February 28, 2002

WINSTON KO, Chair
Department of Physics

RICHARD SCALETTAR, Vice Chair
Department of Physics

SUBJECT: Physics M.S. and Ph.D. degree requirement changes

At its meeting of February 13, 2002 the Graduate Council considered and approved the October 22, 2001 request for several changes to the Physics M.S. and Ph.D. degree requirements. Council’s Educational Policy Committee (EPC) reported that these related to the preliminary examination/Master’s Comprehensive Examination and new second-year requirements for Ph.D. students. EPC discussed these changes and recommended Graduate Council’s approval. Council concurred. In addition, EPC said it “would like to express its appreciation to the Physics Department for presenting their proposal with such clarity and conciseness.”

In order to assist graduate programs and Graduate Studies in keeping accurate records of when degree requirements are approved by Graduate Council, we request that you submit an electronic version of the approved degree requirements to Lee Wilce in the Office of Graduate Studies at lswilce@ucdavis.edu. She will add Graduate Council’s approval date to the document and keep a copy in an electronic file of approved degree requirements.

Sincerely,

John M. Labavitch, Chair
Graduate Council

/lsw

cc: P. FitzGerald
    K. Garcia
    C. González
    R. Kraft
    L. Rabena
Physics – MS and PhD degree requirement changes

30 January 2002

John Labavitch
Chair, Graduate Council

Dear John:

The Physics Department proposes a number of changes to its M.S. and Ph.D. programs. These relate to the preliminary examination/Master’s Comprehensive Exam and new second-year requirements for Ph. D. students. The proposed changes are outlined in Professor Scalettar’s cover letter and the specific language relevant to the changes is printed in bold on the accompanying sheet.

The Educational Policy Committee discussed these changes and found that it had no objections. We believe that the proposal is ready for presentation to Graduate Council.

The EPC would like to express its appreciation to the Physics Department for presenting their proposal with such clarity and conciseness.

Yours sincerely,

David A. Traill, Chair
Educational Policy Committee
October 22, 2001

PROFESSOR JOHN M. LABAVITCH, Chair
Graduate Council

SUBJECT: Request Change of Physics Department Degree Requirements

Dear Professor Labavitch:

We are writing this memo to describe several requested changes to our degree requirements, and the rationale behind the changes.

[1.] Changes to Written ('Preliminary') Exam format: The Physics Department administers a written exam to its graduate students at the beginning of each Fall quarter. The exam tests general knowledge of first year graduate and advanced undergraduate coursework. It is typically taken by students at the beginning of their second year of study. Students have two chances to pass the exam.

We would like to make two changes:

[a.] Change: Allow students to take the examination immediately upon entry to the program, and not count that attempt against the two tries allowed. Rationale: Allow advanced students who enter the program to proceed more immediately to research.

[b.] Change: Divide exam into two pieces and allow separate passage of individual parts. Rationale: Allow advanced students who enter the program with partial mastery of certain areas of physics to proceed more immediately to research. Allow all students better to focus their efforts on areas of weakness when they retake exam for second time.

[2.] Changes to graduate course requirements: The physics department currently prescribes only that graduate students take a core of nine first year courses (or else exhibit equivalent mastery of material through passage of written examination). Change: Require a cluster of between three and eight (depending on subspecialization) advanced courses. Rationale: Ensure uniformity of essential specialized knowledge of students in each subspecialization. Having standardized core of knowledge will allow faculty better to evaluate student performance in oral ('Advancement to Candidacy') exam, and also allow students to have a more precise knowledge of expectations for that exam.
Master’s Degree -- Two master's programs are offered. Plan I requires 30 quarter hours of graduate and upper division courses and a master's thesis. Plan II requires 36 quarter hours of graduate and upper division course work of which at least 18 hours must be at the graduate level and passing a Master's Comprehensive examination. The exam is described in detail later in the text. Both plans require classical physics (200ABC), quantum mechanics (215AB or in unusual cases 115AB if approved by the graduate curriculum committee), mathematical methods (Physics 204AB or either of the two alternatives described under the Ph.D. degree), and statistical mechanics (219A). There is no foreign language requirement for the master's degree.

Ph.D. Degree -- The Doctor of Philosophy degree requires a thorough understanding of the foundations of physics and mathematical methods as evidenced by performance on the preliminary exam and an oral exam and submission of a dissertation which must include an original contribution to fundamental physics. Ph.D. students must also complete the graduate core courses: Physics 200ABC, Physics 215ABC, Physics 219A, and Physics 204AB. By prior approval from the physics graduate curriculum committee, the Physics 204AB requirement may be replaced by (a) Physics 104AB plus Physics 223A or B, or one quarter of an appropriate graduate course in the Mathematics Department; or by (b) two quarters of graduate level mathematics courses. The last option is intended for the exceptionally well prepared student. Ph.D. students must also complete a 'cluster requirement' in their chosen area of specialization. There is no foreign language requirement for the Ph.D. degree.

Beginning in their second or third quarter, students are encouraged to spend some portion of time on research. This research may take the form of 1 or 2 units of 299 under the direction of a faculty member. This does not commit students to a given field of research but is often helpful in making such a choice later on. Quite often, this research has led to a thesis and has greatly accelerated its completion.

Each graduate student selects a course of study in consultation with a graduate adviser. A student with weaknesses in preparation may be advised to audit or take for credit specific advanced undergraduate courses. A typical graduate program for a Ph.D. student with a teaching assistantship and no deficiencies in undergraduate preparation would be as follows:

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Fall Quarter</th>
<th>Winter Quarter</th>
<th>Spring Quarter</th>
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<tbody>
<tr>
<td>Physics 200A</td>
<td>Physics 200B</td>
<td>Physics 200C</td>
</tr>
<tr>
<td>Physics 204A</td>
<td>Physics 204B</td>
<td>Physics 215C</td>
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<tr>
<td>Physics 215A</td>
<td>Physics 215B</td>
<td>Physics 219A</td>
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<td>Physics 290</td>
<td>Physics 290</td>
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<td>Physics 390*</td>
<td>Physics 295</td>
<td>(Physics 299)</td>
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<tr>
<td>Physics 396*</td>
<td>(Physics 299)</td>
<td>Physics 390*</td>
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<td><em>If Teaching Assistant for a lab.</em></td>
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**SECOND YEAR AND BEYOND**

In the second year and subsequent years, students take an appropriate set of 'cluster' courses, based on their expected area of research. These clusters are as follows:

- Condensed Matter Experiment: Phy 240ABC
- Condensed Matter Theory: Phy 219B, 240ABC
- Cosmology/Astrophysics: To be arranged in consultation with adviser.
- Nuclear Experiment: Phy 223B, 224ABC, 230A, 245AC, 252B

**Advanced Courses and Research**

The preliminary exam/Master's Comprehensive exam is given every year in the fall before the start of classes. Normally students are expected to take the preliminary exam at the beginning of their second year. However, students may choose to take the examination immediately upon entrance to the program if they feel that their background is sufficiently strong. This initial attempt is not counted against the total number of times (two) that a student is allowed to take the exam. The exam will cover senior undergraduate and first year graduate level physics. The examination is divided into two parts which may be passed separately: the first day will cover classical mechanics, electricity and magnetism, and mathematical methods. The second day will cover quantum mechanics, statistical mechanics and thermodynamics, modern physics, lab methods and data analysis. A detailed syllabus outlining the material to be covered will be provided during the spring of the year the exam will be taken. Students entering with deficiencies in their undergraduate preparation may receive a one year deferment of the exam. Students whose first time performance on the exam is unsatisfactory can retake the exam, or the appropriate portion thereof, the next year. (The exam is divided in two parts which may be passed separately.)

Students passing the preliminary exam at the Ph.D. level at the beginning of their second year of graduate study must take an oral examination within 15 months; students passing the preliminary exam at the Ph.D. level at the beginning of their third year must take the oral exam during that academic year. The oral exam serves as the Ph.D. Qualifying Examination and is required by the Graduate Division. It may emphasize, but is not restricted to, the candidate's broad field of specialization. After the student has passed the Ph.D. oral exam, a committee will be established to advise and pass on the acceptability of the student's thesis. While there is no formal thesis defense, most students present their thesis work to the department in a specialty seminar or a department colloquium.

It is impossible to predict the length of time needed to complete the requirements for the Ph.D. degree as it varies from student to student. Experience has shown that for students with an adequate preparation a typical time for completion is five and one half years.