Interdisciplinary Programs:
Ecology, Evolutionary Biology, and Behavior

Over eighty faculty and one hundred graduate students have taken up the challenge of participating in MSU’s Ecology, Evolutionary Biology and Behavior Program (EEBB)—delivering on the premise that interdisciplinary education can provide unique opportunities to expand graduate students’ fields of knowledge and areas of research.

Students from thirteen different departments and graduate programs in four colleges are involved in the EEBB concentration. Participating departments include Anthropology, Plant Biology, Plant Pathology, Crop and Soil Science, Entomology, Fisheries and Wildlife, Forestry, Geological Sciences, Horticulture, Microbiology, Philosophy, Psychology, and Zoology. According to EEBB Director Dr. Don Hall, the program’s popularity rests on its mission to provide a sense of “breadth” to students with highly focused training in other fields. He notes, “What we wanted to do was provide students and faculty an interdisciplinary experience where they could bring their specific strengths to bear on a sharing of all these interests which had a common base—EEBB.”

Although it is a dual-degree program, EEBB does not require a longer time commitment than disciplines with a single focus. This is a result of the flexibility of the coursework and the cooperation of the participating departments.

The program, instituted fifteen years ago, was the brainchild of Dr. Guy Bush, (Hannah Distinguished Professor, Emeritus), Dr. Don Straney (Professor of Zoology and Assistant to Provost for Faculty Development), and Dr. Don Hall, (Professor of Zoology and current EEBB Program Director). During a discussion about the state of biological sciences, these scientists realized two things: First, they felt that because students received almost all their coursework and experience from their major professor, they could be too parochial in their scientific experience at MSU. Second, they noticed the opportunity to provide more exposure to evolutionary biology, which Dr. Hall names the “queen of the sciences” because of the foundation it provides to all other areas of scientific study. By linking Evolutionary Biology with Ecology—which has for decades been very strong at MSU—and more recently Behavior, three very closely related disciplines asking similar questions but in different ways become interconnected.

The three chosen areas, Ecology, Evolutionary Biology and Behavior, became the focus at the onset of the program because each represents an area that is very strong at MSU, but is disparately represented in the various departments. Each has appeared as a subset of a larger discipline such as zoology and botany or in more applied areas like fisheries and forestry which dealt with mainly ecological subjects. For Dr. Hall, “it’s like cutting the cake two different ways. One way is by taxonomy, which is what most departments traditionally have done. Now we’re saying that rather than throw that all out and start all over again, why not divide the biological sciences at MSU with a different structure that cuts across the layers of the cake and label them depending on their interests, such as neuroscience, genetics and EEBB.”

The advantage of this functional, rather than taxonomic, organizational model is to realign these areas of focus without destroying the old structure. The traditional structure of separate departments in the biological sciences remains intact. In addition, simply by creating a new program like EEBB, the process of interdisciplinary reorganization, which could have taken up to a decade under a more aggressive model of splitting and reconfiguring departments, happens fairly quickly.

In addition to the breadth of knowledge offered by the program, EEBB is on the cutting edge of new directions in the biological sciences. The burgeoning field of molecular biology is providing new insights into the areas of ecology and evolution. According to Dr. Hall, many of the changes going on in the biological sciences right now are being studied at the molecular level. Previously, programs in specific fields like zoology or genetics were going their separate ways and not sharing much information with one another. Now, a more unified study of evolutionary biology, which transcends the old, is emerging.

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Graduate students in EEBB realize this trans-disciplinary approach is the trend of the future and understand the importance of this program for their future careers. Megan Mahoney believes that her dual degree in zoology and EEBB will help her be a stronger candidate when she enters the job market “because I have been exposed to a broad range of ideas and research. Perhaps I will be more diverse, and thus, desirable, than a person from a program that was focused in one area.” Dr. Kay Holekamp, Professor of Zoology, adds: “The EEBB program at MSU is very well regarded in both national and international communities of scientists working in this area. I sat on a National Science Foundation panel where proposals submitted by former EEBB students fared very well in competition with proposals submitted by other behavioral ecologists. EEBB graduates also clearly do very well in a highly competitive job market. For example, the PhD student from my lab who completed her degree most recently, Erin Boydston, walked out the door at MSU in April and stepped directly into her ‘dream job,’ working as a field biologist for the U.S. Geological Survey in San Francisco.”

The success of the EEBB program begins with the close interaction between students and faculty. Faculty frequently collaborate with graduate students in research projects and publications. As doctoral candidate Micaela Szykman points out, “The participating faculty members are a great team of exciting researchers. They are very supportive of the students in the program, they bring friends and colleagues for the weekly seminars, and they agree to teach classes in their field, even when they aren’t required to put in that teaching time.”

At the same time, the faculty see the graduate students as important in shaping not only the EEBB program, but also their own scholarly work. Dr. Richard Lenski, Hannah Professor of Microbiology, finds that the EEBB graduate students are “our strongest resource, bar none.” Dr. Kay Holekamp agrees and adds: “Teaching in the EEBB program keeps me very much on my professional toes! The students are very sharp and ask insightful, often difficult, questions when I lecture to them or interact with them in graduate seminar courses. They are tenacious in pursuit of the knowledge they seek and they force us, the faculty, to stay well abreast of all recent developments in our own areas of scholarly expertise.” This helps make the program very popular with the over 80 faculty members currently participating in EEBB.

Aware of the uniqueness of their position studying these interrelated sciences, EEBB students take an active part in the initiatives designed to support their progress in the program. One initiative, the Graduate Student Colloquium, provides an opportunity for students to process and design events that help them to negotiate the EEBB program. Some of the Colloquium topics have included: how to talk both formally and informally about research, how to negotiate graduate school, and how to prepare for conferences. Students also have the opportunity to practice giving papers and thesis presentations in front of their peers and receive helpful feedback. These weekly meetings evolved through students’ desire to interact with each other without the formality of a faculty-critiqued event. Including structured peer-review, discussion, and social interactions, the Colloquium allows for student-to-student mentoring, helps newer students to “learn the ropes” of the EEBB graduate program, and facilitates student connections to the larger academic community.

Another important opportunity the EEBB graduate program offers is the weekly seminar program. These events feature lectures given by invited guest speakers and are very popular with graduate students. The seminar series is overseen by a committee of faculty and graduate students who make suggestions on topics and distinguished speakers to be invited. The program, formerly held in the MSU Museum, has been well attended that it has been moved to a larger venue, the Natural Science Building Auditorium. These seminars have included such topics as “Conservation, Population Biology and Physiology of Sea Turtles,” by Dr. Frank Paladino (Department of Biology, Indiana University-Purdue); “What Biologists Need to Know about the Neocreationist Wedge Movement,” by Dr. Robert Pennock (Lyman Briggs School, Michigan State University); and “The Evolution of

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MSU Graduate Students Attend Congress of Epidemiology

Graduate students and faculty in the Department of Epidemiology represented Michigan State University at the Congress of Epidemiology in Toronto, Canada, on June 13-16, 2001. A master’s degree candidate, Plamen Dimitrov, won the prestigious award of First Place Student Poster—Session Two for his poster “Balkan Endemic Nephropathy in Vratza, Bulgaria, 1964-1987: An Epidemiologic Analysis of Population-Based Disease Registers.” Five other students—Scott Asakevich, Susan Bohm, Michael Brennan, Nicole Jones, and Sung (Larry) Lee—along with several faculty members and project managers presented papers and research. MSU alumni Allen Stout, now at Ford Motor Company, and Joe Bonner, now at the University of Michigan Medical School Department of Medical Genetics, also participated. In all, 17 people affiliated with MSU took part in the meeting—the University’s largest participation in this conference to date.

With over 1600 people from 33 countries attending, this meeting was one of the largest and most notable gatherings of epidemiologists ever held in North America. The Congress combined five groups working in the field of disease and public health, including the American College of Epidemiology, the American Public Health Association’s Epidemiology Section, The Canadian Society for Epidemiology and Biostatistics, and the Society for Epidemiologic Research. The fifth group, the Society for Pediatric Epidemiologic Research, held an additional meeting before the Congress and featured as its keynote speaker Dr. Nigel Paneth, Chairperson of MSU’s Department of Epidemiology.

Dr. Paneth emphasized the importance of this Congress for the department’s graduate students preparing for careers in the field: “Our students had the chance to see cutting-edge epidemiologic research from around the world and to discuss their own findings with top researchers.” Nicole Jones, whose work focused on methods of measuring stress in pregnant women, added, “The diversity of topics was amazing. Attending this Congress helped to give a different and wider perspective on the important topics and issues in epidemiology than a single program can provide.”

MSU graduate students’ record attendance and success at this Congress stemmed in part from a supportive department invested in its graduate students’ professional development. Susan Bohm, whose research investigated the relationship between maternal concentrations of PCBs and pre-term delivery, rated her department’s involvement “very supportive—both financially and in terms of training preparedness. In January 2000 the department hosted Science in the Field Day, at which students and faculty could present posters on their research. This provided the MSU epidemiology students with an opportunity to practice poster presentation skills on home turf before appearing at national and international conferences.” Karen Klomparens, Dean of the Graduate School, strongly endorses such opportunities for graduate students. “Our own surveys of graduate students, as well as those conducted at the national level, reflect students’ desires and expectations that departments will support professional development and networking as part of graduate education.”

Graduate students presented papers and posters on a variety of topics. Plamen Dimitrov, who received his master’s degree from MSU in May 2001, based his award-winning poster on his master’s thesis (advisor Dr. Wilfried Karmaus). He studied a serious kidney disease, Balkan endemic nephropathy, common in sections of his home country, Bulgaria. He has already submitted his results to the European Journal of Epidemiology and now plans to continue his interests in environmental epidemiology.

Currently working as a graduate assistant in the department’s asthma surveillance study, Susan Bohm (academic advisor Dr. Mike Collins) displayed a poster entitled “Maternal Concentration of Polychlorinated Biphenyls in Michigan Anglers Increases the Risk of Preterm Delivery” (project advisor Dr. Wilfried Karmaus). Her background includes work in scientific journal publishing with the National Research Council of Canada, and her main area of interest is autoimmune diseases.

Sung (Larry) Lee, MD, a 2001 graduate whose advisor is Dr. Nigel Paneth, presented “Association of Clinical Chorioamnionitis and Cerebral Palsy in Preterm Infants.” He is a practicing obstetrician-gynecologist in Lansing.

In his poster entitled “Lump Discrimination: Can We Be More Specific?” Michael Brennan critiqued the methodology used to assess physicians’,
nurses’, and medical students’ specificity of lump detection in the breast. His poster explained how he and other MSU faculty members, including Dr. Henry Barry (Family Practice), Dr. Janet Osuch (Surgery), Dr. Pramod Pathak (Statistics and Epidemiology), and Dr. Dorothy Pathak (Epidemiology and Family Practice), assessed problems in methodology and offered alternatives. Currently working toward his master’s degree (advisor Dr. Wilfried Karmaus), Brennan has just completed a stint as a research assistant for the department’s study of Polish women migrants and breast cancer. He now works in the Office of the Associate Dean for Research in the College of Human Medicine.

Nicole Jones (advisor Dr. Claudia Holzman) co-authored a poster entitled “An At-Home Collection Protocol for Measuring Stress in Pregnant Women” with Dr. Claudia Holzman (Epidemiology), Dr. Adroaldo Zanella (Animal Science), Dr. Randall Fotiu (Computer Laboratory), Dr. Cheryl Leece (Animal Science), and the Prematurity Study Group. Currently a staff member for the Department of Epidemiology, she works on the department’s Pregnancy Outcomes and Community Health Study.

Scott Asakavich (advisor Dr. Joseph Gardiner) is currently attending medical school at the MSU College of Human Medicine. Under the advisement of Dr. Wilfried Karmaus, he presented a poster entitled “Childhood Growth and Exposure to Dichlorodiphenyl Dichloroethene and Polychlorinated Biphenyls.” Asakavich’s work examines the relationship between environmental contaminants and children’s development.

Formerly a program in the College of Human Medicine, epidemiology gained department status in 1997. Approximately 50 graduate students are currently enrolled in the master’s program; the department hopes to offer a PhD program in epidemiology in the near future. The department’s research mission is to “conduct cutting-edge epidemiologic investigations of importance to public health, especially the public health of Michigan.” The department enjoys research connections throughout the College of Human Medicine, the College of Osteopathic Medicine, the College of Nursing, and the College of Veterinary Medicine, as well as with outside institutions such as the Michigan Public Health Institute, the Michigan Department of Community Health, the University of Michigan, and Wayne State University. The department holds a strong record of obtaining grants from federal agencies such as NIH, NIMH, NIAA, AHCPR, and the CDC which help support graduate student research. For more information, see the department’s web page at http://www.msu.edu/unit/epi.

The Department of Epidemiology combines the opportunity of researching at a large university with the benefits of working in a smaller department. According to master’s student Michael Brennan, “the department has enough researchers with a variety of interests that allowed me as a student to look into many subjects of human research. At the same time, it is small enough to allow me to perform some of the practicalities of epidemiology alongside the researchers. By exposing me to both theory in the classroom and practical applications through work with professors and on my thesis, the department has given me an excellent education.” Congratulations to all MSU participants in the Congress of Epidemiology!
Agriculture in Ants,” by Dr. Ulrich Mueller (University of Texas-Austin). Doctoral student Megan Mahoney (advisor Dr. Laura Smale) explains, “Weekly seminars are one of the backbones of the program. These seminars bring speakers from throughout the broad fields represented by EEBB. Thus, plant ecologists learn about insects, and behaviorists can be exposed to evolution in bacteria. It helps us remain well-rounded and exposed to many topics.” This interactive learning is at the heart of the EEBB approach to interdisciplinary education. 

Graduate students in EEBB have also initiated off-campus gatherings to deepen their familiarity with the opportunities offered by the program. For example, during the last academic year, Megan Mahoney, while president of the EEBB graduate student association, helped to institute an annual visit to the Kellogg Biological Station. The event allowed graduate students to explore the research done at KBS as well as to form connections with the people working there.

Traditionally, the link between a focus and a broad approach to study has been an area of contention. Does one lose specialized expertise in the process of becoming interdisciplinary? According to Dr. Hall, a symbiotic relationship exists between integrated and specialized approaches to study. He comments that “you need the disciplinary strength to become interdisciplinary.” For this reason, EEBB students are encouraged to enter the program while completing a concentration in a specific discipline. Therefore, the program becomes a step toward a more broad-based study—a natural progression of their work. Building on the depth of a student’s discipline, the breadth of a program like EEBB gives further relevance to their area of knowledge. Students begin to see the overarching themes of their specialization, and this translates into a new vision of the connection between their concentrations and the whole area of biological science. For EEBB students, this approach provides them with a more varied background in the field and makes them very competitive in the marketplace. Consequently, the flexibility of the program allows students to discover new ways of approaching knowledge—interdisciplinary studies’ greatest promise.

PhD candidate Micaela Szykman spent three years at a game reserve in Kenya to study the behavior and clan structure of free-living spotted hyenas. Here, she points out some of the photos she took as part of her research.