

Physics WIC Requirement

Senior Thesis or PH 317

<https://physics.oregonstate.edu/wic-course-information>

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Outline

- Timeline & Options (403 vs. 317)
- Finding a Thesis Project
- Writing a Thesis
- After the Bachelor's
- Contacts

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Timeline & Options

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Physics Major Timeline

- Junior Year
 - Paradigms
 - Computational Physics Lab
 - Electronics Lab
 - Research
 - Possibly PH 317
- Senior Year
 - Capstones (EM, QM, Thermo, Optics)
 - **WIC: Senior Thesis or PH 317**
 - Electives, Computers, Research
- Job / Grad School

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University Requirements

- OSU Baccalaureate Core
- Writing Intensive Curriculum (WIC) course
 - Major specific
 - Physics majors: PH 403 thesis or PH 317
 - Choice is not in MyDegrees yet, but the UG Head Advisor can fix it
 - If you do PH 403, need research
 - If you do PH 317, need additional elective
- Physics info:
<https://physics.oregonstate.edu/undergraduate/academics/writing-intensive-courses>
- OSU info: <https://wic.oregonstate.edu>

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Senior Thesis Requirements

Writing Intensive Curriculum Option 1

- Required for Honors degree
- Recommended for graduate school
- Physics Research required
 - PH 401 Research
 - 3 units (minimum)
 - Completed by winter Senior year
 - PH 403 Thesis
 - 1 unit each term of Senior year
 - WRITTEN thesis
 - ORAL presentation at end of Spring
 - More about the thesis later

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PH 317

Writing Intensive Curriculum Option 2

- PH 317 Advanced Lab
 - <https://physics.oregonstate.edu/ph317-experimental-physics-w2022>
 - Winter Term, MWF 2-4,
 - 3 credit lab course with extensive writing
 - Limited space (12), best to reserve w/ advisor
 - Research-type experience focused on 2 experiments only: X-ray crystallography, Brownian motion
 - Work in teams, learn troubleshooting, statistics & uncertainty, open-ended extensions of experiments using student-generated questions to further investigate the topics, research-grade equipment writing reports, probably oral presentations
- Additional physics elective

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Thesis Timeline, Action Items

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|------------------------|-------------------------------|
| • JR year Fall term: | Gather info, Seek project |
| • JR year Winter term: | Seek project, WIC Fair |
| – Apply for summer REU | |
| – Contact OSU profs | |
| – other ... | |
| • JR year Spring term | Start PH 401 |
| – (latest Summer) | |
| • JR-SR Summer: | Do Research, PH 401 |
| • SR year Fall term: | PH 403, PH 401 |
| • SR year Winter term: | PH 403, PH 401 |
| • SR year Spring term: | PH 403 |

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Finding a Thesis Project

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How do I secure a thesis project?

- Learn about the research from talking to seniors and grads, the WIC projects page, the WIC thesis page (previous projects and advisors)
 - <https://physics.oregonstate.edu/wic-course-information>
 - <https://physics.oregonstate.edu/senior-thesis-projects-20222023>
- Department will host a **WIC Fair** meeting winter term to match advisors to projects (next slide).
- You can also visit a professor to ask for an appointment (maybe even a lab tour by a grad or UG). Email may work but can get lost.
- Have a copy of your resume.
- Try to visit at least three people.
- Projects outside the department or OSU are possible. Share
 - <https://physics.oregonstate.edu/undergraduate/academics/writing-intensive-courses/thesis-advisors>
- Both you and faculty need time to decide; a final decision won't be immediate.
- No project by late winter and you may be assigned to PH 317.

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WIC Fair

- Winter term
- One-on-one student / faculty meetings in 10-minute blocks
- Goals of the Fair:
 - Students to gather information about thesis projects, advisors and PH 317 course
 - Faculty to gather information about the students' interests and skills.
 - Match students with research advisors or PH 317 by the end of winter term.

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Research Options

- OSU Physics Faculty
- OSU Faculty in other depts
 - Engineering
 - Oceanography
 - Chemistry
 - Ag
 -
- REU (need OSU co-advisor)
- Internships (need OSU co-advisor)

<https://physics.oregonstate.edu/undergraduate/academics/writing-intensive-courses/thesis-advisors>

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|--------------------------|---------------------------------------|
| • Liz Gire | Physics Education Research |
| • Matt Graham | Experimental Condensed Matter Physics |
| • Patti Hamerski | Physics Education Research |
| • Jeff Hazboun | Astrophysics |
| • David Lazzati | Theoretical Astrophysics |
| • Yun-Shik Lee | Experimental Atomic & Optical Physics |
| • Corinne Manogue | Physics Education Research |
| • Ethan Minot | Experimental Condensed Matter Physics |
| • Oksana Ostroverkhova | Experimental Atomic & Optical Physics |
| • Weihong Qiu | Experimental Biophysics |
| • Heidi Schellman | Particle Physics |
| • Guenter Schneider | Theoretical Condensed Matter Physics |
| • Xavier Siemens | Astrophysics |
| • Bo Sun | Experimental Biophysics |
| • Yangliuting (Doris) Li | Physics Education Research |

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|--------------------------------|--------------------------------------|
| • David Craig | Theoretical Quantum Physics |
| • Dr. Kathy Hadley | Theoretical Astrophysics |
| • Dr. K. C. Walsh | Physics Education Research |
| • Pavel Kornilovich (HP) | Theoretical Condensed Matter Physics |
| • Tevian Dray (Math- retiring) | Relativity |
| • Douglas Keszler (Chem) | Experimental Solid State Chemistry |
| • Chong Fang (Chem) | Experimental Physical Chemistry |

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UNDERGRADUATE RESEARCH

2023-24 OPPORTUNITIES

| FALL '24 | WINTER '24 | SPRING '24 |
|---|--|--|
| <p>URSA: ENGLISH Faculty supervisor: Hendricks, D.J. 12</p> | <p>URSA Workshops: "Tapping the Best of Us" and "The Power of Research" Hendricks, D.J. 100</p> | |
| <p>URSA Workshops: "Research 101" Hendricks, D.J. 400</p> | <p>URSA & LINGUISTICS Information session: Patterson, Jay 12</p> | <p>URSA: Student applications due Monday, May 10th</p> |
| <p>HONORS COLLEGE: CDS Research Symposium Hendricks, D.J. 24</p> | <p>URSA: Student applications due Monday, March 18th</p> | <p>HONORS COLLEGE: Thesis Panels & CDS Hendricks, D.J. 24</p> |
| <p>URSA: ENGLISH Faculty supervisor: Hendricks, D.J. 400</p> | <p>URSA Workshops, URSA & Linguistics Session Hendricks, D.J. 100</p> | <p>URSA: Writing Poster Symposium May 15th</p> |
| <p>Deadlines:</p> | <p>Workshops, URSA & Linguistics Session</p> | <p>Presentations opportunities</p> |

**COLLEGE OF SCIENCE • SCIENCE SUCCESS CENTER
RESEARCH OPPORTUNITIES**



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Writing a Thesis

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OSU WIC Thesis Guidelines

- <http://wic.oregonstate.edu/wic-thesis-option>
- The thesis must be written in the student's major, or in the case of a student with an interdisciplinary major, in a subject area relevant to the major.
- Students in a major who are writing a thesis will meet together regularly in a group, with faculty leadership, to discuss and demonstrate understanding of issues related to writing in the discipline; to discuss and demonstrate familiarity with a variety of types of writing used by those working in the field (for example, writing done for various audiences); and to participate in peer review of ongoing drafts of writing projects in the major. [This is PH 403.]
- The person leading the thesis writing group will be a faculty member in the discipline rather than a graduate teaching assistant.
- Students writing a thesis will gain experience in the steps involved in the process of writing a large document over time. Documents in the process might include: thesis proposal or project description, update memos to the committee or faculty mentor, literature review, drafts of required thesis sections on which the student received feedback, a whole draft with feedback, and a final polished version.

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OSU WIC Guidelines (contd)

- Thesis writers will receive instruction in revising their writing and will perform significant revision of their writing.
- Thesis writers will have opportunities (perhaps in the thesis writing group) to use informal, minimally graded or ungraded writing as a mode of learning and understanding content.
- Thesis writers will write at least 2000 words of polished writing that has gone through revision in response to feedback, and a total of 5000 words including drafts. Graphics are not included in the word count. Drafts to prepare for an oral presentation can also be counted in the 5000 words.
- Thesis writers will demonstrate in their thesis the ability to integrate and document information from outside sources.
- Students receiving WIC credit in a thesis option will take a minimum of three hours of thesis/research credit.
- It is recommended that at least one person in a department offering a WIC thesis experience have taken the WIC Seminar in order to be familiar with current research and pedagogies for helping students become better writers.

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PH 403 Description

PH403 (Thesis) concerns the writing aspect of the research, and students enroll in 1 unit of PH403 in each of Fall, Winter and Spring of the senior year. You will need permission from the Physics office to register. These three total credits satisfy the OSU Writing Intensive Course (WIC) requirement of the OSU Baccalaureate Core requirement. Students meet weekly as a group to write, critique, and revise their writing. They also discuss and write about issues relating to ethics, types of science writing, and logical presentation of ideas. In Winter and Spring, activities focus on the thesis itself, including significant time devoted to the writing and revision of the thesis. Steady progress and continual peer and advisor review are expected throughout. A typical thesis is about fifteen to twenty pages, or about 3,000 to 5,000 words. The goal is to have the thesis ready by week 6 of Spring term. This means that research should be substantially complete by the end of Winter term of the senior year.

After the written thesis is complete, class time is devoted to preparing 10-minute oral presentations, the standard at physics conferences. In the final week of Spring term, there is a mini-conference where students give oral presentations on their projects to the department.

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Senior Thesis Outline

- 1 Title, abstract, PACS.
- 2 Introduction: Why is topic important? How does it relate to the real world? How does it add to our knowledge base?
- 3 Previous work: Survey of what has been done before.
- 4 Methods: Description of theory, equipment, computational tools, etc.
- 5 Results: What did you observe or derive?
- 6 Discussion: What do the results mean? How do they relate to previous work?
- 7 Conclusion: What have we learned? What should be done next?
- 8 Bibliography

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Recent OSU Physics Theses

See updated list of theses from recent years, including links to digital copies, at <https://physics.oregonstate.edu/undergraduate/academics/writing-intensive-courses/past-participants>

- A Simplified Method for Simulating Ballistic and Diffusive Motion in a Brownian System
- Using the Langevin Equation to Verify a Single-Particle Brownian Motion Simulation
- Relativistic Ray Tracing: Visualizing Curved Space-Time Towards Locating Neutron Stars
- Checking for Noise Model Consistency Between the NANOGrav 12.5- and 15-Year Data Sets
- Tabletop Fusion Reactors: Construction and Testing of a Demonstration Inertial Electrostatic Confinement Fusor
- Model effectiveness in time-resolved spectroscopy: new statistical approaches to uncertainty and model selection for global analysis
- Computational Study of the Structure of Indium Alloys at Low Temperatures Using ab initio Methods
- A Machine Learning Model for Predicting Student Homework Success and Studying the Structure of Homework Questions
- Time Resolved THz Spectroscopy of Photocarrier Dynamics in WSe₂
- Computational Study of the Electrostatic Interaction between Kinesin-5/Bi mC and the Microtubule
- Time-Independent Degenerate Perturbation Theory
- Predicting the Percentage: Relating the Refractive Index to Effective Medium Theory in Combination Dielectric Films
- The particle on a ring in polymer quantum mechanics: A quantum cosmology analogue on a compact space
- Investigating Polymer Quantum Mechanics: Mathematical Formulation, the Particle on a Ring, and Time Evolution
- Modeling Optical Reflection and Electric Field Intensity in Organic Semiconductor Microcavities

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After the Bachelor's

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Jobs

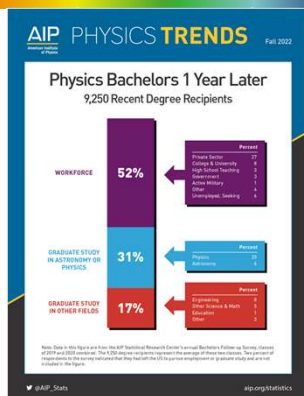
- Oregon: HP, Intel, InFocus, ESI, Solar World...
- Washington: Boeing, Microsoft, Yahoo, ...
- California: Silicon Valley, LA Aerospace, ...
- OSU Career Center: <https://career.oregonstate.edu/>
- Career Fair: <https://career.oregonstate.edu>
- Career Fair: <https://career.oregonstate.edu>
- UO MS Internships: <https://internship.uoregon.edu>
- Physics career info: <http://www.aps.org/careers/>
<https://www.aip.org/career-resources-undergraduates>

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Jobs



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<https://www.aip.org/statistics/physics-trends/physics-bachelors-1-year-later-1>

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Want to Go to Graduate School?

- Physics, Applied Physics, Engineering, ...
- M.S., Ph.D.
- Research Experience as UG
- Letters of Recommendation (3+)
- GRE
 - General: Computer based, anytime
 - Physics: paper-based: September, October, April
 - GRE seminar: PH 407(1) Spring term
- Finance: TA/RA, Fellowship (NSF, DOE, etc)

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Graduate School Info

- GRE: www.ets.org/gre
- AIP info: www.gradschoolshopper.com
- GradSchools.com: www.gradschools.com
www.princetonreview.com
www.petersons.com

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Graduate School Timeline

- GRE (if needed, see <https://docs.google.com/spreadsheets/u/0/d/19UuYToXOPZkZ3CM469u3Uwk4584CmZyAVVwQJJCyc/htmlview?pli=1>)
 - General: Computer based, anytime
 - Physics: paper-based; **September, October, April**
- Applications due: Jan 1 (depends)
- Letters of Recommendation (3+, 4 weeks notice)
- Fellowship apps
- Acceptance date: Feb, March approx
- Visit campuses: March, April
- Decision date: 15 April <https://cgsnet.org/april-15-resolution>

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Career Development Center

Help with all things career related (resumes, jobs, internships, grad school, ...)

- <https://career.oregonstate.edu/>

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Contacts

- Head Advisor: Fred DeAngelis (me)
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- PH 403 Instructor: Heidi Schellman
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- PH 317 Instructor : Matt Graham
graham@physics.oregonstate.edu
- Dept. Chair: Davide Lazzati
Davide.Lazzati@oregonstate.edu

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