Entomology Graduate Studies Guide, Entomology program, Department of Plant and Environmental Protection Sciences College of Tropical Agriculture and Human Resilience

February 2025

Introduction
Entomology is the study of insects, their diversity and evolution, as beneficial organisms, and as pests. The program focuses on agricultural crops as well as native ecosystems. Sub-disciplines within the Entomology program include insect systematics and evolution; insect conservation; invasive species management; biological control; urban entomology; insect ecology; and integrated pest management.

This guide explains the basic policies, requirements and procedures for graduate students pursuing degrees in Entomology for the Master of Science degree (M.S.), and the Doctor of Philosophy degree (Ph.D.). Student responsibilities are underscored in this document. For any questions about the program, please contact Dr. Mark G. Wright (markwrig@hawaii.edu), Entomology Graduate Chair.

Program Goals
The Entomology Graduate Program has three goals for students. The faculty expect students to communicate effectively, to be competent and knowledgeable biologists, and to conduct novel research in entomology. The student learning outcomes associated with these goals are:

- Acquire and demonstrate competency/skills as a biologist
- Acquire and demonstrate knowledge of entomology necessary for professional success
- Acquire and demonstrate communication and literacy skills;
  and for PhD
- Demonstrate the ability to apply creative and critical thinking in the independent development and conduct of research

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PEPS: Entomology Facilities
The entomology program of the Department of Plant and Environmental Protection Sciences is housed mostly within Gilmore Hall, UH Manoa campus. Gilmore Hall includes research laboratories, teaching rooms and an insect teaching collection, a research insect museum, and insect rearing facilities. Students in entomology have access to greenhouse space at Gilmore Hall and other locations on campus, experimental farms on each of the Hawaiian Islands. Students also have access to various facilities on campus, such as molecular biology services, electron microscopy, and typical university campus resources.

Important forms for graduate student progress:
https://manoa.hawaii.edu/graduate/forms/

Degree Requirements https://cms.ctahr.hawaii.edu/peps2/GRADUATE/Entomology

Entomology-specific online information:
https://cms.ctahr.hawaii.edu/peps/GRADUATE/Entomology

A summary by a grad student on how to register for your graduate assistantship is available at this link.

MS in Entomology
The MS degree in Entomology provides an education in selected areas of science (e.g. insect systematics; biocontrol; urban entomology, etc.).
The MS degree program is offered under either Plan A (thesis) or Plan B (non-thesis). A total of 30 credit hours are required for each degree option.
Students are strongly recommended to take courses in statistics, biometry or experimental design.

Recommended course to take: It is also a reasonable expectation that any Entomology student should have completed at least basic entomology courses, such as general entomology.
It is strongly recommended that **all** Entomology graduate students (M.S. and Ph.D.) take a course in biostatistics (e.g. BIOL220, introductory level), biometry (e.g. ZOOL631), or experimental design (e.g. TPSS603). NREM310 is **NOT** recommended as an option for a stats course.
Courses in GIS (geographical information systems) are offered by NREM and the UH Geography department.
Students with strong interests in systematics, evolutionary biology and insect taxonomy should consider courses in systematics (PEPS662), and related courses offered by the Biology and Zoology programs, and suitable molecular biology courses addressing sequencing technology and bioinformatics, offered by the Biology program and MBBE program in CTAHR. Students with interests in pest management, insect ecology, and related areas, could consider courses in insect ecology (PEPS671), biological control of insects (PEPS675), population ecology (BOT652), insect nutrient regulation (PEPS640), and insect physiology (PEPS641).

M.S. Plan A (Thesis)
This option focuses on research and demonstrating the ability to plan and conduct field and /or laboratory research and analyze the data. This work is written up as a thesis document. Thesis Research credits are initially taken as 'directed research', PEPS 699 under the direction of your advisor.

Note that all MS students need to complete at least 2 credits of entomology research seminar. Other course requirements are decided by the student's graduate committee, consisting of the advisor and at least two other graduate faculty members.
Once a MS student has completed their proposal presentation and Graduate Division Form II https://manoa.hawaii.edu/graduate/forms/, they may register for thesis credits, PEPS700.
Upon completion of the course of study and prior to graduation, PEPS 699 credits may be converted into PEPS 700 credits as required. The student must be registered for at least 1 credit of PEPS 700 during the semester that the thesis is submitted.
Coursework required for the MS Plan A are 16 credits in courses approved by the candidate's committee. Of these, at least 12 credits must be at 600-level or higher class-credits (not research credits).
Students are also required to take and participate in 2 credits of entomology seminars.
Students are also required to present a proposal seminar and defense seminar PEPS 799 (1 credit hour each for CR/NC). PEPS 799 credits are not counted towards the 30-credit degree requirement.
Students who have not taken sufficient thesis (PEPS700) credits by expected graduation may request to have PEPS699 (directed research) credits transferred to meet the thesis credit requirement.

Progress from proposal to research
It is advisable to assemble a MS graduate committee as soon as possible. The committee consists of a major advisor, plus two members of the entomology graduate faculty, https://cms.ctahr.hawaii.edu/peps2/GRADUATE/Entomology . Affiliate graduate faculty cannot serve as major advisors for MS students.
Students should aim to plan their course work in consultation with their advisor and committee members during their first semester. Course work should include an adequate number of 600 level courses.
Planning for thesis work should commence at this stage as well, addressing the central research topic and expected studies involved.
Graduate Division Form I should be submitted at this stage.

Thesis Proposal
The M.S. thesis topic should be a well-defined project which demonstrates the student's ability to plan and conduct research, collect and analyze data, and write a coherent thesis. This is planned in consultation with the graduate committee the student has assembled. The MS graduate committee may require a written research proposal. A formal presentation of the proposed research is made as a proposal seminar (PEPS 799). Upon successful completion of the proposal seminar, **Form II** should be submitted to the Graduate Division.

Thesis and Defense

Upon completion of data collection and analysis, the student writes their thesis. The thesis is typically written in the style of journal publications, with each chapter written as a separate manuscript. Most MS theses include a brief introductory chapter and a brief conclusion.

Examples of accepted theses may be found online through Hamilton Library, or hard copies are available in Gilmore room 311. Consult the Graduate Division website for formatting requirements.

The final thesis defense is a public presentation that includes an overview of the thesis work, questions, and a meeting with the graduate committee after the public presentation. At the successful completion of the thesis defense, the student submits **Graduate Division Form III** indicating that the graduate committee considers that the students passed the defense.

Once all graduate committee members are satisfied with the content of the thesis, the student may circulate **Graduate Division Form IV**, for final thesis approval by the committee members. The final edited version of the thesis is usually submitted fairly shortly after the thesis defense. Please see graduation checklist: https://manoa.hawaii.edu/graduate/wp-content/uploads/graduation_checklist_for_masters_plan_a_thesis.pdf.

M.S. Plan B (Non-Thesis)

This degree option is focused on experiential research and course work. The courses required for each student are individually determined based on interests and specific needs in consultation with their faculty advisor, and typically an additional two members of the entomology graduate faculty.

Directed research experience (rather than thesis credits) is required for this option.

Students are required to take entomology research seminars. A total of 23 class-work credits (at least 12 at 600-level), are required for this degree option.

The student writes a brief report on the research they conducted during their PEPS 699 courses, and may be required to make an oral presentation describing the work.

The timing for submission of Graduate Division forms is similar to the MS (Plan A).

Ph.D. in Entomology

Students entering the Ph.D. program will have either earned an M.S. degree from a recognized institution, or be admitted directly from B.S studies, if they have adequate research experience.

MS students may apply to upgrade to PhD after at least one year, as a new application to the program. This option should be discussed with the student's advisor.

The Ph.D. degree course requirements are determined for each student, in consultation with the graduate advisor and committee members. There is no strictly structured set of course requirements.

PhD students each need to assemble a graduate committee consisting of their major advisor; three graduate faculty members from the Entomology graduate program; and a

University Representative (a tenured faculty member from a separate academic program on campus). The latter acts as a member of the committee, but also serves as a monitor of the student's wellbeing during exams and defenses, on behalf of the university.

PhD students should submit **Graduate Division Form I** once their graduate committee is assembled and their basic concept for dissertation research has been agreed upon.

Ph.D. students are required to take:

- **PEPS 690** Seminar in Entomology, for a total of three credits over the course of their studies.
- **PEPS 799** (1 credit hour for the Proposal Seminar). No course registration is required for the final defense, which is a university requirement for graduation with a PhD.
- **PEPS 800** Dissertation Research (1 credit hour) once the student has completed their comprehensive exam successfully, and advanced to PhD Candidate. 800-level credits are administered by Dean of the UH Graduate Division, rather than Entomology graduate faculty.

Recommended course to take: It is strongly recommended that **all** Entomology graduate students (M.S. and Ph.D.) take a course in biostatistics (e.g. BIOL220, introductory level), biometry (e.g. ZOOL631), or experimental design (e.g. TPSS603). See above (in M.S. details) for more coursework recommendations.

Each PhD student is required to pass a comprehensive exam. The comprehensive exam requires at least an oral exam, with the option of an additional written exam. The decision on exam structure is agreed upon between the student and committee members. The exam is intended to probe the student's knowledge of a range of topics in entomology, as well as various other aspects of biology. Students may take the comprehensive exam a maximum of twice, if unsuccessful on the first attempt.
The student typically discusses reading topics with each committee member to prepare for the exam. The exam is not limited to the readings suggested by committee members.
Once the student has passed the comprehensive exam, they submit **Graduate Division FormII** and advance to candidacy. The candidate may request they be awarded a MS *en route* upon passing the comprehensive exam.
Candidates may register for dissertation research credits, PEPS800, at this point.

Dissertation Seminar and Defense
Upon completion of the proposed research, each student will write a dissertation. The dissertation is written in a style agreed upon by the student and committee chair. We usually follow a journal format. Examples of accepted dissertations are found in our library. The drafting and revision of a dissertation can be a long and arduous process taking 6-12 months. After the dissertation has reached an acceptable level (based upon advisor and committee members assessments), it will be publicly presented. The defense seminar will be scheduled and announced, at least 2 weeks ahead of the planned date, as the UH

Graduate Division will announce it on the UH calendar of events. The committee should receive the dissertation over a suitably planned period prior to the defense so they are able to make edits and suggestions.
After the defense seminar is completed, the floor is opened to questioning from all students and faculty. Upon the conclusion of the open questioning period, the committee will conduct a private examination. This examination will cover the dissertation and related areas. When the examination has concluded, the student will be asked to leave the room and the committee will discuss the acceptability of the dissertation and defense. The acceptance of the dissertation is determined by a majority vote of the committee. The student will be asked to return to the room and informed of the committee's decision. The judgment of the dissertation is officially recognized with the filing of **Form III** and with the signing of the signature page. The student may be asked to make edits or additions to the dissertation before the signature page is signed or Form IV is submitted to the Graduate Division. Please see graduation checklist: https://manoa.hawaii.edu/graduate/wp-content/uploads/graduation_checklist_for_phd_doctoral_candidates.pdf.

Travelling for Fieldwork & Conferences
Students on grant-supported projects will typically need to travel among the islands for fieldwork, and will likely attend entomology (and other) scientific meetings using grant funds. Such travel needs to be completed through the PEPS office (Gilmore Room 310), following the correct steps. A travel request form is required, due to the office staff in Gilmore 310 at least 2 weeks prior to travel. In summary, the travel form requires the following information: dates for travel, to which location, and the purpose of the trip. The traveller should identify appropriate flights (Hawaiian Airlines for inter-island trips), vehicle rental information, accommodation, means of travel to the airport, account numbers to be charged, and all other information requested on the travel request form if possible. Upon completion of travel, the traveller should complete a travel completion form, also available through the staff in Gilmore hall 310.

The following Entomology Scholarships are available for additional funds to travel:
We have several Entomology awards and scholarships available that may be used for travel, for example to meetings (which usually includes making a presentation at the meeting), field work, and other research related expenses.

Please note that you should apply for scholarships in a timely manner, so that for example for meetings, you are able to register for the 'early bird' rate. Submission dates; 15 February; 30 June each year. Special circumstances that may require submission outside these due dates can be considered when appropriate.

The scholarships and the faculty members administering each are listed below:

Edward M. Ehrhorn Entomology Scholarship: (Dr. Ikkei Shikano)
Wallace C and Shizuko Mitchell Endowed Scholarship fund: Dr. Daniel Rubinoff
Minoru Tamashiro fund for entomology: Dr. Mark Wright

D Elmo Hardy Student assistance endowment (systematics students): Dr. Daniel Rubinoff
Au Yeung Sui / Emmet Easton Scholarship: Dr Z Cheng
Tanada Family Entomology Fund: Dr. Mark Wright
Nan-Yao & Jill Su endowed fund for Entomology: Dr. Jia-Wei Tay.

Details for each scholarship (criteria, areas of study) may be found on the STAR website.

Your applications, submitted to the appropriate administrator (not through STAR!) should include a brief description of what you plan to do with the funds (e.g. attend meeting; conduct fieldwork, etc.), a conference abstract (if the funds will be used to attend a meeting), and an expected budget. The faculty members managing each award should be contacted to determine what maximum amounts are available.

Academic Performance

As a graduate student, you have a right to periodic evaluation of your academic progress. should be in regular contact with your advisor and committee members as appropriate. You should meet with your thesis/ dissertation committee at least once a year to review your progress and plans for the coming year.

Academic Integrity

Integrity in research is of the highest importance. It represents a commitment to basic values such as fairness, equity, honesty and respect. Your professional integrity is one of the most precious things you possess. We expect and demand high standards of ethical behavior during your tenure in the department. You should expect and demand the same from us.

The following text is from the University of Hawaii Graduate Division webpage:

The University of Hawai'i at Manoa exists for the pursuit of knowledge through teaching, learning, and research conducted in an atmosphere of physical and intellectual freedom. Members of the UHM academic community are committed to engage in teaching, learning, research, and community service and to assist one another in the creation and maintenance of an environment that supports these activities. Members of the academic community may not violate the rights of one another nor disrupt the basic activities of the institution. Students who are disruptive are subject to a variety of disciplinary actions that may include reprimand, probation, restitution, suspension or expulsion. Continued enrollment at UHM is contingent on appropriate academic conduct. Some graduate students are professionals or professionals-in-training in their respective fields, and as such, are subject to the ethical and conduct standards of their profession. Their continued enrollment at UHM is contingent on appropriate academic conduct as well as professional behavior.

It must be recognized that members of the academic community have the same privileges and responsibilities with respect to the law, as do members of the larger society. As a result, members of the UHM campus community must acknowledge that when the interests of the university are violated by a student, the student is accountable to the

institution and may also be held responsible to civil authorities. These interests of the university are described in the University of Hawai'i at Manoa Student Conduct Code. Any questions regarding the Student Conduct Code should be addressed to the Dean of Students.
To ensure a safe and healthy working environment for faculty, students and staff, the University of Hawai'i at Manoa sets and enforces rigorous safety standards that meet and exceed local, state and federal law. The Environmental Health and Safety Office (EHSO) at the university sets a multitude of rules and regulations pertaining to common laboratory materials and other research related activities in Hawai'I, and they may be quite different from those at other institutions. The university has specific programs and requirements for:
a. Radioactive material
b. Biological "commodities" - including micro-organisms, plants, animals, biological toxins, cell or tissue samples, recombinant DNA, etc.
c. Compressed gas (SCUBA) diving
d. Certain chemicals and hazardous materials
e. Disposal of hazardous waste
In addition, there are regulations governing the importation and shipment of these materials or types of equipment into the State and/or university. For more information, please visit the EHSO website.
Students who work in a laboratory setting are required to attend and maintain health and safety training in skill areas that are relevant to their work. The EHSO offers a variety of training programs in laboratory safety, radiation safety, hazardous waste, scientific diving, fire extinguisher use, and shipping of biological commodities. Please contact EHSO to check on class schedules or to arrange for training. Labs and lab members must be certified in compliance with EHSO guidelines at all times.

Additional Resources

UH Mānoa Graduate Division
2540 Maile Way, Spalding 353B
(808) 956-8544
gradss@hawaii.edu
https://manoa.hawaii.edu/graduate/

Graduate Student Organization
2445 Campus Rd., Hemenway 212
(808) 956-8776
gso@hawaii.edu

International Student Services
2600 Campus Road, QLC 206
(808) 956-8613

issmanoa@hawaii.edu

LGBTQ+ Center
2600 Campus Rd., QLCSS 211
(808) 956-9250
lgbtq@hawaii.edu

Mānoa Graduate Student Advocate

Academic Labor Union

Filing Grievances: https://academiclaborunited.org/grievances

University Health Services
1710 East West Rd.
(808) 956-8965
uhsm@hawaii.edu

Food Vault Hawai'i
465 Campus Road, Room 208
(808) 956-8178
sld@hawaii.edu
https://manoa.hawaii.edu/studentlife/campus-center-complex/services/food-vault/

Chemistry Stockroom
Bilger 116
Phone: 956-8382
Beatrice (Rice) Chinen (Research Stockroom Manager): chinena@hawaii.edu
Hours: Monday-Friday 10 AM-12 PM, 2-4 PM
https://manoa.hawaii.edu/chem/department/facilities/stockroom/