

Course Syllabus
Physics 300/400: Advanced Lab
Fall Semester, 2022

Instructor: Bethe Scalettar
Office: Olin 231
Phone: Ext. 7585
Office Hours: M,F 9:00 a.m. – 10:00 a.m.
Class Meetings: T,Th 9:40 a.m. – 11:10 a.m; M ~4:00 p.m. – 5:00 p.m.
Technical Staff: Alan Younis (Electronics Shop & Machine Shop)

Course Description, Goals, and Outcomes: In Advanced Laboratory, you will have an opportunity to be *creative* with experimental (and theoretical) physics. You will propose and implement an experimentally-oriented, independent physics project that you are passionate about. This is a relatively unique opportunity, and I hope that you will find the experience exciting and rewarding.

This course will help you refine a number of important skills. One is designing a project that is both interesting and feasible. An ability to do this well is critical to success in many careers, including those involving scientific research in academic and industrial settings. Another is developing a time-line for success and adhering to it under less-structured conditions. This is especially important when engaged in projects, like those in Advanced Laboratory, which have no “prescription” for success.

This course also will help you strengthen additional important skills. These include exploring and mastering the literature and communicating your work well in both written and oral formats. For example, you will be responsible for formal written and oral presentations of your work, as well as for maintaining a *lab notebook*. The notebook is a record of daily work that makes it possible to keep track of procedures and outcomes over the long term. Lab notebooks are a mandatory component of scientific research because they also facilitate testing for project reproducibility.

As a component of this course, you are required to attend the physics colloquium. We will discuss and critique the presentations in the follow-up class meeting to enhance understanding of their content and to reinforce awareness of what constitutes a successful (or unsuccessful) presentation. You also are required to complete a short, structured project (e.g., the experiments in a Thorlabs kit) during the first few weeks of class while designing your independent project. Two excellent options are the Thorlabs Fourier Optics and Optical Microscopy kits.

My primary role is to help and advise you and evaluate your work. To this end, I will meet once a week with each group to discuss progress and possible approaches for trouble-shooting problems. I also will provide you with information on appropriate formats for the project proposal and for the formal reports and with a list of resources that might provide inspiration for possible projects.

Course grades will be based on the following weighting:

Project Proposal	15%
Lab Work & Notebook/Project Outcome	35%
Final Paper or LCphysX Video	15%
Oral Presentation	15%
Colloquium Discussion	5%
Short Project	<u>15%</u>
TOTAL	100%