Princeton University EEB

EEB Handbook for
Independent Study

Academic Year 2022-23

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Preamble

Your independent work conducted in the Department of Ecology and Evolutionary Biology at Princeton leads toward fulfilling the University requirement for earning your undergraduate Bachelor's degree. The exploration and brainstorming for your thesis project formally begins in the fall of the Junior year. Below, this handbook will provide general information on broad expectations, a timeline, and tips that are meant to be helpful. We encourage independent projects and growth, and while every student and Advisor are unique, we still have a framework of support and expectations. This handbook should complement the discussions you have with your Advisor and their expectations.

The special areas of strength in our department are evolution & genomics, behavior & sensory biology, ecology & the environment, conservation & biodiversity and infectious disease. The interests and research of faculty range widely over these areas, such that most thesis projects fit within the scope of our faculty's expertise. However, students also have excellent opportunities for combining several areas for innovative interdisciplinary work.

The ultimate goals of your senior thesis independent study in EEB are: (1) to develop your skills, ideas, and abilities in a specific research topic, and (2) to ensure that your experience and education are sufficiently developed to support you through the Comprehensive examinations.

This handbook is organized into sections to provide a set of suggestions that may help guide every undergraduate through their major degree in EEB, and additional sections that are dedicated to each "type" of research project that will fulfill the requirement for independent study. These chapters should help you decide what type of project you would like to pursue.

Departmental Support Staff, Administrators, and Resource Support

- *Undergraduate Department Representative*, Rob Pringle (rpringle@princeton.edu)
- *Department Manager*, Lucia Machnowsky Schutz, lschutz@princeton.edu
- *Undergraduate Program Administrator*, Sandra Kaiser, sakaiser@princeton.edu
- *Research Support at Stony Ford*, Billy Craigens (craigens@princeton.edu)
- *IT Help*: Jesse Saunders, Justin Terry, Rajeshri Chokshi, eeb-it@princeton.edu
- *Research Facilities*, Tina Hansen (chanson@princeton.edu)
- *Della/Tigress (HPC) Help Service*, cses@princeton.edu

Summary of a Suggested Thesis Timeline

- Junior Fall semester: Think about your research interests, watch the faculty videos, review faculty websites to help determine who you would be interested in working with for your Spring JP and Senior Thesis.
- Junior Fall Reading Period and Winter Session: Meet with your Advisor to finalize your thesis project. Be prepared for writing and submitting a proposal for funding very early in the Spring semester!
- Junior Spring semester: Apply for research funding and begin your project. Obtain training, permits, protocol approvals, etc. from RIA and SAFE.
- Summer of Rising Seniors: Data collection time!
- Senior Fall semester: Being analysis and write drafts of your thesis "while you go". This prevents last minute panicking.
- Senior Spring semester: Complete and submit your poster and written thesis. Prepare and complete your Comprehensive Examinations.

Past EEB independent projects

Please visit Thesis Central (https://rbsc.princeton.edu/policies/senior-thesis-submission-information-students#general) for examples of independent projects completed by EEB undergraduates. This is also a great resource for submitting your thesis to the University.

Finding an Advisor (Junior Fall semester)

Over the summer and at the start of this semester, begin exploring research topics on which you would like to spend the next 12 months researching (e.g. reading papers, formulating hypotheses, collecting data, performing analyses, interpreting data, presenting a poster and conducting an oral examination)! EEB offers broadly five areas (and sub-areas) of research focus:

- Behavior & Sensory Biology: Social behavior, sensory ecology, neurobiology
- Evolution & Genomics: Adaptation, complex traits, speciation
- Conservation & Biodiversity: Biodiversity loss, land-use change, restoration
- Infectious Disease: Parasites, immunity, epidemics
- Ecology & the Environment: Species interactions, biodiversity, ecosystems

Take the time to learn about the faculty in each of the areas that interest you, browse some papers in the field, and try to identify one general aspect of the field that excites you. You should allow yourself room for creative thinking, as you are likely to revise your goals as feasibility or resources or cost become a reality during the detailed planning stages in the Junior Spring semester. The goal during this first month is to get a sense for what sort of activities you envision yourself immersed in for the next three semesters (plus summer).

At the start of the Junior Fall semester, you will have the opportunity to sign up to meet with 3-4 faculty to discuss research opportunities in the faculty lab, your research ideas, and to get a better sense of possibilities and expectations.

Remember that finding an Advisor is similar to a job interview. There are many aspects to balance when interviewing and pitching yourself for an Advisor. Your research interests must be supported by the expertise and resources of your Advisor. You also are encouraged to consider your mentoring needs. Some aspects of the faculty's research group can be useful when organizing your thoughts to prepare an application and interview (e.g. group size, if and how often do they meet as a group, will you want interactions with other group members, is there expertise already in the group?).

After You Have an Advisor

Once you have an Advisor, become familiar with their individual expectations for you as a group member. Each faculty will have comments and goals to help quickly determine the structure of your thesis project, which in turn will help you build your budget proposal (see below) and your Spring JP topic. A more detailed outline for these next activities are discussed in the below sections, and the sections cover topics from resources and administrative details to the expectations each subsequent semester, finishing your written thesis, constructing a poster, and the Comprehensive Examinations. When you have questions, please see out your Advisor and Sandra Kaiser for more information and clarification.

Junior Spring semester

Thesis funding. Early during your Junior Spring semester, expect to get three documents from Sandra Kaiser: Compliance Checklist, Budget, and Proposal documents. During your initial meeting with your Advisor, you should discuss each of these and how to complete them. The budget proposal is due in mid-February of the Junior Spring semester (ask Sandra Kaiser). The submission is to the Student Activities Funding Engine (SAFE). The budget you will submit must include both research and room/board expenses if you plan for on-campus research during the summer or if you plan on field work (domestic or abroad). The amount awarded is highly dependent upon EEB's budget allocation, but the maximum is $2,500/student. Other funding sources may be higher or lower, depending on their budget commitments.

Remember: This is an application and a competition! The amount of funding you may receive is often highly linked to how well your budget proposal is written. It must be clear, concisely state a hypothesis, motivate the study, and written very competitively. You may not receive the full amount of funding requested. You may be asked to adjust your thesis study design along the way, depending on funding received and project design.

Other possible sources of funding outside of EEB are: Office of Undergraduate Research (OUR), High Meadows Environmental Institute (HMEI), Office of Undergraduate Research (OUR), School of Public and International Affairs (SPIA), Global Health, Grand Challenges, Program in Latin American Studies (PLAS), as well as other campus programs depending on the type of research project. Though this proposal may be similar in content to the Spring JP, it must be formatted and organized to meet the requirements of the University funding agencies. You can browse additional funding sources in the SAFE

portal https://puwebp.princeton.edu/safe. This is the same portal where you will submit your funding request application.

The Senior Thesis Research budget is composed of two components:

1) Living and travel expenses (dependent on thesis type) -- If staying locally, the student will have to create a budget for the duration of their local residence. If the summer is expected to include travel (domestic or international), this should be included in the research budget.
2) Research-related activities -- Any costs for data collection, lab services (e.g. immunoassays, sequencing), supplies (e.g. field equipment), or other possible expenses need to be included and justified for review by Princeton.

When drafting the project budget, it is important to include every expense involved, even if those items will not be covered by University money. It is also very important that the student and faculty adviser understand the true project cost. In addition, the faculty adviser needs to see that the student has developed a comprehensive budget and clearly details all funding aspects of the planned and desired project.

Begin data collection. Some training and data collection can begin during the end of this semester, although this is highly dependent upon conversations with your Advisor and the type of research study you will conduct. Computational, meta-analysis, or laboratory research are likely candidates for studies to begin in late Spring.

Writing your Spring JP. This assignment is suggested to be no longer than 10 numbered pages (double spaced; not including title page, abstract page, references, tables, or figures). You need to include a section on methods and anticipated analysis that directly address your hypothesis, which must be clearly stated. It is most critical to motivate the thesis by identifying a gap in knowledge and how your work will work to reduce that gap. Explain the conceptual theory behind your question and if there is an application or broader impact of your research. All referencing of peer-reviewed literature (*absolutely no* direct quotes, websites, or popular magazine articles) needs to follow that of:

Smith, D.W., Jacobson, A.M., Anderson, R.S. (year). The title of the paper. *Journal Name* 17(1), 252-274.

Plagiarism. All content that you include in your written thesis or poster needs to reword the primary literature with a citation to that original work. Reserve the use of direct quotes for a very rare occasion. In your thesis document, you are required to rewrite the content found in your Spring JP (i.e. you are not to cite your Spring JP as a supporting document).

Copyright infringement. You are never allowed to include a screen shot of a figure or a table from a published paper unless you: **1)** obtain permission from the journal and then include a proper citation (and provide proof of permissions); or **2)** clearly modify the figure or table and include a citation that states this is an adaptation of the original figure. The latter option is best.

Field-based research

This design consists of data collection at a field site or station, which may be domestic or international. This may require travel and relevant documentation, lodging, and a daily schedule of working outside, hiking, walking, climbing, observing, sitting, etc. Study designs may need rapid adjustments to accommodate any changes in local governments, species abundance, permit issues, weather, travel, etc. Techniques learned likely include camera trapping, observational data collection, species identification, tracking, photography, and more.

Timeline note! If planning to study in the field during spring semester, each student must meet with their faculty Advisor and plan their research project as early as possible.. Students who are away during February and March may find it difficult to finalize a project via email correspondence.

EEB and associated field sites. Princeton EEB maintains or is affiliated with the below three field stations. Although you are not restricted to these three field locations, the infrastructure and support are already in place so the permits/documentation required to conduct field work are likely easily prepared. Discuss extensively with your advisor if you plan on doing field work at these sites, or at new locations.

- **Stony Ford Research Center.** The Stony Ford Center for Ecological Studies at Princeton University was established in 1967 by Millard and Margaret Meiss in memory of their son Michael. Stony Ford encompasses ninety-nine acres of former farmland about 4.5 miles from the central Campus of Princeton University. For more details, please see https://eeb.princeton.edu/about-us/field-stations/stony-ford-research-station
- **Mpala Research Centre.** The Mpala Research Centre (MRCC) was opened in November 1994 at the core of the Ewaso Ecosystem in central Kenya. Defined by the catchments of two perennial rivers, the Ewaso Ny'iro and Ewaso Narok, and by the protracted migrations of over 6000 elephants, this is a vast and diverse savanna landscape supporting prodigious wildlife populations. For more details, please see https://eeb.princeton.edu/about-us/field-stations/mpala-research-center
- **Smithsonian Tropical Research Institute.** Princeton University partners with The Smithsonian Tropical Research Institute (STRI). Princeton students travel to and conduct research in Panama to understand its biological diversity. For more details, please see https://eeb.princeton.edu/about-us/field-stations/smithsonian-tropical-research-institute

Research regulations on campus. As your thesis project is being developed, it is helpful to work with the applicable office within the Office of Research Integrity and Assurance (https://ria.princeton.edu) to ensure compliance with animal and human subjects research regulations. During the application period, students must have their Senior Thesis Research

proposal and budget complete in order to upload them to SAFE to request funding (see more below for budget and SAFE applications). More information regarding research compliance, forms, and travel requirements can be found on the EEB website (https://eeb.princeton.edu/about-us/research-compliance).

Special note: If you are being added to an existing protocol, please discuss with your Advisor about adding you to that protocol as to avoid writing a *de novo* protocol that may not be needed. You are then still responsible for submitting such paperwork to add your name to the existing protocol.

- **Institutional Animal Care and Use Committee (IACUC)**. This committee is in charge of reviewing all research protocols involving vertebrate animals, including laboratory and field research, both here and abroad. To conduct any research with animals, you will need an approved IACUC protocol prior to the start of your project (https://ria.princeton.edu/animal-care-and-use). Depending on your animal species and protocol, you will work with your Advisor to complete several forms and submit them for a review. If your project is related to other projects in your Advisor's laboratory for which they already have clearance, you might be eligible for inclusion on a preexisting protocol. If not:
  o Choose a deadline for submission as your target. Keep in mind that the approval process can take several months after initial submission, so you should prepare and submit far in advance of when you want approval.
  o Under the advisement of your Advisor, you both will need to contact IACUC directly with a short summary of your research to verify the forms you need to complete.
  o Complete online training specific to your research (IACUC staff can help direct you to the appropriate modules for your work).
  o Submit your proposal by your target deadline. The proposal will automatically be reviewed by Princeton's veterinarian and you will have an opportunity to make changes based on the veterinarian's comment before the committee reviews it.
  o Any changes to the protocol (i.e. additional researchers, change in animal number) must be approved by the committee. If these are small administrative changes, they can be handled quickly, but submit as soon as possible.
- **Institutional Biosafety Committee (IBC)**. This committee is in charge of evaluating risks associated with chemicals and biological agents. They provide support for shipping of dangerous goods and are the best people to talk to about import/export permits of hazardous materials.
  o Choose a deadline for submission as your target. There are few submission times open per year, and the committee is often not in session. It will take at least two months to get the final approval letter after submission, but try and allow for four months.
  o If you have any questions, consult with your Advisor and the Environmental Health and Biological Safety Officer before submitting documents. As with any of these processes, the staff working for the committees are incredibly helpful and willing to talk you through anything you are confused about.
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- **Institutional Review Board (IRB)**. This committee oversees any work with involving humans. This includes, but is not limited to: Questionnaires, medical data, human population surveys, etc. If you will be interacting with humans or data collected from humans, consult with your Advisor and the website to determine where you will need to submit protocols for review.
    - Choose a deadline for submission as your target. Keep in mind that although this committee meets relatively frequently, they can take a long time to approve protocols.
    - Take necessary online training that pertains to your research after discussing with your Advisor.
    - Research that involves minimal risk can be submitted for expedited review; however, research involving greater than minimal risk requires full review.
    - Submit your proposal by your target deadline.
    - IRB requires annual renewal, and if your research duration is longer than one year, you will be required to submit renewal forms each year.

Traveling for research. All students must register any University-sponsored international travel on Enroll My Trip. When traveling internationally, you may want to purchase international health insurance, although check with your Student Health Plan policy to see if it covers emergencies that happen while traveling internationally. Princeton has an agreement with HTH Worldwide to provide coverage for about $35/month (or $9/week). Please consult the Princeton University Travel website for more information: https://travel.princeton.edu and a helpful checklist https://travel.princeton.edu/graduate-students/checklist. Any international travelers must also register with International SOS using Princeton's membership number (11BSGC000022, https://www.internationalsos.com) and are encouraged to print and carry an ISOS card while abroad. This service provides numerous benefits, including emergency evacuation and access to special clinics around the world. Finally, international travel often requires immunizations or medications that you may not have already. If you are planning on any international travel, please make an appointment with UHS to become aware of travel risks and immunization requirements or suggestions.

Ethical Approval and Safety. Regardless of whether you have conducted independent research before, there are several important committees and regulations your work must satisfy before the beginning of the project. Even if you think your work will be mostly computational, please read all the following so that you will be familiar with ethical committees if your work shifts into any research fields that these committees regulate (e.g., human health data).

Field Work. Depending on the location of your research you may need to prepare and submit the following:

- **Princeton University.** IACUC, IBC, and IRB protocols. These committees consider applications only a few times per year, so you must consult with your Advisor and plan your submission dates in advance (see below for details). Travel Health Appointment: Meet with the University Health Services (UHS) Travel

Clinic in McCosh Health Center well before you plan to leave for a country. Many vaccines and boosters take a while to become effective.

- **National Regulations.** Sometimes research or student visas are needed to conduct research in a foreign country. Check with the field station or your collaborators and the State Department for specifics.
- **Local Approval.** Sometimes collaborators or field stations require you to submit a proposal before beginning research. Further, some countries/foreign institutions may require an IACUC/IRB/IBC-equivalent. Determine if your collaborators (and their governments/institutions/agencies) will require you to obtain ethical approval in addition to Princeton's approval.
- **Research Agreement.** Institutions may also ask for a Research Agreement (RA) with Princeton. The easiest way to set this up is as an agreement between your professor and a professor at the institution. However, some may require more institutional buy-in in the form of a Memorandum of Understanding. These take over a year to complete and require evaluation by Princeton University's legal team in the Office of Research and Project Administration.

Laboratory Work. Whether you will be doing laboratory work in Princeton University or elsewhere, there are some things you should keep in mind. If you plan on working in a laboratory at Princeton, you are highly encouraged to attend Lab Safety Training (https://ehs.princeton.edu). It is offered frequently and takes about 3 hours. Discuss this need with your advisor. You may also need specialty training if you are working with live viruses, blood-borne pathogens, etc. Any laboratory work that involves animals requires that you get approval from IACUC and perhaps the IBC. Any protocols with hazardous or potentially hazardous material will need IBC approval. See Sandra Kaiser and Tina Hansen for details.

Campus resources. Detailed here are some of the more common resource centers you may need while you analyze your data collected from your independent study.

- **Statistics.** Students and faculty within the EEB and in other departments are great resources for statistics help. If you are having trouble with a particular analysis or just have a general question, the best place to go first is usually your fellow lab members. In addition, you have access to the consultants at the Data and Statistical Services center in Firestone. They specialize in social sciences stats, so you might have to do some extra explaining to account for the biological theory components of your data, but the consultants are able to give advice on the use of statistics packages or the appropriate statistics to use. The lab also has computers with useful data analysis and database software such as Microsoft Access, SPSS, and Stata. For some online statistics help also see https://dss.princeton.edu/training/. Additionally you can download JMP for free. This is a statistics package that can be used on both Macs and PCs (contact eeb-itP@princeton.edu for details). R (and R Studio) is another great and free environment in which you can complete a large diversity of analyses.

- **Research Computing and related computational resources.** Princeton Research Computing (https://researchcomputing.princeton.edu) provides resources for research computing including free courses on programming and access to high performance computing clusters. They offer weekly drop-in help sessions if you're stuck on anything computing-related. You can email cses@princeton.edu for more information. There is also an intersession (late January-early February) Advanced Statistical Programming camp held by the university that introduces code parallelization and cluster usage.
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Data collected in a laboratory setting involves specialized training for handling equipment, reagents, or animals. Laboratory work can be molecular or experimental designs for animal handling and testing. Techniques learned likely include implementing genetic protocol, DNA handling.

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Computational research

There are hundreds to thousands of publicly available datasets that are rich for mining and re-analysis with new questions, perspectives, or combinations of data types. This type of thesis will consist largely of computer-based work, navigating public databases, applying for data access if material is sensitive, and inherently requires a thoughtful process for data cleaning, merging, calibration, etc. prior to analysis and presentation.

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Meta-analysis research

Similar to the computational research, this thesis strategy would require a focus on a deep literature review, collating studies and conducting a meta-analysis on their findings, particularly when perhaps original raw data is not available and summary statistics or trends are most accessible. The goal is to master the wide literature and synthesize a new framework using a diversity of data sources, steeped in the literature.

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- Choose a deadline for submission as your target. Keep in mind that although this committee meets relatively frequently, they can take a long time to approve protocols.
- Take necessary online training that pertains to your research after discussing with your Advisor.
- Research that involves minimal risk can be submitted for expedited review; however, research involving greater than minimal risk requires full review.
- Submit your proposal by your target deadline.
- IRB requires annual renewal, and if your research duration is longer than one year, you will be required to submit renewal forms each year.

Campus resources. Detailed here are some of the more common resource centers you may need while you analyze your data collected from your independent study.

- **Statistics.** Students and faculty within the EEB and in other departments are great resources for statistics help. If you are having trouble with a particular analysis or just have a general question, the best place to go first is usually your fellow lab members. In addition, you have access to the consultants at the Data and Statistical Services center in Firestone. They specialize in social sciences stats, so you might have to do some extra explaining to account for the biological theory components

of your data, but the consultants are able to give advice on the use of statistics packages or the appropriate statistics to use. The lab also has computers with useful data analysis and database software such as Microsoft Access, SPSS, and Stata. For some online statistics help also see https://dss.princeton.edu/training/. Additionally you can download JMP for free. This is a statistics package that can be used on both Macs and PCs (contact eeb-it@princeton.edu for details). R (and R Studio) is another great and free environment in which you can complete a large diversity of analyses.

- **Research Computing and related computational resources.** Princeton Research Computing (https://researchcomputing.princeton.edu) provides resources for research computing including free courses on programming and access to high performance computing clusters. They offer weekly drop-in help sessions if you're stuck on anything computing-related. You can email cses@princeton.edu for more information. There is also an intersession (late January-early February) Advanced Statistical Programming camp held by the university that introduces code parallelization and cluster usage.

- **GIS.** The Maps and Geospatial Information Center in Lewis Library is a great resource for performing GIS analysis, or just learning how to use GIS software. You can schedule an appointment with one of their analysts on their website (http://library.princeton.edu/collections/pumagic/hours-access) to help you get started with your project, or you can drop by and use one of their GIS computers anytime. They also hold GIS workshops each semester for students just starting out in GIS or those interested in specific GIS techniques. See their website (http://library.princeton.edu/collections/pumagic) for more information on their hours, appointments, and workshops. All Princeton students can also receive a license for ArcGIS, just ask one of the EEB IT team (ithelp@princeton.edu) to get set up. ArcGIS is currently only available for PC computers, QGIS is an open source alternative available for use on Mac and PC computers.

Completing your independent study documents (Senior Spring)

Poster. EEB students are required to participate in Discovery Day. This event, in conjunction with PEI, is a poster show where you will present your poster to faculty. Students are scored on their poster and prizes are awarded at Class Day. You will receive submission requirements and instructions in the Spring. Your poster will be due before your thesis.

Completing your written thesis. Please limit your final thesis document to 50 pages of main text (double spaced, typical font usage and size, e.g. Times or Arial 12 point font). Only after discussing with your Advisor will an increase in length be accepted. Succinct scientific writing can be challenging, and the goal is to make each sentence valuable and non-redundant. The written document should have the format of the below, in the order listed:

- Title page (title, your name, department, date, Advisor name, etc.)
- Acknowledgement page – thank your family, friends, faculty, funders
- Abstract page. Limit your abstract to 250 words. Include brief comments on motivation, background, hypothesis, methods, result, and broader context. Do not include any citations in this.
- Main text
    - Background/introduction. You are to rewrite this introduction, using your Spring JP as a guiding document. Your ideas are expected to mature or even shift from when you wrote your Spring JP. You are not to copy or direct quote any material from published papers, nor can you do this from your Spring JP. This is a challenging exercise but it is absolutely required to show your depth of knowledge on the background literature and understanding of the conceptual framework that is supporting your thesis research.
    - Methods. Include all details needed for someone to repeat your experiment/analysis from reading your document. Give all steps, parameters, amounts, etc.
    - Results. Do not interpret results; simply provide them here with all supporting data in the order in which your project occurred. Report all values, be thoughtful to the number of significant digits use, report statistics, etc.
    - Discussion. Interpret and contextualize your results. Give broader picture, next steps, caveats, etc.
- References as formatted as follows:

    Smith, D.W., Jacobson, A.M., Anderson, R.S. (year). The title of the paper. *Journal Name* 17(1), 252-274.

- Tables with informative captions and presented in the order discussed in the main text
- Figures with informative captions/legends and presented in the order discussed in the main text
- Supplementary materials (Appendix). These are items and content that does not fit within the page limit. They can be more fully detailed protocols, scripts, side notes that explain justification for a parameter selection for example, etc. Be thoughtful with this section! You may not need it but if you do, ensure that you justify the inclusion of every item.

- <u>Signed honor pledge</u>

Binding. Check with your Advisor regarding if they require a bound copy of your thesis, or if a PDF version is suitable for their needs.

The Comprehensive Examination

This exam should be considered an advanced conversation with two faculty, one of whom is your Advisor. The goal is to explore the depth and complexity level of both your specialized and general knowledge as it pertains to EEB. This exam is typically 45-50 minutes in duration and consists of two topics of discussion: (1) your thesis research and (2) general knowledge. Sandra Kaiser will schedule these Examination. The meeting is traditionally heavier in the discussion of your thesis but structure varies across students and projects, often shaped by the conversation. The format is oral; no slides are presented and no textbooks allowed. You should plan to bring your thesis with you and other documents that you feel are relevant. Each Examination will vary in the time and depth spent on each topic.

Thesis Research Knowledge. This part of the Examination will explore all aspects of your research project, from its conception, design, rational, gap in the field, selection of methods, caveats and limitations, data analysis, interpretation, and future steps.

General Knowledge. Faculty are given a copy of your EEB transcript and will have the freedom to ask you about any topic from any class you have completed.

General Advice and Tips

- You are surrounded by incredible graduate students and post-doctoral researchers. They are a wealth of information and there are weekly opportunities to ask for guidance, explanations, details, and advice. In preparing your own thesis document, remember to consult with your Advisor and Sandra Kaiser. These interactions are crucial.

- **Write your thesis document as you make progress on each stage of the research!** This effort will make a huge difference in the last weeks before the thesis document and poster materials are due. Advice, supervisors, or mentors are not always available for last minute explanations, reviews, or comments. Starting early means you allow yourself time to explore the conceptual frameworks and inferences made from your research efforts.

- Pay attention to deadlines! Submit materials to RIA and SAFE in a timely fashion.

- If you need regular meetings with your advisor, let them know!

- There are numerous events in the department that you may finding interesting to attend and are relevant to your research. There are annual 2nd and 4th Year Talks that occur during the Spring semester. You are welcome to attend these presentations, which may help you think about your own independent research and about how you want to present your work for the Poster Show. There are several Special Topics Groups (e.g. Disease Group, Lab Tea, EvoGroup, IBRG, Conservation Group) that meeting weekly or biweekly where students, visiting scholars, post-doctoral scholars and faculty present and discuss research. You are welcome to attend some or many of these groups. For details on topics and meeting days/times, consult with your Advisor. Also, you are welcome to attend the weekly EEB Seminar Series that occurs Thursdays at 1230pm in Guyot 10. There are typically flyers around Guyot advertising the schedule of visiting speakers.

- You should begin analyzing your data in the fall of your senior year. Although you likely have a heavy course load, it is good practice to make progress on your project weekly. Keeping in touch with your work will avoid overwhelming stress as the deadlines approach. Even if you work perfectly under that pressure, other people may not (i.e. others that you will likely ask for assistance or guidance on analysis, writing, design, interpretation, etc.). Planning and thoughtful efforts will positively support your progression through your thesis project.