

Learning Assessment for Field of Astronomy and Space Sciences

I. LEARNING GOALS FOR THE PH. D. PROGRAM

In years 1 and 2:

1. Gain a broad, current foundation of knowledge in the field of Astronomy and Space Sciences (hereafter, “the field”),
2. Identify an appropriate area of research of interest to the student and to a current faculty member within the field (“appropriate” means one that can potentially lead to the fulfillment of the goals listed under “By the end of the program”),
3. Begin acquiring the background knowledge for conducting research in the selected area by completing relevant courses,
4. Begin conducting research in consultation with the faculty member,
5. Gain experience presenting ideas orally: by working as a teaching assistant and/or by participating in the field’s various seminars and colloquia.

By the end of the program:

6. Conduct original, publishable research in the field,
7. Demonstrate in-depth knowledge across at least two sub-disciplines,
8. Demonstrate state-of-the art knowledge of one area,
9. Write effectively for professional audiences,
10. Speak effectively to professional and lay audiences.

II. MEASURES and DATA COLLECTION

Two types of data will be collected:

1. DIRECT measurements: Q-, A-, B-forms to be completed by faculty, described below,
2. INDIRECT measurements: Exit form to be completed by student, described below.

DIRECT MEASURES

Direct Measures	
Goals	Judgment based on:
(1- 5)	Course work, teaching, Q exam, progress locating adviser
(6-10)	Teaching, A-exam, B-exam, written Ph. D. thesis, dossier of published papers, participation in scientific meetings, talks delivered to professional and lay audiences

Learning will be formally assessed at three times in the student’s career: at the Q, A and B exams. The data are gathered by the appropriately named Q-form, A-form and B-form whose content is described in detail below.

Timeframe: the Q exam will be administered by a faculty committee at the beginning of the third semester.

An analysis of course work			
Learning Goal	Issue	Judgment based on	Assessment
(1)	Has the student become acquainted with the basic concepts at an introductory level?	courses taken, including before Cornell	Y/N
(3)	Has the student mastered the basic concepts at an introductory level?	course grades at Cornell	Y/N

Q-form (part 1): Class record. Here and elsewhere Y/N means “satisfactory to continue/not satisfactory to continue”.

An analysis of performance (oral and/or written)		
Learning Goal	Issue	Assessment
(1)	breadth of foundation for field	E/G/F/NAA
(1)	topical aspects of field	E/G/F/NAA
(3)	appropriateness of course background choice for research direction	E/G/F/NAA
(5)	demonstrated communication skills	E/G/F/NAA
(2,3,4)	overall progress towards choice of chair and formation of special committee	Y/N

Q-form (part 2): Q exam performance. E/G/F/NAA mean the learning goal has been met in an excellent/good/fair manner or not attained at all. The various levels of performance are defined as follows. Excellent is “one of the best students in a few years; excellent faculty material or equivalent” (perhaps 5% by number). Good is “doing well and on-track; a typical performance; minor flaws” (perhaps 90% by number). Fair is “minimal standards achieved; comparable to those opting for an early Master’s” (perhaps 5%). NAA is “minimal level not achieved” (perhaps 1%).

Timeframe: the A exam will, ideally, be taken before the beginning of the fifth semester; it must be taken before the beginning of the seventh semester unless special petitions are filed and accepted.

An analysis of readiness for research		
Learning Goal	Issue	Assessment
(6)	suitability of research for original, publishable results?	E/G/F/NAA
(6)	cognizance of research-related ethical issues?	Y/N
(7)	background in theory?	Y/N
(7)	background in observation?	Y/N
(7)	background in instrumentation?	Y/N
(7)	background in information technology?	Y/N
(7)	suitability of overall background for implementing plan?	E/G/F/NAA
(10)	effectiveness of oral presentation of plan	E/G/F/NAA
(10)	capacity for giving/receiving useful feedback?	E/G/F/NAA
(6-10)	readiness to proceed?	Y/N

A-form: to be completed by chair as part of the process of filing the exam results; committee consensus; dissent to be noted; abbreviations as before. Judgments to be based on presentation and questioning during the A exam.

Timeframe: the B exam will be taken when the thesis is complete.

An analysis of accomplishments		
Learning Goal	Issue	Assessment
(6)	research quality	E/G/F/NAA
(7,8)	knowledge	E/G/F/NAA
(9)	written Ph. D.	E/G/F/NAA
(10)	oral presentation	E/G/F/NAA
(6-10)	Adequate level of accomplishment?	Y/N

B-form: to be completed by chair; committee consensus; dissent to be noted; collected as part of the process of filing the exam results; abbreviations as before.

INDIRECT MEASURES

Indirect Measures will be based on student generated information.

- Student's Exit interview (Exit-form)
 - Self-reported: request all peer-reviewed publications and conference proceedings.
 - Self-reported: request post-graduation activity or employment and future contact information.
 - Anonymously-reported: which aspects of the program were beneficial for achieving the goals (and for education) and why?
 - Anonymously-reported: what changes need to be made to the program and why?

DATA PLAN FOR THE FORM RESPONSES

This plan applies to all the form data (Q-form, A-form, B-form, and Exit-form).

Collecting the data: A key consideration is that the data collection be as simple, as efficient and as systematic as possible. The field will use University-provided survey system (Qualtrics). When the Q exam is given or the student registers with the GFA for A or B exam the Special Chair will receive a unique online, survey link containing the Learning Assessment required by the Field (Q-form, A-form or B-form). After the exam the Chair completes the form, the survey data is electronically returned to the GFA and the DGS is automatically informed. In addition, for the B exam the student will receive a unique online, survey link containing the exit interview (Exit-form) required by the Field. The DGS withholds the final signature for filing the results with the Graduate School until all the needed responses have been received in good order.

Management of the data: The form information will be kept in a common file in the Field office. It will be available to the DGS, the Special Committee and members of the Field and may be utilized at the Field meetings. After the student leaves the form information will be retained as part of a summary purged of personal identifiers, i.e. only the frequency of the individual assessments of the learning goals amalgamated each year will be retained for Q-, A- and B-forms. Self-reported information in the Exit-form including the student's publication record in the program, post-graduation position, contact information and email will be retained by the Field; the rest of the Exit-form will be anonymous.

III. FIELD MEETING REVIEW

Field meeting:

- Conducted at least once a year to discuss the Ph. D. program.
- DGS distributes new survey data that has been generated since the last meeting.
- In the meeting: review the status of each student in the program with respect to the learning goals. Presentation to be led by the faculty adviser with additional input from others in the field (teachers, collaborators, etc.). Specific situations where learning goals are not being met are discussed.
- The DGS reviews ongoing efforts to improve student learning and data collection (as agreed upon in past meetings).
- The field discusses
 - improvements in the program,
 - alterations in the assessment criteria and data collection.
- The field agrees upon a time line and assignment of responsibility for action items.
- After the meeting the DGS summarizes in writing the time line and assignment of responsibility for improvements in the program and/or alterations in the assessment criteria and data collection methodology. This information is archived along with the data in the field records by the GFA.
- This summary is distributed and forms the basis for some of the discussions at the next meeting.