Physics Ph.D. Curriculum

The NC State Physics Ph.D. Curriculum is designed to provide students both a firm foundation in traditional disciplines as well as instruction leading to a breadth of knowledge in sub-disciplines.

1. **Foundation Requirement.**

   In addition to demonstrating a mastery of the undergraduate and graduate physics core by passing the Departmental Exam, students must exhibit further proficiency by obtaining a B grade or better in at least two of three courses including:

   PY 786 Electrodynamic Systems

   PY 782 Many-body Quantum Systems

   PY 783 Advanced Classical Mechanics

2. **Breadth Requirement**

   Students must master a sub-discipline in computational, experimental, or theoretical physics by successfully completing courses approved by their faculty committee. These shall be:

   Six Physics courses at the 500-level or above with an emphasis in, for example:

Astrophysics

Atomic Physics

Biophysics

Educational Physics

Elem. particle Physics

Nanoscience/materials

Nuclear Physics

Optics

other

If approved by the student's committee, up to two of these courses may be replaced by appropriate courses at the 400-level or above from other departments.

-or-

If a minor is selected, six total courses with at least four courses in the minor department at the 400-level or above, and the remainder physics courses at the 500-level or above. (For an interdisciplinary minor, these four courses may be spread among three departments.

Departmental Exam

The Departmental Ph.D. Exam tests mastery of the core disciplines of physics at the undergraduate and graduate level. Students will be allowed two opportunities to take the examination, which must be passed in its totality within five semesters of matriculation.

Dates: Tuesday, Wednesday, and Thursday during the 1st week of classes in the Spring Semester

Duration: Three hours each day

Content: 1. Four Electricity and Magnetism problems at the level of

• *Electromagnetic Fields and Waves* by Lorrain, Corson & Lorrain

• *Introduction to Electrodynamics 3rd edition* by Griffiths

• *Classical Electrodynamics* by John David Jackson (chapters 1-7)

2. Four Quantum Mechanics problems at the level of

• *Quantum Physics* by Gasiorowicz

• *Introductory Quantum Mechanics* by Liboff

• *Modern Quantum Mechanics* by Sakurai

3. Two Classical and two Statistical Mechanics problems at the level of

• *Classical Dynamics of Particles & Systems* by Marion & Thornton

• *Mechanics 3rd edition* by Symon

• *Statistical Mechanics* by Huang

Transition Issues

1. Three "old" exams will have to be generated for students to study by.

2. Course titles and descriptions for the former core (781&2 and 785&6) will need to be changed.

3. Final offering of the old exam in May of 2004 will be followed seamlessly by the new version in January of 2005. Special cases are few and can be dealt with individually.