



UNDERGRADUATE RESEARCH

OVERVIEW

You have the opportunity to follow your own investigational instincts through undergraduate research. This experience gives you the opportunity to specialize in a specific area of interest, connect with faculty, and prepare for graduate school or a career in research and development. Research that culminates in the production of an undergraduate research thesis allows you to receive the designation of “**Graduation with Research Distinction**” or “**Graduation with Honors Research Distinction**” on your diploma. This information packet includes the recommended timeline and requirements for earning distinction, both for honors students and non-honors students. However, students may also choose to participate in undergraduate research in the absence of earning distinction. Either option will provide you with a valuable experience!

GETTING STARTED

One of the most challenging parts of undergraduate research can be finding a project. This process should occur during your first three years as an undergraduate engineering student. Here are a few ways to find a project:

- Reach out to an influential instructor with whom you’ve had a course. Before doing so, gather information on your own regarding the research this faculty member is currently working on to ensure that it aligns with your interests and prepare for your initial discussion about opportunities or formal email listed below.
- Search departmental and faculty websites to see what current projects exist in that department or with that faculty member. Innovative projects are usually highlighted here. These websites also usually contain detailed information about areas of research and/or labs available within that specific department.
- Talk to upper class students already working on research projects by attending research forums (e.g. Denman Forum) and/or your departmental academic advisor.

Your next step should be to contact the faculty members who are conducting research in areas of interest you, in order to identify a faculty member who would be willing to serve as your research advisor. Here are a few strategies for contacting faculty:

- Be formal. When contacting them through email, make sure you are clear in your request and also formal in your writing. Be ready to email them a current resume and Advising Report. Make sure to email from your Ohio State email account.
- Be patient. Faculty members are busy people. Not only do they have teaching responsibilities for multiple classes, but they have research and service responsibilities as well. It may take them up to a week to respond, so plan ahead.
- Understand that some faculty members may not have room in their lab or may not be willing to advise undergraduate students. Try not to take this personally and keep looking for an advisor.

Keep in mind, you can do research outside of your major department, within a different engineering department or even within a different college at Ohio State. However, your research advisor needs to have graduate advising status in the College of Engineering. Make sure to ask them if they have graduate advising status. If you are conducting research that is interdisciplinary in nature, you may select a co-advisor from outside the College of Engineering, but your primary research advisor still must be an engineering faculty member.

You also need to determine the area in which you plan to receive distinction. You and your advisor should determine this at the beginning of the project. For example, you may be a student pursuing a Chemical Engineering BS degree, but your distinction area and co-advisor are within the department of Chemistry. You can earn “Graduation with Honors Research Distinction in Chemistry.” It is important to plan this in advance to ensure that you are meeting the correct requirements which align with your project.

GPA REQUIREMENT

If you are planning to earn research distinction, you need to have the following cumulative point hour ratio (CPHR) at Ohio State at the end of the term in which you apply for distinction and also at the end of the term in which you graduate:

- Honors Students = **3.400** Minimum
- Non-Honors Students = **3.000** Minimum

The reason for a CPHR requirement is to make sure classes are your first priority. There are no exceptions to this requirement.

HONORS PLAN FORM

To better inform you of opportunities and requirements within undergraduate research, you should fill out an **Honors Plan Form**, formerly known as a Declaration of Intent, to declare your plans regarding your research project. This is a requirement for Honors students to complete by the end of their second year, which is defined as the completion of four full-time (12+ hours) autumn and spring terms at Ohio State, by 5 p.m. on the last day of final exams. If you are unable to submit this at the end of your second year, you can submit at a later time and regain your Honors status at that time. We recommend this date to keep you on track with your project. If you are pursuing “Graduation with Honors in Engineering” through the Honors Contract, you can declare both of these through this same form.

The Honors Plan Form is an electronic form which can be found at this website:

https://osuengineering.co1.qualtrics.com/SE/?SID=SV_9ssMWQwPXUZGMzX. The information needed for this form includes the following:

- Department in which you are conducting research and also in which you plan to earn distinction
- Projected research coursework (see “Research Coursework” for more details regarding this requirement)
- Project abstract write-up summarizing your project (problem statement, research significance, objectives)
- Research advisor and contact information
 - *The College of Engineering will follow up with your research advisor to confirm that they are supporting you in your research endeavors.*

The College of Engineering will review your Honors Plan Form during the term after the term in which you submit this form and will notify you of any issues.

DISTINCTION APPLICATION

In order to be eligible for Research Distinction or Honors Research Distinction upon graduation, you must submit an application, which includes both a proposal and letter of recommendation from your research advisor, before the end of your third year at Ohio State, which is defined as the completion of six full-time autumn or spring terms at Ohio State. If you are a transfer student, this needs to be turned in while you still have at least two full terms remaining at Ohio State. This deadline is in place to ensure that you have enough time to complete your project and the distinction requirements while having a worthwhile and beneficial experience.

Application approval will enable you to enroll in research distinction coursework (4999 or 4999H) and to earn distinction upon graduation, if all other requirements are met. Your application will also be reviewed for potential funding from the **Undergraduate Research Scholarship (URS)**. This is not a separate application process; see section "Distinction Application: Undergraduate Research Scholarship" for the details of this scholarship opportunity. The application is online only and accessible between the first day of the term and 5 p.m. on the 6th Friday of the term through this website: <https://engineering.osu.edu/scholarships/undergraduate-research>. **The deadline for this application is 5:00 p.m. on the 6th Friday of either autumn or spring term.**

Your application will be reviewed by a committee of faculty members during the entirety of the term in which you submit your application. The faculty will review both your proposal and your research advisor's letter of recommendation. You will be notified of the results of your application in regards to both approval and the scholarship by the last day of final exams during the term in which you applied. Because you need application approval to enroll in 4999 or 4999H, please wait until receiving this response to enroll in the appropriate research course for the following term. See the following sections regarding guidelines for the proposal, letter of recommendation, and scholarship.

DISTINCTION APPLICATION: PROPOSAL

Begin working on your proposal during your third year or sooner, after determining your project topic and research advisor, as you start the initial steps of your research project. The proposal should be no more than five typewritten pages, not including figures, title page, and bibliography. One additional page for figures is allowable with a maximum of four figures. All pages should have a 1" margin all around; font should be Arial or Times New Roman in size 12; proposal should be double-spaced.

The proposal should include the following content areas (multiple sections can appear on a page):

- Abstract
 - Summary of the problem statement, objectives, and methodology
- Background and Motivation
 - Define problem statement and general area in which you are working
 - Assess the shortcoming(s) with existing knowledge and/or existing approach
 - Discuss related scholarship in this area
 - Include specific key facts about the problem at-hand
 - Highlight the importance of answering the problem
- Significance
 - Discuss importance of research project
- Methodology
 - Provide specific details in your proposed approach
- Anticipated Results
 - Include what you hope to resolve after performing this research
- Timeline
 - Provide a table or chart outlining your timeline for completing this project
- Brief Personal Statement
 - Include information regarding your background in the field and how the project prepares you for your future career
 - Include a statement concerning any arrangements that have been made to obtain or use special equipment or other resources required for the project
- Bibliography
 - List all references

Proposals are reviewed by a faculty committee which may not include a specialist in your field. Attempt to state your proposal and its significance as clearly as possible. Make sure to avoid jargon and define acronyms. Clearly define the part of your project on which you are focusing if there is a group involved with this research. Your proposal will be reviewed based on the following criteria:

- Technical Feasibility (timeframe, facilities, and student background)
- Clarity of Presentation (appropriate language and grammar, precise and logical presentation of ideas)
- Research Contribution (well-formed questions and an explanation of how this project will address those)

Because the project is to be carried out in close cooperation with your research advisor, the proposal should be written in consultation with the faculty member who will serve as your research advisor.

Sample proposals are available for viewing in 244 Hitchcock Hall during normal business hours (M-F at 8 a.m.-5 p.m.).

DISTINCTION APPLICATION: LETTER OF RECOMMENDATION

Applications and proposals must be accompanied by a letter of support from your research advisor. Upon completion of the electronic application, your research advisor will be notified via email and instructed to upload a letter of recommendation in support of your proposal. The research advisor recommendation must be received by **5 p.m. on the seventh Friday** of the term in which you applied. The importance of the recommendation letter cannot be overemphasized. Approval and scholarship award determination will be based on the potential value of the project for the student. The interest and concern of the research advisor and his/her assessment of the student and the project often will be influential in the approval process.

DISTINCTION APPLICATION: UNDERGRADUATE RESEARCH SCHOLARSHIP

The faculty committee will also review your application for consideration of receiving the Undergraduate Research Scholarship based on the criteria mentioned in the previous section during the term in which you apply. All engineering students pursuing distinction and with at least a 3.000 CPHR at the end of the term in which they apply will be considered for this scholarship.

The number of scholarships awarded will be determined by the amount of funds available. Awards range from \$500 to full in-state tuition and are applied toward any University fees at the rate of half the amount of the scholarship over the subsequent two semesters. Students who are awarded funds as part of the autumn application will receive funding during the subsequent spring and autumn semesters; students who are awarded funds as part of the spring application will receive funding during the subsequent autumn and spring semesters. Should the project require a different pattern of support, special arrangements must be made with and approved by the College of Engineering Scholarship Coordinator and Associate Dean of Undergraduate Education and Student Services. Submission of an application does not guarantee award. Students who do not receive awards are eligible to re-apply for an Undergraduate Research Scholarship in a future autumn or spring term.

Please note the following two scholarship categories, under which this award will merely substitute for other forms of aid with no net gain to the recipient. First, if you are receiving need-based aid, the Undergraduate Research Scholarship can only bring total awards to the amount allowable under the Title IV federal regulations which establish need. Second, if you are receiving University scholarship funds at the maximum currently allowable (\$25,758 — which is the full institutional cost of education for in-state students) you are ineligible for additional funding. **Students who have been awarded funds from a previous Undergraduate Research Competition are not eligible to re-apply.** Students may receive funding for a maximum of two semesters. All awards will be divided into two equal disbursements. Students who graduate prior to the full disbursement of their award will forfeit any remaining amount. Continued disbursement of funding is contingent upon satisfactory progress as

determined by the faculty research advisor. The College of Engineering will require satisfactory progress reports each semester. Students must also maintain a CPHR of 3.000 or higher to continue receiving funds. Any violation of these terms is subject to immediate suspension of funding.

Recipients generally must be enrolled as full-time students (12 credit hours) during the semesters in which they receive funding (except summer term), although enrollment for 5 credit hours with a heavy research emphasis is allowable. Exceptions for less than 12 credit hours must be approved by the College of Engineering Associate Dean of Undergraduate Education and Student Services. Students must enroll in and complete a minimum of 6 credit hours of 4999 (non-honors) or 4999H (honors) within the department in which the research is being completed. This is also a requirement for distinction as outlined in the next section. Recipients are also required to participate in the College of Engineering Research Forum occurring in the spring term: www.engineering.osu.edu/urf. Students are also encouraged to participate in the Denman Research Forum in the spring: www.engineering.osu.edu/undergraduate/research/forum. Keep in mind, both of these events can count towards your Enhanced Honors Experience (more details provided in “Enhanced Honors Experience” section).

The top two URS proposals from autumn term will be offered research internships through the Engineering Experiment Station (EES) during the following summer term. Only applicants who apply in the autumn term will be considered for the EES Internship. Selection will be made by the faculty committee, in consultation with the Engineering Experiment Station. The student's research proposal, academic performance and promise, and substance of his/her plans for the summer research experience and honors research thesis will be evaluated with respect to potential for development of research in the College of Engineering. The purpose of the Engineering Experiment Station Honors Research Internships is to provide especially promising candidates for Graduation with Research Distinction or Graduation with Honors Research Distinction the opportunity to significantly enhance the quality of their undergraduate research thesis projects through a paid research internship. The EES Internship covers up to six credit hours of tuition for research credits taken in the summer term, along with a stipend. Each research intern will work as a student employee with their faculty advisor and will be expected to conduct their research project culminating in an undergraduate thesis. The student's research project must be for work that is not currently funded from other sources, although the work can supplement ongoing research.

RESEARCH COURSEWORK

After being approved for distinction through the previously mentioned application process, you are eligible to enroll in research coursework. A minimum of 6 semester credit hours is required; a maximum of 9 hours is allowed. These must be taken over multiple (2 or more) terms. Students usually enroll in this course during their last two terms at Ohio State as an undergraduate student.

In most departments, this course is not an actual class, but a placeholder to give you credit for the amount of work put into your research project. The exact number of credits will be determined by the student and project advisor, in accordance with any department policies. You should work with your research advisor to determine the requirements for successful completion of this course. This course should be taken in the department in which you are receiving distinction and also with your research advisor listed as the instructor of record. Therefore, your advisor needs to be a faculty member in that department. Honors students pursuing a research thesis to graduate “With Honors Research Distinction” should enroll in 4999H and students pursuing a research thesis to graduate “With Research Distinction” should enroll in 4999.

In most departments, at least some of these hours can count towards your Technical Elective requirements. **Please talk to your academic advisor ahead of time to plan your projected curriculum considering this option.**

If you have not received approval through your distinction application or if you are not looking to pursue distinction but still want to conduct undergraduate research, you should enroll in 4998. Keep in mind, this course does not count towards the 6 required distinction hours.

ENHANCED HONORS EXPERIENCE

This only applies to Honors students admitted to Ohio State in Autumn 2012 and beyond.

To earn **Honors** Research Distinction, you must complete option (A) or (B) below. Verification of completion of these activities should be emailed to the Undergraduate Research Coordinator, Liz Riter, at riter.7@osu.edu.

Verifications are due four Fridays prior to the Commencement date of your graduation term.

(A) Honors Contract in Engineering

(B) Complete at least **3** of the following activities (with up to one repeated use of the same category)

- Presentation of research at an OSU sponsored event (e.g. the Denman Undergraduate Research Forum)
- Presentation of research at a meeting or conference external to OSU (e.g. meeting of a professional society)
- Submission of a manuscript to a peer-reviewed research journal or conference proceedings (student may be a co-author)
- Submission of a manuscript to an undergraduate research journal or non-peer-reviewed journal or proceedings (student must be lead author)
- Completion and submission of a patent disclosure application
- 3 semester hours of Honors designated or graduate coursework
- Other appropriate activity by petition to and approval of the College of Engineering Undergraduate Honors Committee.

ORAL DEFENSE

You must complete a satisfactory oral defense (presentation) of your research project and thesis before a 2-3 member faculty committee. The committee must consist of the research advisor, and at least one other faculty member with graduate advising status. It is your responsibility to ask faculty members to be a part of your committee, to set up the day/time of your defense, and to reserve a space in which you will do this. You should plan for a one hour defense, including a 30 minute presentation and 30 minutes of Q&A. However, the format of the defense is determined by your research advisor.

Upon successful completion of your defense, the committee members will sign the Oral Defense Form, which must then be submitted to the Undergraduate Research Coordinator no later than **four Fridays prior to the Commencement date of your graduation term.**

THESIS

You should be working on your thesis while you are enrolled in the 4999 or 4999H course. Your research advisor can provide direction regarding the content and format of your thesis. Here are some recommendations in terms of the content of your thesis:

- Title Page
- Abstract
- Acknowledgements
- Table of Contents
- List of Figures
- List of Tables
- Introduction, including Literature Review, research significance, overview of thesis
- Methodology
- Results
- Conclusion, including contributions, additional applications, future work, summary
- Appendices
- References
- Figures
- Table

Once your research advisor has approved your thesis, you should submit your final thesis to the [Knowledge Bank](http://library.osu.edu/projects-initiatives/knowledge-bank/tools/submission-instructions-for-knowledge-bank-collections/knowledge-bank-submission-instructions-honors-theses/) **no later than four Fridays prior to the Commencement date of your graduation term**. Please see this site for instructions on submitting your thesis: <http://library.osu.edu/projects-initiatives/knowledge-bank/tools/submission-instructions-for-knowledge-bank-collections/knowledge-bank-submission-instructions-honors-theses/>. If you are looking to **DELAY DISSEMINATION** of your thesis, this link also provides instructions for that process. As an additional resource for writing your final thesis, please reference the Graduate School handbook guidelines: <http://www.gradsch.osu.edu/Depo/PDF/Guidelines.pdf>.

GRADUATION CERTIFICATION

Once you have completed all of these requirements, you will be certified to graduate with either Research Distinction or Honors Research Distinction during the term in which you are graduating. **Make sure to indicate this on your application to graduate.** In general, these are the checks we do for certification:

1. Earned the required CPHR
2. Received approval via the Distinction Application/ Proposal
3. Completed and passed at least 6 hours of 4999 or 4999H in department of distinction over multiple terms
4. Completed and submitted verification of Enhanced Honors Experience (*only required for Honors students*) by deadline
5. Completed and submitted Oral Defense Form by deadline
6. Completed and submitted Final Thesis to Knowledge Bank by deadline

You will be notified via email by the Undergraduate Research Coordinator of your distinction certification two Fridays prior to the Commencement date of your graduation term. If you do not meet these requirements or deadlines, you will not receive this distinction on your diploma.