Fiscal Unit/Academic Org	Physics - D0684
Administering College/Academic Group	Mathematical And Physical Sci
Co-adminstering College/Academic Group	
Semester Conversion Designation	Converted with minimal changes to program goals and/or curricular requirements (e.g., sub-plan/specialization name changes, changes in electives and/or prerequisites, minimal changes in overall structure of program, minimal or no changes in program goals or content)
Current Program/Plan Name	Physics
Proposed Program/Plan Name	Physics
Program/Plan Code Abbreviation	PHYSICS-PH
Current Degree Title	Doctor of Philosophy

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		120	80.0	80	0.0
Required credit hours offered by the unit	Minimum	62	41.3	33	8.3
	Maximum	66	44.0	34	10.0
Required credit hours offered outside of the unit	Minimum	0	0.0	0	0.0
	Maximum	0	0.0	0	0.0
Required prerequisite credit hours not included above	Minimum	0	0.0	0	0.0
	Maximum	0	0.0	0	0.0

Explain any change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the above table

All of the core courses will be reduced to 3 CR courses (from 5 CR for the old Quantum Mechanics sequence and 4 CR for the other core courses), with some of the less foundational content removed. Under semesters, all graduate students will be required to take all six semester core courses during their first year (exceptions will be considered by petition), so that they will be better positioned to move into research and take advanced courses during their second year. The number of CR and contact hours for each core course was reduced to make it possible for first-year Graduate Teaching Associates to complete all core courses, take the required P6780 and P7891A seminars, fulfill their teaching duties, and to start to get involved in research.

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

Program Learning Goals

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes

Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? No

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Pre-Major

Does this Program have a Pre-Major? No

Attachments

- chairLetter.pdf: Letter from Chair

  (Letter from Program-offering Unit. Owner: Hughes,Richard E)

- PhysicsGradSemesters.pdf: Grad semester program

  (Program Proposal. Owner: Hughes,Richard E)

- PhysicsGradQuarters.pdf: Grad quarter program

  (Other Supporting Documentation. Owner: Hughes,Richard E)

- courseListingAndConversionGrad.pdf: Course conversion map

  (Curricular Map(s). Owner: Hughes,Richard E)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Hughes,Richard E	10/21/2010 11:14 AM	Submitted for Approval
Approved	Hughes,Richard E	10/26/2010 10:39 AM	Unit Approval
Revision Requested	Andereck,Claude David	10/27/2010 02:00 PM	College Approval
Submitted	Hughes,Richard E	11/24/2010 03:46 PM	Submitted for Approval
Approved	Hughes,Richard E	11/24/2010 03:47 PM	Unit Approval
Pending Approval	Andereck,Claude David	11/24/2010 03:47 PM	College Approval

THE OHIO STATE UNIVERSITY

Department of Physics

Office of the Chair
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To: Office of Academic Affairs
From: James J. Beatty, Chair, Department of Physics
Date: October 13, 2010
Re: Semester Program Proposal for Physics Graduate PhD program

The Physics department has the following programs which will be converted from quarters to semesters:
1) The Undergraduate Engineering Physics Major
2) The Undergraduate Physics Major
3) The Undergraduate Physics Minor
4) The Combined Physics BS/MS
5) The Graduate Physics PhD

The subject of this proposal is the Physics Graduate PhD program; the other programs are addressed in separate proposals.

The Graduate Studies Committee of the Department of Physics has worked hard to produce this proposal, describing the conversion of our current Graduate PhD program from the quarter system to the semester system.

The contents of this proposal have been discussed at length in a variety of Graduate Studies Committee meetings as well as faculty meetings through the 2009-2010 academic year. In addition, the Graduate Studies Committee discussed a preliminary version of the proposal with the Physics Graduate Student Council.

Based on their comments, the Graduate Studies Committee revised the proposal and then circulated it to the faculty for review and comments. A vote on the final proposal was taken on June 3, 2010. The outcome of the vote was 18 in favor, 4 opposed, 3 abstained. I strongly endorse this proposal.

Physics Graduate Ph.D. program under quarters

General Information

The program for the Ph.D. degree must lead to mastery at a high level of the fundamental principles of physics and mathematics necessary for productive and creative scholarship in physics. The program is planned by the student and a member of the Graduate Faculty who acts as her/his research advisor so as to meet the student's individual needs and interests. Important aspects of the program include:

Course requirements: The "core course requirement" and "advanced course requirement" are described below.

Research Advisor: The student is encouraged to have chosen a research area of interest within the first year and should choose a research advisor who will serve to guide the student through her/his research project prior to the annual review of the second year. To encourage and facilitate this selection process, all first and second year physics graduate students must find a research advisor (temporary or permanent) and register for at least three credit hours of Physics 816 (Topics in Physics – independent study) or Physics 999 (thesis research) during at least one quarter each academic year. This does not commit the student or advisor to on-going Ph.D. research. First year students typically register for this research during Spring Quarter, prior to the Summer Quarter "Fourth Quarter Research GRA" appointment, which is awarded to all first and second year regular Ph.D. students who are in good standing with the department. The required student time commitment for this research is at the discretion of the research advisor, and should take into account the student's coursework and teaching loads. At a minimum, it should include attending group meetings and reading pertinent literature.

Advisory Committee: Upon satisfying the "core course requirement" and completing at least two of the five required "advanced courses" (see below), the student and the research advisor will select an Advisory Committee consisting of the research advisor, a theorist and an experimentalist within the area of specialization of the advisor, and a fourth member of the graduate physics faculty from outside of the advisor's research area. This Advisory Committee will conduct the annual review for the student throughout the research program. It shall also serve as the Candidacy Exam Committee and (together with the Graduate School Representative) the Dissertation Committee (see below). If any member of the Advisory Committee is unable to fulfill any one of these functions within a reasonable time frame (e.g., because of sabbatical leave or extensive travel), a substitute may be petitioned by the submission of a letter from the student and the advisor to the Graduate Studies Office substantiating the need for a replacement.

Candidacy Examination: The Candidacy Examination is described below.

Annual Review: The Graduate Studies Committee of the department will review the performance of all graduate students annually as discussed below.

Dissertation and Final Oral Examination: The candidate must submit a satisfactory dissertation and pass a Final Oral Examination in order to qualify for the Ph.D. The Final Oral Examination is described below.

Graduate School: The student must fulfill all of the Graduate School requirements. The current requirements and the order in which they must be fulfilled are listed in the Graduate School Handbook.

Foreign language: The Department of Physics does not require a demonstration of competency in a foreign language as a part of the Ph.D. requirement.

Language Requirements: All international students who are not citizens of countries in which English is the official language are required by the Physics Department to be certified in spoken English prior to the end of the third quarter of study, not including Summer Quarter. In addition, the Graduate School requires that English 108.02 (a writing course) or its equivalent be completed within four quarters of entering graduate school.

Academic Requirements

General Requirements: As mentioned above, each student is expected to attain a high level of proficiency in the fundamentals of physics and to acquire a broad education in the principal areas of his/her physics research.

The courses in the curriculum fall into three categories:

- a set of core courses intended to develop the fundamentals of the field,
- a set of advanced courses intended to develop the essentials of the various specialized areas of contemporary physics.

In addition to the formal course requirements, all graduate students in physics are expected to attend the weekly departmental colloquia and seminars on a regular basis.

It is strongly recommended that each student have some teaching experience as part of his or her graduate program.

Each student is expected to begin research as early as possible and should endeavor to decide on an area of specialization during the first year of study and a research advisor prior to the annual review for the second year. In any case the choice of research advisor should be made by the beginning of the third year.

Each student will be expected to proceed to the Ph. D. degree as quickly as is possible under her/his personal circumstances.

Departmental course requirements:

Core Course Requirement:

Except in the special case given below, all graduate students enrolled in the Physics Ph.D. program must take the core courses 827-828-829, 834-835-836, 846-847, and 821 (which are defined as the four sets of courses), at least five advanced courses, and pass the Candidacy Exam within the first three years of entering the program and attain a minimum GPA of B+ (3.30) in the core courses. If a student receives a low grade in any of the core courses, she/he may retake that course only once with the higher score being used to calculate the GPA. If this minimum GPA requirement is not met within the first three years of entering, the student is disqualified from the Ph.D. program.

***Special case--Students entering with a Physics GRE score of 750 or higher and with evidence from their official transcripts that they have successfully taken equivalent graduate courses at their previous institute may request to test out of one or more of the four sets of courses as appropriate to the equivalent courses taken. Exceptions to the 750 score requirement will be considered by petition to the Graduate Studies Committee. The method used for testing out of a course set is at the discretion of the Vice Chair for Graduate Studies and Research.

Advanced Course Requirement:

The advanced graduate course requirement for a Ph.D. is five courses total. The 800-level courses must be chosen from the list of "Advanced Courses" (see below), which are 830, 848, 880.02, 880.05, 880.06, 880.08, and 880.20, and no more than two 780 courses can be used for this requirement (i.e. five 800, four 800 + one 780, and three 800 + two 780 all meet the requirement). Except for those given above, there are no other restrictions on which courses may be taken to satisfy this requirement.

Note that students are encouraged to complete the core course requirements and enough of the advanced course requirement in order and pass the Candidacy Exam before the beginning of their third year. Ph.D. Graduate students are required to complete all course requirements and pass the Candidacy Exam before the beginning of their fourth year.

Core Courses - These courses provide the foundations of the physics program.

P821	Advanced Dynamics
P827-828-829	Quantum Mechanics
P834-835-836	Electromagnetic Field Theory
P846-847	Thermodynamics and Statistical Mechanics

Contemporary Physics Courses (P780 level) - These courses provide a general overview of their respective research fields. Note that 780 courses are required to be taught at an introductory level such that senior undergraduates are qualified to take them.

P780.02	Physics of Elementary Particles
P780.04	Physics of Atoms and Molecules
P780.05	Physics of Nuclei
P780.06	Physics of Condensed Matter
P780.20	Special topics, including Physics Education, Biophysics, Computational Physics, Atomic and Laser Spectroscopy, etc.

In addition, other courses in contemporary physics at the 780 level are offered from time to time. A list of these courses is given online. Courses may be taught only when an adequate number of students enroll for credit in the course.

In order to become familiar with and get involved with the research programs in the department, students are required to enroll in the Seminar "Topics in Physics," Physics 795, during Autumn and Winter Quarters of their first year, and to register for at least three credit hours of 816 (Topics in Physics – independent study) or 999 (thesis research) during at least one quarter during their first and second years. Graduate students who are Graduate Teaching Associates are also required to be enrolled in the Physics 801A seminar in any quarter (excluding summer) during the first year that they are teaching.

Advanced Courses - Several courses which are advanced extensions of the core course sequences are offered on a regular basis given sufficient demand by the students. These include:

P830	Advanced/Many-body quantum theory (one quarter)
P848	Advanced Statistical Physics (one quarter)
P880.02	Elementary Particle Physics (three quarters)
P880.05	Nuclear Physics (three quarters)
P880.06	Condensed Matter Physics (three quarters)
P880.08	Field Theory (three quarters)
P880.20	Special Topics, including Atomic, Molecular and Optical Physics, Non-linear Physics, Group Theory, Spectroscopy, General Relativity, Physics Education, Cosmology, Particles and the Early Universe, Nuclear Astrophysics, etc.

The “Special Topics” advanced courses are offered on an irregular basis.

With the approval of her/his Advisory Committee, a student may **substitute** two courses from any other department for two in Physics in satisfying the advanced course requirement.

Colloquia and Seminars - Colloquia and special seminars provide an important opportunity for the faculty and students in the department to be introduced to research programs underway in the

department as well as to hear reports from scientists from throughout the U.S. and other parts of the world. Attendance at the weekly departmental colloquia on a regular basis is expected of all graduate students. For students who have selected an area in which to do their research, or are in the process of making such a choice, attendance at the special seminars in that area provides an important means of becoming acquainted with the frontiers of the field. All students are strongly advised to attend the special seminars in their chosen research area.

Rationale for Changes to the Ph.D. Program from quarters to semesters

Overall, there are minimal changes in course content requirements, but there are some changes in how and when graduate students will take required courses. The main changes are:

(1) The content of the three-quarter Electromagnetic Field Theory core-course sequence was split into two parts: one which focuses on the analytical and computation techniques necessary understand and apply the fundamental content of Electromagnetic Field theory, and one which contains the main physics content of the previous sequence. The separated analytical and computation techniques will be combined with other techniques necessary for the other core courses, and put into a one semester course Physics 7701 (Analytic and Numeric Methods of Physics). This course is similar to the old quarter-based course Physics 730 (Methods of Theoretical Physics), but has expanded content and will be taught at a more advanced level. The main physics content of the old Electromagnetic Field Theory sequence will be put into a one-semester course P7401 with the same name.

(2) All of the graduate core courses are reduced to 3 CR courses (from 5 CR for the old Quantum Mechanics sequence and 4 CR for the other core courses), with some of the less foundational content removed. Under semesters, all graduate students will be required to take all six graduate core courses during their first year (exceptions will be considered by petition), so that they will be better positioned to move into research and take advanced courses during their second year. The number of CR and contact hours for each core course is reduced to make it possible for first-year Graduate Teaching Associates to complete all these core courses, take the required Physics 6780 and Physics 7891A seminars, fulfill their teaching duties, and to start to get involved in research.

Physics Graduate Ph.D. program under semesters

General Information

The program for the Ph.D. degree must lead to mastery at a high level of the fundamental principles of physics and mathematics necessary for productive and creative scholarship in physics. The program is planned by the student and a member of the Graduate Faculty who acts as her/his research advisor so as to meet the student's individual needs and interests. Important aspects of the program include:

Course requirements: The “core course requirement” and “advanced course requirement” are described below.

Research Advisor: The student is encouraged to have chosen a research area of interest within the first year and should choose a research advisor who will serve to guide the student through her/his research project prior to the annual review of the second year. To encourage and facilitate

this selection process, all first and second year physics graduate students must find a research advisor (temporary or permanent) and register for at least two credit hours of Physics 7998 (Graduate Research) or Physics 8999 (Graduate Thesis Research) during at least one semester each academic year. This does not commit the student or advisor to on-going Ph.D. research. First year students typically register for this research during Spring Semester, prior to the Summer Term "Summer GRA" appointment, which is awarded to all first and second year regular Ph.D. students who are in good standing with the department. The required student time commitment for this research is at the discretion of the research advisor, and should take into account the student's coursework and teaching loads. At a minimum, it should include attending group meetings and reading pertinent literature.

Advisory Committee: Upon satisfying the "core course requirement" and completing at least two of the three required "advanced courses" (see below), the student and the research advisor will select an Advisory Committee consisting of the research advisor, a theorist and an experimentalist within the area of specialization of the advisor, and a fourth member of the graduate physics faculty from outside of the advisor's research area. This Advisory Committee will conduct the annual review for the student throughout the research program. It shall also serve as the Candidacy Exam Committee and (together with the Graduate School Representative) the Dissertation Committee (see below). If any member of the Advisory Committee is unable to fulfill any one of these functions within a reasonable time frame (e.g., because of sabbatical leave or extensive travel), a substitute may be petitioned by the submission of a letter from the student and the advisor to the Graduate Studies Office substantiating the need for a replacement

Candidacy Examination: The Candidacy Examination is described below.

Annual Review: The Graduate Studies Committee of the department will review the performance of all graduate students annually as discussed below.

Dissertation and Final Oral Examination: The candidate must submit a satisfactory dissertation and pass a Final Oral Examination in order to qualify for the Ph.D. The Final Oral Examination is described below.

Graduate School: The student must fulfill all of the Graduate School requirements. The current requirements and the order in which they must be fulfilled are listed in the Graduate School Handbook.

Foreign language: The Department of Physics does not require a demonstration of competency in a foreign language as a part of the Ph.D. requirement.

Language Requirements: All international students who are not citizens of countries in which English is the official language are required by the Physics Department to be certified in spoken English prior to the end of the second semester of study, not including Summer Term. In

addition, the Graduate School requires that English XXXX (a writing course) or its equivalent be completed within one year of entering graduate school.

Academic Requirements

General Requirements: As mentioned above, each student is expected to attain a high level of proficiency in the fundamentals of physics and to acquire a broad education in the principal areas of his/her physics research.

The courses in the curriculum fall into three categories:

- a set of core courses intended to develop the fundamentals of the field
- a set of graduate introductory courses which provide a general overview of various active research fields in Physics
- a set of advanced courses intended to develop the essentials of the various specialized areas of contemporary physics.

In addition to the formal course requirements, all graduate students in physics are expected to attend the weekly departmental colloquia and seminars on a regular basis.

It is strongly recommended that each student have some teaching experience as part of his or her graduate program.

Each student is expected to begin research as early as possible and should endeavor to decide on an area of specialization during the first year of study and a research advisor prior to the annual review for the second year. In any case the choice of research advisor should be made by the beginning of the third year.

Each student will be expected to proceed to the Ph. D. degree as quickly as is possible under her/ his personal circumstances.

Departmental course requirements:

Except in the special case given below, all graduate students enrolled in the Physics Ph.D. program must take the six core courses; at least three non-core graduate courses, and pass the Candidacy Exam within the first three years of entering the program and attain a minimum GPA of B+ (3.30) in the core courses. If a student receives a low grade in any of the core courses, she/ he may retake that course only once with the higher score being used to calculate the GPA. If this minimum GPA requirement is not met within the first three years of entering, the student is disqualified from the Ph.D. program.

Core Course Requirement:

Except in the special case given below, all graduate students enrolled in the Physics Ph.D. program must take the six core courses 7401, 7501, 7502, 7601, 7602, and 7701.

***Special case--Students entering with a Physics GRE score of 750 or higher and with evidence from their official transcripts that they have successfully taken equivalent graduate courses at their previous institute may request to test out of one or more of the four sets of courses as appropriate to the equivalent courses taken. Exceptions to the 750 score requirement will be considered by petition to the Graduate Studies Committee. The method used for testing out of a course set is at the discretion of the Vice Chair for Graduate Studies and Research.

Non-Core Course Requirement:

All graduate students seeking a Ph.D. must also take three (non-core) courses total at the 6800-level or above. Two of the courses must be chosen from the list of "Advanced Courses" (see below), which are 7503, 7603, 8301, 8802.1, 8802.2, 8803.1, 8803.2, 8804.1, 8804.2, 8805.1, 8805.2, 8806.1, 8806.2, 8808.1, 8808.2, 8809.1, and 8809.2, and no more than one 6800-level courses can be used for this requirement (i.e. three 8000, or two 8000 + one 6800, both meet the requirement). Except for those given above, there are no other restrictions on which courses may be taken to satisfy this requirement.

Note that students are encouraged to complete the core course requirements and enough of the advanced course requirement in order and pass the Candidacy Exam before the beginning of their third year. Ph.D. Graduate students are required to complete all course requirements and pass the Candidacy Exam before the beginning of their fourth year.

Graduate Core Courses - These courses provide the foundations of the physics program.

P7401	Electromagnetic Field Theory
P7501-7502	Quantum Mechanics 1 - 2
P7601-7602	Classical and Statistical Physics 1 - 2
P7701	Analytic and Numeric methods of Physics

Graduate Introductory Physics Courses (P6800 level) - These courses provide a general overview of their respective research fields. Note that 6800-level courses are taught at an introductory level such that qualified senior undergraduates are able to take them.

P6802	Topics in Elementary Particle Physics
P6803	Topics in Astroparticle Physics
P6804	Topics in Atomic and Molecular Physics
P6805	Topics in Nuclear Physics
P6806	Topics in Condensed Matter Physics

P6809	Topics in Biophysics
P6810	Topics in Condensed Matter Physics
P6820	Special topics, including Physics Education Research, Physics of Semiconductors, Surface Science, General Relativity, etc.

In addition, other courses in contemporary physics at the 6800 level are offered from time to time. A list of these courses is given online. Courses may be taught only when an adequate number of students enroll for credit in the course.

In order to become familiar with and get involved with the research programs in the department, students are required to enroll in the Seminar " Special Topics Seminar," Physics 6780, during Autumn and Spring Semesters of their first year, and to register for at least two credit hours of Physics 7998 (Graduate Research) or Physics 8999 (Graduate Thesis Research) during at least one semester each academic year during their first two years.

Graduate Advanced Courses - Several courses which are advanced extensions of the core course sequences are offered on a regular basis given sufficient demand by the students. These include:

P7503	Quantum Mechanics 3
P7603	Advanced Statistical Physics
P8301	Elasticity and Fluid Mechanics
P8802.1, P8802.2	Topics in Elementary Particle Physics 1 - 2
P8803.1, P8803.2	Topics in Astroparticle Physics 1 - 2
P8804.1, P8804.2	Topics in Atomic and Molecular Physics 1 - 2
P8805.1, P8805.2	Topics in Nuclear Physics 1 - 2
P8806.1, P8806.2	Topics in Condensed Matter Physics 1 - 2
P8808.1, P8808.2	Topics in the theory of Quantized Fields 1 - 2
P8809.1, P8809.2	Topics in Biophysics 1 - 2
P8820	Special topics, including Non-linear Physics, Group Theory, Spectroscopy, General Relativity, Cosmology, Nuclear Astrophysics, Physics Education Research, Advanced Computational Physics, etc.

The “Special Topics” and some of the other advanced courses are offered on an irregular basis.

With the approval of her/his Advisory Committee, a student may **substitute** one course from any other department for one in Physics in satisfying the advanced course requirement.

Colloquia and Seminars - Colloquia and special seminars provide an important opportunity for the faculty and students in the department to be introduced to research programs underway in the department as well as to hear reports from scientists from throughout the U.S. and other parts of the world. Attendance at the weekly departmental colloquia on a regular basis is expected of all

graduate students. For students who have selected an area in which to do their research, or are in the process of making such a choice, attendance at the special seminars in that area provides an important means of becoming acquainted with the frontiers of the field. All students are strongly advised to attend the special seminars in their chosen research area.

Sample Plan

Year 1 (total hours: 31)

Autumn	Spring	May	Summer
Physics 7701 (3)	Physics 7702 (3)	Physics 7998 or 8999(6)	Physics 7998 or 8999(6)
Physics 7501 (3)	Physics 7502 (3)		
Physics 7601 (3)	Physics 7602 (3)		
Physics 6780 (1)	Physics 6780 (1)		
Physics 7891 (1)	Physics 7891 (1)		

Year 2 (total hours 32-33)

Autumn	Spring	May	Summer
Physics 68xx or 88xx (4 or 3)	Physics 88xx (3)	Physics 7998 or 8999(3)	Physics 7998 or 8999(6)
Physics 88xx (3)	Physics 7998 or 8999(8)		Candidacy Exam
Physics 7998 or 8999(6)			

Years 3 till completion (total hours 12/year)

Autumn	Spring	May	Summer
Physics 8999 (3)	Physics 8999 (3)	Physics 8999 (3)	Physics 8999 (3)

Semester Course Number	Course Title	Semester Units		Quarter Equivalent Course Number	Quarter Credits	Notes
Combined Undergrad/Grad Level Courses						
Physics 5400/5400H	E&M I	4		Physics 555	4	Semester course has all of 555 and some of 656
				Physics 656	4	
Physics 5500/5500H	Quantum I	4		Physics 631	4	Semester course has all of 631 and some of 632
				Physics 632	4	
Physics 5700	Advanced Laboratory	3		Physics 616	4	Same content
Physics 5401H	E&M II	4		Physics 656	4	Semester course has some of 656 and all of 657
				Physics 657	4	
Physics 5501H	Quantum II	4		Physics 632	4	Semester course has some of 632 and all of 633
				Physics 633	4	
Physics 5600	Statistical Physics	4		Physics 621	4	Semester course has all of 621 and some of 622
				Physics 622	4	
Physics 5300	Theoretical Mechanics	4		Physics 664	4	Enhanced content
Graduate Introductory						
Physics 6802	Topics in Elementary Particle Physics	4		Physics 780.xx	4	Enhanced content
Physics 6803	Topics in Astroparticle Physics	4		Physics 780.xx	4	Enhanced content
Physics 6804	Topics in Atomic and Molecular Physics	4		Physics 780.xx	4	Enhanced content
Physics 6805	Topics in Nuclear Physics	4		Physics 780.xx	4	Enhanced content
Physics 6806	Topics in Condensed Matter Physics	4		Physics 780.xx	4	Enhanced content
Physics 6809	Topics in Biophysics	4		Physics 780.xx	4	Enhanced content
Physics 6810	Topics in Computational Physics	4		Physics 780.xx	4	Enhanced content
Physics 6820	Special Topics	4		Physics 780.xx	4	Enhanced content
Physics 6780	Special Topics Seminar	1		Physics 795	1	Same content

Semester Course Number	Course Title	Semester Units		Quarter Equivalent Course Number	Quarter Credits	Notes
Graduate Core						
7701	Analytic and Numeric methods of Physics	3.00		Physics 730	4	Semester course has some of 730 and some of 834
				Physics 834	4	
7401	Electromagnetic Field Theory	3.00		Physics 835	4	Semester course has some of 835 and some of 836
				Physics 836	4	
7501	Quantum Mechanics 1	3.00		Physics 827	5	Semester course has some of 827 and some of 828
				Physics 828	5	
7502	Quantum Mechanics 2	3.00		Physics 828	5	Semester course has some of 828 and some of 829
				Physics 829	5	
7601	Classical and Statistical Physics I	3.00		Physics 821	4	Semester course has all of 821 and some of 846
				Physics 846	4	
7602	Classical and Statistical Physics II	3.00		Physics 846	4	Semester course has some of 846 and some of 847
				Physics 847	4	
Graduate Advanced						
7503	Quantum Mechanics 3	3.00		Physics 830	4	Enhanced content
7603	Advanced Statistical Physics	3.00		Physics 848	4	Enhanced content
7891	Departmental Seminar or Workshop	Variable		Physics 816	Variable	Semester version
7998	Graduate Research	Variable		Physics 816	Variable	Semester version
8301	Elasticity and Fluid Mechanics	3.00		Physics 822	4	Content of 822
8802.1	Topics in Elementary Particle Physics 1	3.00		Physics 880.02	3	Enhanced content
8802.2	Topics in Elementary Particle Physics 2	3.00		Physics 880.02	3	Enhanced content
8803.1	Topics in Astroparticle Physics 1	3.00		Physics 880.20	3	Enhanced content

Semester Course Number	Course Title	Semester Units		Quarter Equivalent Course Number	Quarter Credits	Notes
8803.2	Topics in Astroparticle Physics 2	3.00		Physics 880.20	3	Enhanced content
8804.1	Topics in Atomic and Molecular Physics 1	3.00		Physics 880.20	3	Enhanced content
8804.2	Topics in Atomic and Molecular Physics 2	3.00		Physics 880.20	3	Enhanced content
8805.1	Topics in Nuclear Physics	3.00		Physics 880.05	3	Enhanced content
8805.2	Topics in Nuclear Physics	3.00		Physics 880.05	3	Enhanced content
8806.1	Topics in Condensed Matter Physics 1	3.00		Physics 880.06	3	Enhanced content
8806.2	Topics in Condensed Matter Physics 2	3.00		Physics 880.06	3	Enhanced content
8808.1	Topics in the theory of Quantized Fields 1	3.00		Physics 880.08	3	Enhanced content
8808.2	Topics in the theory of Quantized Fields 2	3.00		Physics 880.08	3	Enhanced content
8809.1	Topics in Biophysics	3.00		Physics 880.20	3	Enhanced content
8809.2	Topics in Biophysics	3.00		Physics 880.20	3	Enhanced content
8820	Special Topics	3.00		Physics 880.20	3	Enhanced content
8999	Research in Physics	Variable		Physics 999	Variable	Semester version