# HONORS REQUIREMENTS

The Honors Thesis is the culmination of your participation in the W.A. Franke Honors College at the University of Arizona. It is intended to be a personalized research experience in which you explore a concept while incorporating the knowledge or investigative techniques learned during your undergraduate career. It is one half of the following equation for graduating with honors -

## Graduating with Honors

1. You must meet the Honors College requirements which include:

    •completion of the required number of Honors units,

    •completion of a 6-unit Honors thesis during your final two semesters, and

    •a GPA of at least 3.5 at the time of graduation.

2. You must complete an Honors Thesis, the final version of which must be approved by your Faculty Advisor and the Honors College. The Honors Thesis is a research project of at least one-year duration for which there must be a prospectus, and a thesis. The thesis project is expected to help you:

    •integrate your knowledge of neuroscience and cognitive science,

    •give you an opportunity to delve deeply into and think critically about a particular area of neuroscience and cognitive science by engaging in a sustained research project, and

    •develop an appreciation for and skill in research in the neuroscience or cognitive science field.

Your honors thesis should be a well-designed research project, guided by a faculty member, carried out by you, and typically written in the form of a manuscript such as would be submitted to a peer-reviewed journal appropriate for the area of your research. Excellent writing is expected.

## Thesis/Capstone Timeline

The following timeline was created by the Honors College. Students are responsible for checking the Honors College website for any updates to this timeline.

https://www.honors.arizona.edu/academic-requirements

Completion of an Honors thesis requires preparation and planning. You will build up to your thesis throughout your years at UA by completing coursework, participating in research, engaging with faculty, and narrowing down your areas of academic and professional interest. By the end of your junior year, you should have a well-developed thesis plan that you can implement in your senior year.

Follow these basic steps when preparing for the Honors thesis:

Explore Your Thesis Topic

Early in the junior year, you will begin narrowing down your focus for an Honors thesis. This may be done in several ways, including engaging in discussions with faculty. You can search the Thesis and Dissertation database to read former students' theses.

Identify a Faculty Advisor

A Faculty Advisor is the person who will supervise your thesis and award your final grade for your thesis. Students are free to work with any tenure-track faculty member on campus as long as your thesis topic is in an area of EEB, Biology or Bioinformatics.

Ideally, you will find a Faculty Advisor no later than the first semester of your junior year and conduct research in that advisor's laboratory in the second semester of junior year. The goal is to meet regularly with your advisor and develop a proposal over the course of the second semester of junior year. *Students who do not follow this recommended timeline for identifying a Faculty Advisor risk missing the thesis submission deadline.*

Submit the Honors Thesis Prospectus

Students who are completing an Honors Thesis are required to submit an Honors Thesis Prospectus to the Honors College and to the EEB Program by the end of semester prior to beginning the thesis. This process allows you to provide a description of your proposed thesis project and provides confirmation that a faculty member has agreed to advise your thesis. The EEB program requires the submission of the Independent Study/ Directed Research Proposal Form with your prospectus or a summary of your prospectus.

## Register for Thesis credit

The thesis is a two-semester commitment that demands a minimum of six units of work, three units of ECOL 498H per semester, usually taken in the senior year. Students are not permitted to complete all six thesis units in a single semester. You will enroll in ECOL 498H

by submitting the previously mentioned signed enrollment form (located on the EEB website) to the EEB program coordinator. You must enroll in ECOL units to apply to your major. Do not enroll through your faculty mentor's department. Forms are due to the Program by the second week of the semester in which you are starting your thesis.

PLEASE NOTE: Each unit of lab credit officially requires 3 hours of work per week so enrolling for the required 3 units of honors thesis credits per semester means a minimum of 9 hours in the lab per week. Students cannot enroll in fewer or more honors thesis units at once. You and your faculty member should discuss this up front to come to a clear, mutual understanding of the expectation for weekly lab work.

## Engage in Your Thesis Project

Working under the guidance of your Faculty Advisor, you will engage in a personalized research experience. Although the details of the project will vary from student to student, most will begin by writing a draft of the statement of purpose, the methodology/capstone design, and the literature review. This is generally followed by collecting data, completing data analysis, synthesizing and drawing conclusions, and revising the written version of the thesis. Your Faculty Advisor will award a grade in your first semester of thesis work based on the progress you have made up to that point. Remember to register for your next three units of thesis credit for your second semester.

## Submit Your Thesis

Prior to the end of the semester, you will submit your thesis to your Faculty Advisor in order to receive feedback, complete any revisions needed, and receive a final grade. Students completing an Honors Thesis must submit their final thesis to the Honors College and their PI by the last day of classes before graduation. You are encouraged to plan ahead and allow yourself enough time to make any needed revisions. Once your thesis has been approved by your advisor, you will submit:

- your original signed thesis title page
- your original signed UA Library Distribution Rights form The Distribution Rights form allows the UA library to include your thesis in the UA Thesis and Dissertation Database. If you do not want your thesis included in the database, you should write your name on the form and write "do not release" across the page;
- an electronic copy of your thesis document to the Honors College AND to the EEB program. All parts of the thesis, including the signed title page, the distribution rights form, the abstract and the actual thesis, should be integrated into a single pdf file. Your thesis will be kept as part of the archives and will also be used for program assessment.

Note that you can submit your thesis only after your degree check has been completed by the Honors College. Submission guidelines and forms can be found here: https://www.honors.arizona.edu/thesis-submission

## Thesis/Capstone Prospectus Guidelines

What is a prospectus?

A prospectus is a short description of your proposed thesis. Your prospectus should clearly describe your thesis topic, the form your thesis will take, and how you will reach your thesis goals. For a laboratory-research-based thesis, focus on your governing questions or hypotheses, your research methods, and your theoretical or methodological framework. For a literature-review-based thesis, your prospectus should focus on the big-picture question and what specific question you seek to answer or frame.

Important: To undertake this research, you may be required to get permission from the Institutional Review Board (IRB) in order to ensure the protection of your subjects if your research involves experimentation, observation, or interviews with individuals or groups. Your Faculty Advisor should be prepared to guide you through the process of obtaining Human Subjects/IRB approval, which may include specific training. Sometimes it can take several months to get this permission, so plan accordingly.

What to include in your prospectus

1. Introduction and Specific Aims.

What is your thesis topic, and why is this topic of interest to you and to other scholars or researchers in the field? Why is the topic relevant and important? What specific question will your research or project seek to answer? You can provide detailed and specific information, as space permits, but you should always provide enough background information so that a scientist working outside your specific area of interest, or even a well-read lay reader, can understand the big picture.

You should reference some of the literature to show that you have begun to think seriously about why that question is important to answer and what key findings drive your work. If you will be working in a lab or on a literature review that is driven by work in a lab, you should describe current efforts in the lab you have chosen that specifically support your project. End this section with a list of the specific aims for your work.

2. Methods.

If you will be writing a laboratory-research-based paper or doing empirical or observational research, which research methods and resources will you use? Provide enough detail so

that a reader unfamiliar with the kind of work you will be doing can understand. If you will be doing a project or creative work, please describe in detail what your project work will involve, what the outcome or result will be, and how you will incorporate research-based analysis into your final product or artist statement. The goal of this section is to provide enough detail that you, and we, know how you plan to do your study.

Here's an example: "I will be using intracellular electrophysiology of glial cells in the ventral nerve cord of 3rd instar Drosophila to show how these cells respond to stimulation of interneurons. Interneurons will be engineered to express a channelrhodopsin so that they can be stimulated by light. I will record from the glialcells, pulse the preparation with light, and examine in the glial cells the resulting response to neuronal activity. After recording, I will pulse the glial cells with hyperpolarizing current to fill them with a fluorescent dye, and after processing, will view them on the confocal microscope. I will then use Image J to measure branch length and number." If there are concepts that might not be familiar to your reader but that are important to understand in order to understand your project, you should address them briefly. For example, in the methods outlined above, you might describe what a channelrhodopsin is. Figures are welcome, and may be drawn from published work as long as the legend and bibliography include the appropriate acknowledgement and reference.

If you are writing a literature review, you should include a list of references that you have consulted or plan to consult to begin your review. You and your Faculty Advisor can construct this list together. An annotated bibliography of key references would be an excellent idea.

3. Create a timeline for your work, agreed upon by you and your advisor. Also list any expected work products, such as presentations to your lab group, a poster, an abstract, and the like. Finally, note the expected frequency of meetings with your advisor.

4. Specify that your product and any presentations.

5. Last, specify briefly what you hope to learn or gain from the work you do to create an honors thesis.

Thesis/Capstone Guidelines

Honors Theses are intended to be major student projects involving various types of original work. While the type of research can vary, a substantive and substantial written product is required for completion of your Honors Thesis. It is expected that you will obtain a depth of understanding within the thesis topic equivalent to a point between a large undergraduate research paper and a Master's thesis. The thesis should synthesize and build upon existing scholarship, as well as further the discipline's understanding of the subject in some way.

The thesis may take any form appropriate to your sub-discipline and approved by your Faculty Advisor (e.g. research paper, performance, video, artwork). The Honors College requires a written summary or abstract to accompany thesis work. There are no set requirements as to length, but most theses range between 40 and 60 pages, including illustrations and references. You should discuss the thesis length and other expectations with your thesis advisor prior to the start of your thesis. In addition, the University requires a minimum of 45 hours of work for each unit of credit awarded. (Remember, an Honors Thesis requires a minimum of six units divided over two semesters.) The content of an Honors Thesis may not significantly duplicate research you have previously produced or that you are concurrently conducting in other courses used to fulfill degree requirements at the University of Arizona.

You will work closely with a Faculty Advisor of your choosing when completing your Honors thesis. The Faculty Advisor will help you to develop a research plan, outline goals, and delineate which thesis components should be written during each of the two semesters (with the understanding that the effort put forth and the quality of work completed during each semester can receive a separate grade.) It is also the responsibility of the Faculty Advisor to set a deadline for a draft of the thesis so you will have enough time to make any necessary changes to the final document.

For a laboratory-research-based thesis, the typical structure of the thesis should closely resemble the structure of a paper that would be submitted to a journal in the field of Biology, Ecology and Evolution or Bioinformatics.

A laboratory-based thesis typically will include:

- An Abstract, which is a short summary of your thesis and includes a statement of the key question, the approach and significant results, and a conclusion.

- An Introduction that lays out the overall and specific question(s) addressed, describes why these questions are important, and provides the existing context for the question(s) in the form of a presentation of the key relevant literature; include results from your laboratory if appropriate. If figures are included from another person's work, note the source of the figure in the legend and be sure to include the reference in your bibliography.

- A Methods section that is detailed enough for other people to replicate the work, including the statistical analysis.

- A Results section that details the logic for and results of your studies. Figures are expected.

- A Discussion section in which you will interpret your data in the light of your results and in the context of previously published results in the literature. It will end with a statement of your conclusions and could include one or more summary figures.

- Acknowledgments that specify the names, affiliations, and contributions of others who were critical to your effort.

- A Bibliography listing your references. The Bibliography should include a list of every reference you cite. You do not need to list any references that are not cited in the main body of the thesis.

For a literature-review-based thesis, the typical structure of the thesis should closely resemble the structure of a review paper that would be submitted to a journal in the field of Ecology and Evolutionary Biology. The level of the literature review is greater than that expected for an upper-division course, but it is not expected to be as comprehensive as a Master's thesis. Note the earlier discussion of page length.

The first step will be to identify a topic area with your Faculty Advisor, then do some reading with the intent of exploring the topic broadly so that you can fine-tune the topic area on which you want to focus. Your Faculty Advisor may help you identify relevant research articles or even review articles to give you an overview, or you may search on your own. You will research your specific topic in depth once you and your Faculty Advisor agree on the topic and a broad outline of the thesis. There is no set number of primary research articles or primary sources specified because this is a scholarly exploration, which you pursue until you and your Faculty Advisor believe that you have satisfactorily addressed the question you set out to examine. Your thesis may benefit from figures. You might end up making some schematic diagrams to illustrate a point or a relationship or to make a summary of your findings. You also may include figures from papers you study that you think make particularly important points as long as you cite the source.

Your thesis will have several parts:

- An Abstract, which is a short summary of your thesis and includes a statement of the key question, the major findings of your review and your conclusion.

- An Introduction that lays out the overall and specific question(s) addressed, describes why these questions are important, and provides the existing context for the question(s) in the form of a presentation of the key relevant literature. This is an overview of that literature only.

- The Body of your thesis, in which you critically review, and compare and contrast the studies you have chosen.

- A Discussion section, in which you bring together your analysis and interpretation to address the question you raised at the outset.
- Acknowledgments that specify the names, affiliations, and contributions of others who were critical to your effort.
- A Bibliography listing your references. Every reference you refer to in the text needs to be listed in the Bibliography.

For either type of thesis, the format and style of the thesis should follow guidelines typical of journals in the field of Neuroscience or Cognitive Science. Your Faculty Advisor can help you in this area.

Thesis approval process

You and your Faculty Advisor should agree on a process and timeline for finishing your thesis that will allow several iterations of review by your Faculty Advisor. Two to three weeks before the due date to the Honors College is typical.