

The Ph.D. Program in Astronomy

The Ph.D. program in the Department of Astronomy at Yale lasts typically for five or six years. Extension beyond six years is allowed only in very special cases. The first two years are spent doing course work and two small research projects. Work towards the Ph.D. dissertation usually begins in Year 3. All students need to pass a qualifying examination at the end of Year 2 before they can start full-time work on their dissertation.

The regulations and policies of the Ph.D. program in the Astronomy Department are given below.

1 The First Two Years

The first two years (4 terms) are spent in doing coursework. A typical program of study includes twelve courses during the first four terms, and must include the following core courses: Computational Analysis (ASTR 520), Observational Techniques (ASTR 555), Interstellar Matter and Star Formation (ASTR 560), either Stellar Populations (ASTR 510) or Stellar Astrophysics (ASTR 550), and either Galaxies (ASTR 530) or The Evolving Universe (ASTR 565). Students require the permission of the instructor and the Director of Graduate Studies to skip a core class. However, before they are allowed to do so they will be required to demonstrate their knowledge of the subject covered in the class.

Two of the twelve courses must be research credits, each earned by working in close collaboration with a faculty member. Of the two research credits, one must be earned doing a theoretical research project and one doing an observational research project. The students need to present the results of the project as a written report and will be given a written evaluation of their performance. Very often the first research project is completed during the summer between the first two years of study. Students who finish their first project before the summer begin their second projects at that time.

The choice of the five remaining courses depends on the candidate's interest and background and must be decided in consultation with the DGS and/or the prospective thesis advisor. The students must consult with the DGS and prospective advisers before selecting the other classes — the prospective advisers may require the students to attend specific classes and obtain a specified minimum grade in order for a student to work with them. Students must take any additional course that their supervisors require even after their fourth term. In addition, all students, regardless of their term of study, have to attend Professional Seminar (ASTR 710) every semester. ASTR 710 may not be used to fulfill the twelve course requirement.

Students are encouraged to take graduate courses in physics or related subjects. On

an irregular basis, special topic courses and seminars are offered, which provide the opportunity to study some fields in greater depth than is possible in the standard courses. To achieve both breadth and depth in their education, students are encouraged to take a few courses beyond their second year of study.

There is no foreign language requirement.

Teaching experience is an integral part of graduate education in the Astronomy Department. All students will serve as teaching fellows and complete a total of 9 TF units. Both the levels of teaching assignments and the scheduling of teaching is flexible and determined by the needs of the department. By the end of the third term, however, most students complete 6 TF units. Students do not teach in their fourth term. This is to allow students more time to prepare for their qualifying exams. The remaining 3 TF units is normally be carried out after the fourth term.

Students who successfully complete their first year of study may petition for an M.S. degree. A successful completion implies completing at least five course and one project, and getting an HP average overall. The project needs to be completed by the end of the summer before the third term begins.

2 The Qualifying Examination

Students must meet the Graduate School's Honors requirement (Honors in at least two classes) by the end of the second year (i.e., fourth term) in order to appear for the qualifying examination. The qualifying examination has two parts, one written and one oral.

The written examination is based on the classroom subjects studied by the students during the first two years, and is meant to test the students' familiarity with a wide range of fields within astronomy. Particular attention is paid to the students' performance in the fields in which they plan to do research. Students usually answer questions on six subjects, with one or possibly two subjects chosen by the thesis advisor. A student's performance is considered satisfactory if he/she gets an HP average overall, and gets at least HP in the subject(s) chosen by the thesis advisor.

The oral examination is held a few weeks after the written examinations, and is based on the student's chosen field of research. A committee ('the thesis committee') comprised of the student's thesis supervisor, the DGS and at least two other faculty evaluate the oral examination. The oral examinations typically consists of a 45 min presentation by the student, followed by questions from the thesis committee. The presentation should outline what the student plans to work on for the dissertation. It should minimally cover the scientific background of the project, state why the proposed project is important,

give some details of how the student will approach the project, and provide a rough time-line. The committee judges whether the project seems feasible and whether it is scientifically important enough to justify the time that will be spent on it. Questions from the committee are meant to probe the student's knowledge of the proposed field of research and to examine whether the student has sufficient preparation to carry out the research.

The students are given one chance at a make-up test if they fail either the written or the oral qualifying examination. A student failing both written and oral exams will be required to leave the program.

3 After the Qualifying Examination

Students can begin work towards their dissertation after passing the qualifying exam. They are required to write a dissertation prospectus immediately after passing the examination. The prospectus has to be approved by the thesis advisor and the DGS before it is submitted to the Graduate School for approval. This qualifies the students to be admitted to candidacy for the Ph.D. degree.

Once students are admitted to candidacy, they have to keep their respective thesis committees apprised of their progress. They are required to present the results of their work to their committee at least once a year. The thesis committees should meet in the Fall semester, before the Thanksgiving break. The committees will provide students with written assessments, and inform them whether they are in good standing, on probation, or not in good standing. A student is put on probation when their work is considered unsatisfactory. In such cases the thesis committee will recommend corrective steps and set a time frame within which the student should show improvement. Students on probation who fail to show improvement within the time-period specified by the thesis committee will be deemed not to be in good standing. Students not in good standing will be required to leave the program.

4 The Dissertation Defense

A student's dissertation should present the results of an original and thorough investigation, worthy of publication. Most importantly, it should reflect the candidate's capacity for independent research. Students are strongly encouraged to have already submitted at least part of their work for publication by the time of the final thesis defense. The department requires an oral dissertation defense. In addition, the dissertation is evaluated by three readers, two from among the Yale faculty and one from outside Yale.