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PROCEDURES AND REQUIREMENTS FOR GRADUATE DEGREES IN THE CHEMICAL PHYSICS PROGRAM

I. INTRODUCTION

The requirements for graduate degrees in The Ohio State University Graduate School are summarized in the Graduate School Handbook, which is available in the Graduate School office. Each graduate student should obtain a copy of this Handbook and keep it for reference during the tenure of his or her degree program.

The specific requirements for graduate degrees in Chemical Physics and additional comments and instructions for Chemical Physics students have been brought together in the present pamphlet. It is our hope that the student will not lose sight of the major goal of graduate education in his or her effort to fulfill these requirements. Remember that the graduate student in Chemical Physics who seeks the M.S. or the Ph.D. degree is expected to expend the major effort on a research problem which culminates in a dissertation. To reach this goal the candidate will conduct independent research under the guidance of a preceptor, prepare and present a thesis on the study, and demonstrate that it adds significant new knowledge to an area of Chemical Physics. The course requirements are designed to prepare the student for this major challenge of graduate education.

II. ADMISSION TO GRADUATE PROGRAMS IN CHEMICAL PHYSICS

Admission requires demonstration of an acceptable B.S. or B.A. degree. The student should have a minimum overall undergraduate point-hour ratio of 3.0 (on a 4.0 basis), suitable performance on the graduate record examinations, or satisfaction of such specific additional requirements as may be stipulated in special cases.

III. ACADEMIC STANDARDS FOR THE PROGRAM

A graduate student doing acceptable work toward a graduate degree is expected to maintain a cumulative point-hour ratio of B (3.0) or better in all graduate credit courses. If at any time after 15 hours of graduate credit a student's record falls below the above requirement, the Graduate Studies Committee will be requested by the Dean of the Graduate School to review the record and make a recommendation to the Executive Committee of the Graduate School to determine whether the student should be placed on probation, special student status, or be denied registration. As long as there remains a good probability that the student with a record below 3.0 can raise his overall point-hour ratio to a 3.0 by continuing coursework for one or possibly two additional quarters, probation or special student status may be recommended by the Graduate Studies Committee.

IV. PRECEPTOR SELECTION

The selection of a research advisor is a major step in a student's program and a formal system of interviews has been developed. To initiate the procedure, the student will obtain a

preceptor selection form and designate a minimum of 5 chemical physics faculty members (at least one member each of the Chemistry and Physics Department) that he/she wishes to interview. Students are encouraged to interview as many chemical physics faculty members as they feel may provide research programs of interest. Students entering the program fall quarter may submit to the Chairman of the Graduate Studies Committee their preceptor preference list on the last Friday of classes of fall or winter quarter or at the latest the Friday of the 5th week of spring quarter. For students entering at other times, this must be done no later than the Friday of the 5th week of their third quarter at The Ohio State University.

V. MASTERS PROGRAM

M.S. Degree with Thesis. The student must have a minimum residence of three quarters at The Ohio State University with completion of at least 45 quarter hours of graduate work, including credit for research. Course work must be at the 600-900 level (500 or above outside the Physics and Chemistry Departments), and the courses must be acceptable to the Chemical Physics Graduate Studies Committee and the student's advisor, and must include the core courses listed in the Doctoral program. The student's course program should be decided in conjunction with the thesis advisor.

Students will carry out a research program that will culminate in the writing of a thesis. The research program should be initiated as soon as possible after preceptor selection.

At least two weeks prior to the date proposed for conferring the M.S. degree, the candidate must pass an oral examination before a committee, approved by the Graduate Studies Committee Chairperson and composed of at least three Chemical Physics faculty (including the advisor). Should the graduate record of the candidate be wholly satisfactory to the examining committee, the scope of the examination will be confined to the candidate's field of specialization.

M.S. Degree without Thesis. The following provision is made for granting a terminal Master's degree only without the necessity of completing a thesis. Upon application by the student, he/she must have satisfied the course requirements above for the Master's degree, passed the IOE at level 3 (see Section VI.B.1) and successfully completed both the written and oral portion of an exam comparable to the General Examination (see VI.B.2)

VI. DOCTORAL PROGRAM

The Graduate School requirements for the Ph.D. degree are stated in Section 9 of the Graduate School Handbook. The requirements specific to the Chemical Physics program are as follows:

A. Course Requirements for Ph.D. Candidates. The purpose of coursework in the Ph.D. program is to prepare the student to take the General Examinations for the Ph.D. (written and oral) and to undertake work on a significant original investigation in chemical physics which culminates in the doctoral dissertation.

To this end the student will be required to demonstrate proficiency in a number of specific subject areas. The normal method of demonstrating proficiency is to successfully complete a prescribed set of courses. However, in exceptional cases, the Graduate Studies Committee has the discretion to accept other evidence of the student's proficiency.

The course requirements may be divided into two categories: i) core requirements and ii) elective requirements. Each student must satisfy each of the following three core requirements for a total minimum of 6 courses. The core areas are:

Area	Suggested Course	
	Chemistry	Physics
1) Quantum Mechanics	861(A), 862(W), 863(S)	827(A), 828(W), 829(S), 830(A)
2) Statistical Mechanics/ Thermodynamics/Kinetics	880(S), (775(A) or 876(W))	846(A), 847(W)
3) Spectroscopy	866(S odd years)	* (I)
4) Safety Seminar (to be completed in first year)	685 (W)	

* Depending on topic 880.20 may satisfy this requirement
(Letter in parenthesis indicates quarter normally offered: (A)=Autumn; (W)=Winter; (S)=Spring; (I)=Irregular)
To fulfill the core requirement in each area the student may take the appropriate courses in either department (but not both). These courses will normally be taken during the student's first year of enrollment (except for Physics 830).

In addition, the student must also demonstrate proficiency in several electives in at least two areas exemplified by the following:

Area	Suggested Course	
	Chemistry	Physics
Optics	-	657(S)
Classical Mechanics	-	821(S)
Kinetics	876(W)	-
Electricity and Magnetism	-	834(A), 835(W)
Condensed Matter Physics	-	780.06(S)
Atomic Physics/Spectroscopy		780.04(W)
Analytic Spectroscopy	823(W or S)	-
Electrochemistry	821(W)	-
Advanced Topics	-	880.0X (I)
Special Topics of Current Interest	996 (I)	880.20 (I)
Mathematics	Appropriate math courses at the 500 level or above, e.g., Math 601(A), 602(W), Phys 730(Su), 731(W)	

Overall the student must complete the equivalent of 4 courses of these elective requirements, with at

least half of these being completed within the first year. Credit in the core areas in excess of 6 courses may be applied to fulfill up to 2 courses of the 4 courses elective credit requirements. However, for the Chemical Physics degree, a student must normally accumulate a total of at least 3 courses from the core and elective courses in each of the Chemistry and the Physics Departments. (ChemPhys880(W)-Frontiers in Spectroscopy taken for a grade will count as an elective.)

B. Other Requirements. The graduate degree program in Chemical Physics has several options:

I Terminal M.S. degree
II M.S. degree followed by Ph.D.
III Ph.D. degree, not preceded by the M.S. degree

The choice among these programs will be determined on the basis of the student's academic record and his/her performance on the Integrated Oral Examination (IOE) as described below.

1. The **IOE** is given on an individual basis, but will normally be taken at the end of Spring Quarter or the beginning of Summer Quarter of the student's first year. At this point, the student should have completed most of the course requirements listed above. The IOE shall be administered by 3 Chemical Physics faculty members appointed by the Graduate Studies Chairperson and will test the depth and integration of understanding of the student's knowledge in the core Chemical Physics areas as indicated above and in selected other areas of the student's specialization. The examination shall be oral. In the case of an overall ambiguous performance, the committee can require a second, written examination.

2. **General Examination**. The examination for admission to Ph. D. candidacy, consisting of a written and an oral portion, is also given on an individual basis. The written portion is in the form of a research proposition on a topic in the general area of the student's research interests but different from the thesis topic already being pursued by the student. The topic is selected by the student but must be approved by his advisor. For students permitted to proceed directly toward the Ph.D. (on the basis of the IOE and coursework evaluation), the selection and approval of the proposal topic should be completed *not later than the autumn quarter of the third year*; for students taking the M.S. first, it is to be done *within the quarter following completion of the M.S. degree.*

a) The **written portion** of the general examination will consist of a well-documented research proposal that includes a critical review of the subject matter which is pertinent to the candidate's proposed research problem. The minimum objective will be for the student to use this opportunity to demonstrate a thorough understanding of the project and its relationship to other areas of Chemical Physics. This document normally shall consist of not more than about 30 typewritten, double-spaced pages including all references, figures, tables, etc.

The student's advisor will be responsible for initiating and coordinating the written examination. He/she will submit the approved topic of the proposal to the Graduate Committee Chairperson, who will approve an evaluation committee of four faculty members. The committee will include the advisor plus three chemical physics faculty members, at least one member each of the Chemistry and Physics Department. The student will then have six weeks to prepare and submit his proposal to the committee. During this time, he will be expected to work independently on the proposal, without consulting any

member of the committee, including his advisor. Each member of the evaluation committee (except the advisor) will submit a written critique of the proposal to the student (and send a copy to the advisor) within approximately two weeks after receiving the proposal. The student will then be given an opportunity to modify his proposal and return it to the committee, as required. If the proposal is basically satisfactory, requiring modest revision, the student will be allowed two weeks following its receipt for preparation of the revised proposal; for major revision, three weeks will be allowed. Presentation of a final proposal, which is judged satisfactory by the examining committee, will constitute passage of the written portion of the examination.

b) The **oral portion** of the examination should be scheduled by the student and his advisor through the Graduate School. The Graduate School form is due to the Graduate School 2 weeks prior to the oral exam. The committee should include the three faculty members (other than the advisor) who evaluated the written proposal (at least one member each of the Chemistry and Physics Department). The content of the oral examination will be directed principally toward the proposal itself and the actual research program planned or in progress by the student but some general chemical physics questions may also be directed to the student. Since most of the more general background material will be available in the written proposal, the student should plan to present a brief, informal (approximately 5 minutes) summary of the proposal and then be prepared to answer questions from the committee related to the proposal, to his own research program, and to chemical physics more generally. Satisfactory performance will result in admission to candidacy for the Ph.D. degree. Failure will result in a second attempt not later than the second quarter following. [NOTE: the Grad School is not providing the outside reader but they are still requiring 4 grad faculty members for the oral exam]

3. **Thesis.** The principle requirement for the Ph.D. degree is the accomplishment of independent research. Details concerning the Ph.D. thesis and its oral defense are given in the Graduate School Handbook.