Entomology Graduate Program Goals and Outcomes Assessment
March 12, 2015

Program Background
The University of Minnesota Entomology academic program offers both M.S. and Ph.D. degrees. The program has been consistently ranked among the top 10 Entomology departments nationally for the past 30 years. During the most recent assessment by the National Research Council (NRC), the program was ranked 4th (4/28) based on the overall productivity, quality, and number of funded students (e.g., CHE, 2010; PhD.org 2010; NRC, 2009). There is an approximate 2:1 graduate student: faculty ratio, and the faculty is comprised of 23 Members and 3 Affiliate Members. Among the 23 Members, 19 Members are tenured or tenure-track faculty in the Department of Entomology. Since 2010, the program has maintained an average of 40 graduate students per year, with approximately 75% as PhDs. The program has graduated 47 students over the past 8 years (5.88/year). The vast majority (~95%) of the students are funded by faculty-driven research grants, some TA support, and a growing trend toward endowed and competitive fellowships. The program continues to strive to increase the diversity of our graduate students and faculty. Currently, the majority of our international graduate students are from Central and South America. The recent GRIP report (see Appendix) indicates that the goals and outcomes of the Entomology Graduate Program accommodate the diverse background and expectations of Entomology graduate students.

The mission of the Entomology Graduate Program is to train graduate students in the science of entomology, emphasizing the taxonomy, biodiversity, biology, ecology, and importance of insects and their relatives in relation to human welfare, managed plant and animal agricultural systems, forest and natural systems, and research that supports the maintenance of a healthy environment.

The Entomology Graduate Program offers M.S. Plan A (with thesis), M.S. Plan B (without thesis), and Ph.D. degrees (with dissertation). Students earn these degrees by satisfying the appropriate degree requirements. The graduate faculty defines the requirements, but the Graduate School awards the degrees. While in the program, graduate students receive advanced training as scholars, as researchers, and as teachers of the discipline. At the same time, graduate students themselves contribute to teaching, research and service in the department.

The Program has actively kept track of the career paths of our graduate students when they leave the Entomology Graduate Program. During the spring semester 2014 a “Qualtrics” survey (see Appendix) was electronically distributed to Entomology Department alumni (1989-2013) to determine their current positions and their satisfaction with the graduate program. The survey indicated that most (73%) alumni are in academic or government/public sector careers. Of those in academic settings, 75% are conducting research or teaching (Fig. 1) (see Table 1 for data used to generate graph).

Process for developing this report
This report was developed in consultation with faculty and graduate students in the Entomology Graduate Program. The program’s goals and outcomes for students
and how to assess them were discussed in an open meeting with graduate students. A draft statement was written by the DGS (Tim Kurtti) and revised based on feedback from the head, long range planning committee, faculty and students.

Scholarly Formation

**Identification of most significant and fundamental goals of the Entomology Graduate Program**

As stated in the Manual for Entomology Graduate Students, the goals of our program are for students to acquire:

- **Core knowledge**: a basic command of core areas of entomology, including general entomology, insect biodiversity and evolution, insect structure and function and insect ecology or population dynamics.

- **Specialty knowledge**: in-depth knowledge of one or more areas within entomology, and advanced knowledge from one or more outside, related fields.

- **Critical thinking**: ability to define problems, assemble facts and apply logic to solve problems.

- **Communication skills**: ability to communicate facts and logic, both in writing and in oral presentations.

- **Research skills**: ability to do original research, interpret data, and communicate results.

- **Perspective**: ability to relate current issues in entomology to broader scientific issues facing agriculture, biology and society in general.

- **Professionalism and ethics**: ability to conduct ethical and active citizenship and service in the discipline of entomology; an awareness of professional responsibilities.

**Identification of how goals are put in place**

Educating graduate students to do basic and applied research regarding all aspects of insect biology and related arthropods is the central goal of the EGP. We actively train our students to become independent scholars and contributing members of the entomological community in academia, government, industry, environmental programs and other career options. The core courses provide our students with an advanced background in entomology. Our students receive extensive research training, and mentoring with regard to written and oral communication skills, in their area of research focus.
Core Curriculum:
Four courses serve as foundation courses for students in the Entomology Graduate program. They are Insect Biodiversity and Evolution (ENT 5021), Insect Structure and Function (ENT 5011) and Insect Ecology (ENT 5041) or Insect Population Dynamics (ENT 5045). Students satisfy the “insect ecology” requirement by taking ENT 5041 or ENT 5045. The goals and outcomes of these courses are designed to assure that our students know the basic principles of entomology. We recently restructured the sequence and frequency of these courses so that students can complete these required courses within a single academic year. These courses, implemented since 2000, are intended to facilitate the diverse backgrounds and career paths of Entomology graduate students. They are structured to provide incoming students with a common core of knowledge that will serve as a foundation for their subsequent entomological coursework and thesis research. The courses provide material that is broader than what is covered in more specialized entomology graduate courses. The intent is to provide students with fundamental entomological knowledge and introduce them to the research frontiers in the core areas.

Students are required to present two public seminars. The intent of these seminars is to enable the student to develop and evaluate oral communication skills. They are also designed to help students learn how to review and summarize scientific literature. Students satisfy this requirement by presenting one (M.S.) or two (Ph.D.) public seminars prior to their thesis defense seminar for one credit each. The seminars are evaluated "S/N." One seminar will be a research proposal, and this is a requirement both for M.S. and Ph.D. students. The other is only required for Ph.D. students and is expected to be a review of literature on a subject outside the student's specialty area.

Plan used to determine how students are meeting goals
The criteria used by advisors, advisory committees, and faculty-members to determine if and how successfully graduate students in the Entomology Graduate Program are meeting their goals:

- Timely course completion and faculty evaluation of coursework. Students are expected to complete core courses within the first year with a course grade of B or better.
- Written preliminary examination (implemented as a series of written exams). Students are expected to pass these examinations within the first two years of their graduate program. Both M.S. students and Ph.D. students are expected to satisfy written examination requirements.
- Oral preliminary examination (Ph.D. students). This examination should be taken as soon as students have fulfilled their thesis credit requirements.
- Written research project or paper
- Annual student progress evaluations by the advisors and the entire graduate
faculty

• Thesis proposal seminar. A student should present their thesis proposal seminar within the first academic year and no later than the second academic year.

• Final defense. Students are expected to defend their thesis by giving a public seminar and satisfy the advisory committee during the final examination.

• Dissertation

• Publications

• Presentations and participation at professional conferences

• Participation on departmental (or other University or non-University) committees and in research seminars

• Teaching apprenticeship/graduate assistantship and teaching evaluations

• Awards for outstanding presentations (posters and talks) at national and international meetings

• Awards and Fellowships from university scholarship programs (e.g. Doctoral Dissertation Fellowship, Shevlin Fellowship, Interdisciplinary Center for the Study of Global Change, Interdisciplinary Doctoral Fellowship, MN Drive, DOVE, etc)

Long-term plan for review and update of the Entomology Graduate Program

We will renew our participation in the Graduate Review and Improvement Process (GRIP) in 2017. In the meantime we are planning to hold Faculty/Student sessions to plan for a Departmental Review that will be initiated later this year or during the 2016 academic year. Although the results of the GRIP survey were generally informative and positive (see Appendix), additional, anonymous survey of the current graduate students (e.g., those in residence for at least one academic year) will also be conducted to gauge current perceptions regarding program and curriculum quality. In response to student requests for more Professional Development curricula, that the Curriculum Committee and members of the graduate faculty will consider adding some of these topics to our existing Scientific Communication and Ethics course (ENT 8061). Also, other more experiential opportunities for students will be encouraged, e.g. giving extension talks.

Selected References:


Fig. 1. Recent placement of graduate students in the Entomology Graduate Program (n=60). Academia: Universities, Colleges, Medical Schools, International Research Centers (e.g. CGIAR); Government: State and Federal; Industry: Agrochemical and Agricultural Biotechnology (since 1989). Response rate was 48%.
Appendix:
Summary of Recent Graduate Review and Improvement Process (GRIP) Results

During spring semester 2014 the Entomology Graduate Program (EGP) conducted a Graduate Review and Improvement Process (GRIP). This is a program designed to improve graduate programs through student-centered, action-oriented assessment. The program decided to align its evaluation activities to coincide with the 125-year anniversary celebration of the Department and survey alumni from the past 25 years (from 1989-2013). Current Entomology students were not included in this survey sample because program graduates, apart from the program, and more likely to be pursuing a career, could provide a more informed perspective on the value of the department experience. A total of 44 useable surveys were received, reflecting both Ph.D. and M.S. graduates. A majority of respondents (60%) expected “high academic quality” from the EGP. Research collaboration (15%) and career placement (15%) were also important expectations. These (and other) expectations were met by 96% of all respondents.

Two courses (ENT 5021 - Insect Taxonomy and Phylogeny [now Insect Biodiversity and Evolution] and ENT 5011 - Insect Structure and Function) were identified as the most important and/or relevant courses for respondents in their careers. Several suggestions were made regarding course availability that would have improved the respondents’ academic experience. Most of these were “entomology-specific,” although many were suggestions addressed general science and professional development topics. From the perspective of having a career, half of the respondents commented on improving the Entomology student’s practical experience while in the Program: Professional development opportunities; Internships, mentoring, and networking opportunities; Grant-related skills and opportunities; Opportunities to teach/present; and Entomology/science-specific suggestions. The Entomology Program is poised to take advantage of the quality of data available; this is especially true of the tremendous amount of narrative text that was captured regarding various question domains.

In particular, there appears to be suggestions from seasoned and careered alumni that can be readily acted on. Among these are course evaluations, suggestions to improve the practical experiences for students and the overall experiences for alumni. The review concluded that the Entomology Graduate Program is positioned to remain a highly regarded, well-structured program that is of important value to its alumni for the duration of their careers. The quality, commitment, and presence of the current faculty, Department leadership, and administration, as well as the voluminous amount and quality of the narrative text provided by survey respondents seem to indicate a strong interest in the program’s success. It seems apparent that the Department is fully able to take advantage of the findings and to continue exploring more nuances among these data.