Proposal for UConn Physics Graduate Program Requirements

Motivation: to streamline physics graduate student course and research requirements so that students in all groups take classes from a common core set of courses and also start advanced classes for their proposed research area in their second year. All PhD students should complete their dissertation proposal by the end of their 3rd year (as is currently required).

Physics PhD requirements:

Coursework: 4 courses from the core list (below), plus 6 others either from the core list or advanced courses (including from other Departments, such as Polymer Physics, Chemistry, …) at the discretion of the major advisor. Students must obtain a grade of B or better in each of at least 4 of the core courses, by the end of their fifth semester. Exceptions may be made for students with an MS in Physics who have already taken equivalent courses at other institutions, obtaining a grade of B or better. The Graduate Affairs committee makes these decisions, at the request of the advisor. First year students are required to take 2 semesters of the one-credit Graduate Seminar course (PHYS 5094).

PhD General Examination: Oral examination: short (~30 minutes) oral presentation on a research topic chosen in consultation between the student and their advisory committee, followed by an oral exam probing the student's physics knowledge underlying their presentation. Students must satisfy the core coursework requirement before taking the PhD General Examination. The general exam committee consists of the student's three-person advisory committee, plus two other faculty from a different research field. The General Examination should be completed before the end of the student's fifth semester.

Dissertation proposal: A written dissertation proposal must be approved and defended in an oral presentation, completed by the end of the student's third year in the graduate program.

Graduate School Research Credits: In addition to the Physics PhD course requirements listed above in item 1, the student's PhD degree must include at least 15 credits of dissertation credits: GRAD 6950 or GRAD 6960.

Physics MS requirements:

Non-Thesis MS: 4 courses from the core list (below), plus 6 others either from the core list or advanced courses at discretion of the major advisor.

Thesis MS: 4 courses from the core list (below), plus 3 others either from the core list or advanced courses at the discretion of the major advisor. 9 credits of MS level research classes (GRAD 5950, GRAD 5960) must be included, plus a written and orally defended MS thesis.

Core course list: 5101 Methods of Theoretical Physics
5201 Theoretical Mechanics
5301 Electrodynamics I
5302 Electrodynamics II
5350 Computational Physics (existing course to be renamed)
5401 Quantum Mechanics I
5402 Quantum Mechanics II
5403 Quantum Mechanics III
5500 Statistical Mechanics
6730 General Relativity

Illustrative examples of a possible course curriculum for various groups: these can be adjusted

example PAN student course curriculum:
semester 1: 5101 Math Methods + 5201 Mechanics + 5094 (Grad Seminar)
semester 2: 5401 QM I + 5301 E&M I + 5094 (Grad Seminar)
semester 3: 5402 QM II + 5500 Stat Mech
semester 4: two of: Comp. Phys., Gen. Relativity, QMIII, E&M II, QFT I, Nuclei & Particles

example AMO student course curriculum:
semester 1: 5101 Math Methods + 5201 Mechanics + 5094 (Grad Seminar)
semester 2: 5401 QM I + 5301 E&M I + 5094 (Grad Seminar)
semester 3: 5402 QM II + 5500 Stat Mech
semester 4: two of: Comp. Phys., atomic, molecular, QMIII, E&M II, quantum optics, lasers, semiconductor optical devices

example CMP student course curriculum:
semester 1: 5101 Math Methods + 5201 Mechanics + 5094 (Grad Seminar)
semester 2: 5401 QM I + 5301 E&M I + 5094 (Grad Seminar)
semester 3: 5402 QM II + 5500 Stat Mech
semester 4: two of: Comp. Phys., QMIII, E&M II, solid state, CMP I, polymers, NMR

example ASTRO student course curriculum:
semester 1: 5201 Mechanics + 6710 (Stars) + 5094 (Grad Seminar)
semester 2: 5401 QM I + 6720 (Galaxies) + 5094 (Grad Seminar)
semester 3: 5500 Stat Mech + 6740 (Observational Astrophysics)
semester 4: 5301 E&M I + 6730 (General Relativity and Cosmology)

example GEO student course curriculum:
semester 1: 5101 Math Methods + 5201 Mechanics + 5094 (Grad Seminar)
semester 2: 5401 QM I + 5301 E&M I + 5094 (Grad Seminar)
semester 3: 5402 QM II + 5500 Stat Mech
semester 4: two of: Comp. Phys., E&M II, or from geosciences courses

existing graduate courses in the catalog:

5010. Independent Study
5020. Research in Physics
5094. Physics Seminar
5101. Methods of Theoretical Physics I
5102. Methods of Theoretical Physics II
5201. Theoretical Mechanics I
5301. Electrodynamics I
5302. Electrodynamics II
5350. Computerized Modeling in Science [**to be renamed & modified**]
5401. Quantum Mechanics I
5402. Quantum Mechanics II
5403. Quantum Mechanics III
5500. Statistical Mechanics
5621. Polymer Physics, Advanced Topics in Physics I
5622. Advanced Topics in Physics II
6110. Atomic Physics
6120. Molecular Physics
6130. Quantum Optics
6140. Principles of Lasers
6150. Semiconductor Optical Devices
6201. Fundamentals of Solid State Physics I
6211. Condensed Matter Physics I
6212. Condensed Matter Physics II
6244. The Electrical Properties of Polymers
6247. Nuclear Magnetic Resonance II
6264. Semiconductor Physics
6310. Relativity
6320. Nuclei and Particles
6331. Nuclear Physics I
6332. Nuclear Physics II
6341. Quantum Theory of Fields I
6342. Quantum Theory of Fields II
6710. Stars and Compact Objects
6720. Galaxies and the Interstellar Medium
6730. General Relativity and Cosmology
6740. Observational Astrophysics