Physics

Assessment Plan for the MS and PhD Programs

Program Learning Outcomes
The graduate program in physics at UCR is designed with the goal that students graduating with an M.S. in physics will:

(i) Have strong comprehensive “scholarly knowledge” of the core fields of Physics (Classical Mechanics, Electromagnetism, Statistical Mechanics, Thermodynamics and Quantum Physics) and/or astronomy (core physics, Galactic Dynamics, Techniques of observational Astronomy, Cosmology & Galaxy Formation).

(ii) Cogently present scientific information in oral presentations and written documents. To be achieved by presentations in group meetings, journal clubs, talks at professional confessional conferences such as the American Physical society meetings, American Astronomy Society meetings etc.

(iii) Proficiently use archival scientific literature.

(iv) Couple physics knowledge with critical thinking skills, understand limiting cases and become effective problem solvers.

(v) Be able to teach physics at the High School and Community College Level or work as engineers. The teaching mentoring will be done through the campus TA Development Program and weekly meetings with faculty. The effectiveness will be assessed through teaching evaluations by students and faculty. Highly effective TAs will be presented with campus and department recognition.

Students graduating with a Ph.D in physics will in addition to above have the following professionalization outcomes:

(vi) Be able to carry out independent research in Physics or Astronomy. To be achieved through a oral qualifying exam to be done by end of year 3 and a thesis dissertation and a thesis defense by year 6.

(vii) Be capable of writing scientific papers, technical reports and grant proposals.

(viii) Be able to mentor undergraduate and graduate students and postdoctoral fellows in research. (ix) Be able to teach Physics and Astronomy at four year and graduate degree granting institutions.

In addition, we want all our students to have:

(x) A fulfilling and rewarding educational experience.

Assessment of outcomes (i)-(v): Masters Degree Requirements
A student is recommended for the degree of M.A. or M.S. in Physics on completion of the following requirements: Satisfactory completion of a minimum of 36 quarter units of approved physics courses taken for a letter grade after admission to graduate study. Of these, at least 24 quarter units must be graduate courses. Each course must be passed with a grade of B- or better and the student must maintain an average for all courses of B or better. In addition, either of the following two plans are required:
a) Satisfactory completion of a thesis (outcome ii-vi and vii, viii) in a field of physics to be chosen in consultation with a faculty supervisor. This thesis shall be passed upon by a committee designated by the department.

b) Satisfactory performance on the Comprehensive examination (outcomes i, vi, v, x).

In addition, the students are required to take “Current Research Themes in Physics” seminar series to assess outcomes (ii) and (iii).

Assessment of outcomes (i)-(ix): Doctoral Degree Requirements
In addition to the assessment outlined above for MS degree students, students in the PhD program have to pass the comprehensive exam to meet their scholarly competence requirements (outcome (i)), and the oral qualifying exam (outcome vi), written thesis and thesis defense (outcome vi) to meet their research competence requirements (outcomes (vi) and (vii)). Students are required to attend “Current Research Themes in Physics” to facilitate their physics and astronomy scientific literacy (outcomes (ii) and (iii)). A student is recommended for advancement to candidacy for the Ph.D. degree in Physics upon completion of the following requirements:

Comprehensive Examination
Satisfactory performance on the comprehensive examination, before the winter quarter of the student’s second year is required. The examination consists of a eight hour written exam (two sessions) that covers topics in Classical Mechanics, Statistical and Thermal Physics; Electromagnetism and Quantum Mechanics at the graduate level for the physics track. For the astronomy track, Quantum Mechanics will be replaced by the first year astronomy classes. Based on the exam performance (written) the department recommends a pass at the Ph.D. level, a pass at the M.A./M.S. level, or a fail.

Assessment of Research Competence - Qualifying Oral Examination
Satisfactory performance on an oral examination in the general area of the student’s proposed research.

The student is recommended for the Ph.D. degree following their advancement to candidacy and completion of the following requirements:

a) Doctoral Thesis (outcome vi)
   Satisfactory completion of a dissertation containing a review of existing knowledge relevant to the candidate’s original research, and the results of the candidate’s original research. This research must be of sufficiently high quality to constitute a contribution to knowledge in the subject area.

b) Final Oral Examination (outcome vi)
   Satisfactory performance on a final oral examination conducted by the candidate’s doctoral committee.

Facilitation of learning outcome (v) and (ix):
To facilitate effective physics and astronomy teaching methodologies, all graduate students are given a teaching assistantship in the first year of graduate school. They
are also enrolled in a teaching workshop conducted by the UCR graduate division in their first year, before the start of their teaching assignments.

Assessment of learning outcome (v) and (ix):
The teaching effectiveness of the graduate students is evaluated every quarter through online anonymous student evaluations.

Assessment of item (x)- Fulfilling and Rewarding Education:
This learning outcome is common to both MS and PhD degree students. In order to assess this feature, we have designed an exit questionnaire that will be provided to all our graduates. Conduct exit interviews and obtain placement data for departing students. In addition, a review of the graduate program is conducted every 7 years by a committee of 3 outstanding faculty recruited from leading US universities to both evaluate and provide recommendations on the assessment of learning outcomes.