

## Chemical Physics Ph.D. Joint Chemistry and Physics Department Degree Program

This proposal would create a new doctoral degree in Chemical Physics, to be jointly administered by the Chemistry and Physics departments.

Rationale: Numerous fundamental problems in materials, surfaces, and biochemistry require a background that incorporates both a strong chemistry and a strong physics background. For the mathematically inclined chemistry students or the atomic-molecularly focused physics students, this combined program builds upon their strengths while preparing them for careers at this interdisciplinary boundary.

Mechanics of admission: students apply through either the Chemistry or the Physics department indicating an interest in this program, or join after matriculation at Tufts. A Chemical Physics subcommittee including representatives from both departments will review all applicants to the program. The major advisor is normally chosen in the first year and may come from either department. The advisory committee will consist of at least one member from each department in addition to the major advisor (a total of three committee members).

Financial support shall ordinarily be the responsibility of the student's primary department and/or advisor. Chemistry will allot one TA slot to the program, enabling admitting students into the program with the same financial package normally offered chemistry graduate students.

The core program consists of seven, graduate-level classroom courses at least three of which must be Chemistry courses and three must be Physics courses. These are to be completed by the fourth semester in residence and include:

- Core courses
  - Two semesters of quantum/structure consisting of either Chemistry 133 or Physics 163 and either Chemistry 136 or Physics 164.
  - One semester of electricity and magnetism consisting of Physics 145
  - One semester of statistical-thermodynamics consisting of either Chemistry 131 or Physics 153.
  - One course on structure/bonding, to be chosen from among Chemistry 150 (intermediate organic), 151 (physical organic), 152 (advanced organic synthesis), 161 (advanced inorganic), 162 (transition metals)
- Elective courses
  - Two additional courses from among Chemistry 132 (kinetics), 151 (physical organic), or 162 (transition metals) or Physics 131 (Classical Mechanics), 146 (Classical Electromagnetic Theory II), 173 (solid state) or 174 (solid state). Other appropriate courses may be substituted with the approval of the student's advisory committee.

To provide the student with experience in oral presentation, two oral presentations are required: a public seminar by the end of the fourth semester and a presentation to the advisory committee in the fifth semester. The seminar is based on current literature, can be presented in either department and is evaluated by the advisory committee. The topic for the presentation to the committee is chosen by the student in consultation with the advisory committee. This presentation will be waived for students having at least a 3.3 average in the core courses. In

addition, the student must prepare a written, original research proposal by the end of the eighth semester. This proposal shall be somewhat distinct from the thesis work and defended orally before the advisory committee.