over a sustained period of time.

## **Alumni Involvement**

For the first time, ESG held a reunion of West Coast alumni in the San Francisco Bay Area over the weekend of June 18–20. Over 40 alumni attended and several important initiatives were discussed at meetings held during the reunion, including ways of keeping alumni involved more closely with ESG both academically and socially. A reunion of East Coast alumni was planned for the weekend of October 15–17 2004, and an annual reunion (alternative between the East and West Coasts) will be held in future years.

## **Future Developments**

ESG has begun to develop its own textbook series, based on new subjects developed and taught at ESG. The first textbooks will include *The Physics of Sports* (Taylor, Riskin, and Slocum), and *Composing One's Life: Exploration of Self Through Art, Photography, and the Written Word* (Ramsay and Sweet). Future textbooks are planned, including *Edible Chemistry* (Christie) and *The Integration of Introductory Mathematics and Physics* (Dourmashkin and Orloff).

The first-year student at MIT is expected to understand 18.01 Single Variable Calculus and 18.02 Multiple Variable Calculus, as well as 8.01 Newtonian Mechanics and 8.02 Electricity and Magnetism. However, the mathematics and physics subjects are taught independently of each other despite their intimate historical development. This coming year, ESG will be integrating these two subjects into a new and more efficient combined calculus and physics subject, 18.01A/18.02A with 8.01. The main overall goal of combining the two courses is to enrich both of them.

ESG is working hard to raise funds from alumni (matched in part by the dean of the School of Science) that will help fund a new faculty-in-residence program at ESG,

starting in the spring of 2005. Faculty who wish to try out new subjects in a small, interactive environment will be invited to teach at ESG.

Finally, we are excited about the prospect of involving our alumni (who now number more than 1,500) in many aspects of our program, including sponsoring new seminars, developing a distance learning project, using alumni as e-pals and mentors for freshmen, and helping organize an annual conference on alternative learning.

**Alexander Slocum, Director and Professor of Mechanical Engineering**

**Peter Dourmashkin, Associate Director and Lecturer in Physics**

**Holly Sweet, Associate Director and Lecturer**

*More information about the Experimental Study Group can be found on the web at <http://web.mit.edu/esg/>.*