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|--|--|
| Fiscal Unit/Academic Org | Physics - D0684 |
| Administering College/Academic Group | Mathematical And Physical Sci |
| Co-administering 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 Minor |
| Proposed Program/Plan Name | Physics Minor |
| Program/Plan Code Abbreviation | PHYSICS-MN |
| Current Degree Title | |

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 | | 21 | 14.0 | 14 | 0.0 |
| Required credit hours offered by the unit | Minimum | 21 | 14.0 | 14 | 0.0 |
| | Maximum | 21 | 14.0 | 16 | 2.0 |
| 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 | 34 | 22.7 | 20 | 2.7 |
| | Maximum | 41 | 27.3 | 29 | 1.7 |

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

- Undergraduate Physics minors acquire training in fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity.
- Undergraduate Physics minors acquire analytical and problem solving skills in areas involving both physics and mathematics.
- Undergraduate Physics minors acquire a basic mastery of experimental physics at the intermediate level.
- Undergraduate Physics minors acquire training in at least one area of physics at the intermediate level or beyond.

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? 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

- Dept chair Physics Minor cover letter.pdf: Dept Chair Cover letter
(Letter from Program-offering Unit. Owner: Vankeerbergen, Bernadette Chantal)
- CCI subcommittee Cover Letter for Physics minor.doc: CCI Subcommittee Chair letter
(Other Supporting Documentation. Owner: Vankeerbergen, Bernadette Chantal)
- minorProposal_Feb015.pdf: proposal
(Program Proposal. Owner: Hughes, Richard E)
- Physics minor cover letter.doc: NMS Division of Arts and Sciences cover letter
(Letter from the College to OAA. Owner: Andereck, Claude David)

Comments

Workflow Information

| Status | User(s) | Date/Time | Step |
|--------------------|---|---------------------|------------------------|
| Submitted | Hughes, Richard E | 10/12/2010 09:31 PM | Submitted for Approval |
| Revision Requested | Hughes, Richard E | 10/21/2010 11:09 AM | Unit Approval |
| Submitted | Hughes, Richard E | 10/21/2010 11:13 AM | Submitted for Approval |
| Approved | Hughes, Richard E | 10/26/2010 10:36 AM | Unit Approval |
| Approved | Andereck, Claude David | 10/28/2010 11:04 AM | College Approval |
| Revision Requested | Vankeerbergen, Bernadette Chantal | 12/10/2010 12:33 PM | ASCCAO Approval |
| Submitted | Hughes, Richard E | 01/19/2011 01:09 PM | Submitted for Approval |
| Approved | Hughes, Richard E | 01/26/2011 01:07 PM | Unit Approval |
| Revision Requested | Andereck, Claude David | 02/01/2011 03:03 PM | College Approval |
| Submitted | Hughes, Richard E | 02/01/2011 04:50 PM | Submitted for Approval |
| Approved | Hughes, Richard E | 02/09/2011 10:41 AM | Unit Approval |
| Revision Requested | Andereck, Claude David | 02/14/2011 11:31 AM | College Approval |
| Submitted | Hughes, Richard E | 02/15/2011 05:24 AM | Submitted for Approval |
| Approved | Hughes, Richard E | 02/15/2011 05:25 AM | Unit Approval |
| Approved | Andereck, Claude David | 02/15/2011 10:44 AM | College Approval |
| Pending Approval | Nolen, Dawn Jenkins, Mary Ellen Bigler Meyers, Catherine Anne Vankeerbergen, Bernadette Chantal Hanlin, Deborah Kay | 02/15/2011 10:44 AM | ASCCAO Approval |

Division of Natural and Mathematical Sciences

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February 15, 2011

Larry Krissek
Chair, Arts and Sciences CCI

Dear Larry:

It is a pleasure to forward to you the proposal for the minor in Physics under semesters. The minor has been minimally modified from its present quarter version mainly by the splitting of upper division courses in quantum mechanics and electromagnetic field theory into honors and non-honors versions to better meet the needs of the students. It is a solid proposal, well conceived.

Beyond my own review of the documents, the proposal has been discussed by colleagues from other NMS units at a meeting on October 20, 2010. Feedback from these discussions and from the Science Subcommittee of CCI, as well as from CCI itself, has been incorporated in the proposal.

If you have any questions, I would be happy to address them.

Sincerely,



David Andereck
Professor of Physics
Associate Dean of Natural and Mathematical Sciences, College of Arts and Sciences



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November 16, 2010

Professor Larry Krissek
Chair, Arts and Sciences CCI
Re: Physics Minor

Dear Professor Krissek:

At the CCI's Sciences Subcommittee meeting of November 10, 2010 the semester conversion plan for the Physics minor was reviewed. The subcommittee thought the conversion plan was straightforward and well done. The plan was unanimously approved and it is being submitted for the next step in the approval process.

Sincerely,

A handwritten signature in black ink that reads "Gene E. Mummy".


Gene E. Mummy
Acting Subcommittee Chair for Nov. 10
Associate Dean of Arts and Sciences/Social and Behavioral Sciences



Department of Physics

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191 West Woodruff Avenue
Columbus, OH 43210-1117

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To: Office of Academic Affairs
From: James J. Beatty, Chair, Department of Physics 
Date: October 12, 2010
Re: Semester Program Proposal for Undergraduate Physics Minor

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 Undergraduate Physics Minor; the other programs will be addressed in separate proposals.

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

The contents of this proposal were discussed at length in a variety of Undergraduate Studies Committee meeting as well as faculty meetings through the 2009-2010 academic year. A preliminary version of the proposal was presented and discussed in a "Town Meeting" with undergraduate Physics and Engineering Physics majors on April 15, 2010. Based on their comments, a revised proposal was unanimously approved in a meeting of the Undergraduate Studies Committee on April 20, 2010. This version was then circulated for faculty review and comments, with a vote on the proposal completed on April 30. The outcome of the vote was 44 in favor, 0 opposed.

Rationale for Changes to the Undergraduate Physics Minor Program

There are no significant changes to the Physics Minor program.

The date of the last significant revision to the Physics Minor program was in 1998.

Course Listing and Curriculum Map for the Physics Minor

| Requirements | Semester Course Number | Course Title | Semester Units | Quarter Equivalent Course Number | Quarter Credits | Notes | Relevant Learning Goals Achieved (see below) |
|--|------------------------|------------------------------------|----------------|----------------------------------|-----------------|--|--|
| Required Prerequisite Courses | | | | | | | |
| Introductory Physics | Physics 1250/1250H | Mechanics, Thermal Physics, Waves | 5 | Physics 131/131H | 5 | Semester sequence has same content as quarter sequence | 1a,2a |
| | Physics 1251/1251H | E&M, Optics, Modern Physics | 5 | Physics 132/132H | 5 | | |
| | | | | Physics 133/133H | 5 | | |
| Introductory Math | Math 1151 | Calc I | 5 | Math 151 | 5 | Semester sequence has same content as quarter sequence | 2a |
| | Math 1152 | Calc II | 5 | Math 152 | 5 | | |
| | | | | Math 153 | 5 | | |
| Possible Prerequisite Courses Outside of Physics | | | | | | | |
| Possible prerequisites, depending on courses in the Physics core below which are chosen. | Math 2153 | CalcIII | 4 | Math 254 | 5 | Content of current 254 | 2b |
| | Math 2174 | LinAlg/DiffEq | 3 | Math 415 | 4 | Merges 415 and 568 (topics still under discussion) | 2b |
| | | | | Math 568 | 3 | | |
| | CSE 1222 | Intro to C++ | 2 | CSE 202 | 4 | Same content | 3a |
| Note: Suitable honors and/or advanced versions of all above prerequisite courses are allowed as substitutions. | | | | | | | |
| Physics Courses Required for the Physics Minor | | | | | | | |
| Intermediate | Physics 2095 | Introductory Seminar | 1 | Physics 295 | 1 | Same Content | 4a |
| | Physics 2300 | Dynamics of Particles and Waves I | 4 | Physics 261 | 4 | Semester course has all of 261 and some of 262 | 1b,2b,4b |
| Physics Courses Which Could be taken to Satisfy the Physics Minor | | | | | | | |
| Intermediate | Physics 2301 | Dynamics of Particles and Waves II | 4 | Physics 262 | 4 | Semester course has some of 262 and all of 263 | 1b,2b,4b |
| | | | | | | | |
| Upper Division | Physics 5400/5400H | E&M I | 4 | Physics 555 | 4 | Semester course has all of 555 and some of 656 | 1c,2c,4c |
| | | | | 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 Labs Core | Physics 3700 | Methods in Experimental Physics | 3 | Physics 416 | 4 | Same content | 3a |
| | Physics 4700 | Intro Electronics for Physicists | 3 | Physics 517 | 4 | Same content | 3b |
| | Physics 5700 | Advanced Laboratory | 3 | Physics 616 | 4 | Same content | 3c |
| | Physics 3455H | Honors Holography | 3 | Physics H455 | 4 | Same content | 3b |
| Physics Electives: | | | | | | | |
| | Physics 3470 | Optics | 3 | Physics 570 | 4 | Same content | 4b |
| | Physics 5401H | E&M II | 4 | Physics 656 | 4 | Semester course has some of 656 and all of 657 | 1c,2c,4c |
| | | | | Physics 657 | 4 | | |
| | Physics 5501H | Quantum II | 4 | Physics 632 | 4 | Semester course has some of 632 and all of 633 | 1c,2c,4c |
| | | | | Physics 633 | 4 | | |
| | Physics 5600 | Statistical Physics | 4 | Physics 621 | 4 | Semester course has all of 621 and some of 622 | 1c,2c,4c |
| | | | | Physics 622 | 4 | | |

Course Listing and Curriculum Map for the Physics Minor

| Requirements | Semester Course Number | Course Title | Semester Units | Quarter Equivalent Course Number | Quarter Credits | Notes | Relevant Learning Goals Achieved (see below) |
|---------------------------------------|----------------------------|---|----------------|----------------------------------|-----------------|------------------|--|
| | Physics 5300 | Theoretical Mechanics | 4 | Physics 664 | 4 | Enhanced content | 1c,2c,4c |
| | Physics 6802 | Topics in Elementary Particle Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6803 | Topics in Astroparticle Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6804 | Topics in Atomic and Molecular Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| Physics Electives (continued): | Physics 6805 | Topics in Nuclear Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6806 | Topics in Condensed Matter Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6809 | Topics in Biophysics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6810 | Topics in Computational Physics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | Physics 6820 | Special Topics | 4 | Physics 780.xx | 4 | Enhanced content | 4c |
| | | | | | | | |
| | | | | | | | |
| Learning Goal | 1 | Undergraduate Physics minors acquire training in the fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity. | | | | | |
| | 2 | Undergraduate Physics minors acquire analytical and problem solving techniques in areas involving both physics and mathematics. | | | | | |
| | 3 | Undergraduate Physics minors acquire a basic mastery of experimental physics at the intermediate level. | | | | | |
| | 4 | Undergraduate Physics minors acquire training in at least one area of physics at the intermediate level or beyond. | | | | | |
| | Learning Goal Level | a: Beginning; b: Intermediate; c: Advanced | | | | | |

Semester Advising Form

| Physics Minor Form | | | | | |
|---|----------------|--------------|---------------------------------------|----------|--|
| Last name: | | | | Address | |
| First Name: | | | | City | |
| Middle: | | | | Zip Code | |
| OSU ID | | | | | |
| lastname.# | | | | | |
| Expected graduation | | (quarter) | | (year) | |
| INSTRUCTIONS: Put grade next to appropriate course. Current semester courses should be listed as "IP" below. | | | | | |
| Required Prereqs (see note below) | | | Signature of advisor _____ Date _____ | | |
| Course | Credits | Grade | | | |
| Physics 1250 | 5 | | | | |
| Physics 1251 | 5 | | | | |
| Math 1151 | 5 | | | | |
| Math 1152 | 5 | | | | |
| | | | | | |
| Possible Prereqs (see note below) | | | | | |
| Course | Credits | Grade | | | |
| CSE 1222 | 2 | | | | |
| Math 2153 | 4 | | | | |
| Math 2174 | 3 | | | | |
| | | | | | |
| Required Physics | | | | | |
| Course | Credits | Grade | | | |
| 2095 | 1 | | | | |
| 2300 | 4 | | | | |
| | | | | | |
| | | | | | |
| Take 3 of the following courses, with at least 1 from the list of courses marked * | | | | | |
| Course | Credits | Grade | | | |
| Physics 3700 * | 3 | | | | |
| Physics 4700 * | 3 | | | | |
| Physics 5700 * | 3 | | | | |
| Physics 2301 | 4 | | | | |
| Physics 5400 | 4 | | | | |
| Physics H5401 | 4 | | | | |
| Physics 5500 | 4 | | | | |
| Physics H5501 | 4 | | | | |
| Physics 5300 | 4 | | | | |
| Physics 5600 | 4 | | | | |
| Physics 3470 | 4 | | | | |
| Physics H3455 | 4 | | | | |
| Physics 68xx | 4 | | | | |
| | | | | | |
| Note: Suitable honors and/or advanced versions of prerequisite courses are allowed as substitutions. Note the substitution in place of the listed course and have the advisor initial the substitution. | | | | | |

Quarter Advising Sheet

| Physics Minor Form | | | | | | |
|---|---------|-----------|---------------------------------------|----------|--|--|
| Last name: | | | | Address | | |
| First Name: | | | | City | | |
| Middle: | | | | Zip Code | | |
| OSU ID | | | | | | |
| lastname.# | | | | | | |
| Expected graduation | | (quarter) | | (year) | | |
| INSTRUCTIONS: Put grade next to appropriate course. Current quarter courses should be listed as "IP" below. | | | | | | |
| Required Prereqs | | | Signature of advisor _____ Date _____ | | | |
| Course | Credits | Grade | | | | |
| Physics 131 | 5 | | | | | |
| Physics 132 | 5 | | | | | |
| Physics 133 | 5 | | | | | |
| Math 151 | 5 | | | | | |
| Math 152 | 5 | | | | | |
| Math 153 | 5 | | | | | |
| CSE 202 | 4 | | | | | |
| Possible Prereqs | | | | | | |
| Course | Credits | Grade | | | | |
| Math 254 | 5 | | | | | |
| Math 415 | 4 | | | | | |
| Math 513 | 3 | | | | | |
| Required Physics | | | | | | |
| Course | Credits | Grade | | | | |
| Physics 295 | 1 | | | | | |
| Physics 261 | 4 | | | | | |
| Physics 416 | 4 | | | | | |
| Take at least 12 credit hours from the following list of courses: | | | | | | |
| Course | Credits | Grade | | | | |
| Physics 262 | 4 | | | | | |
| Physics 263 | 4 | | | | | |
| Physics 517 | 4 | | | | | |
| Physics 555 | 4 | | | | | |
| Physics 656 | 4 | | | | | |
| Physics 657 | 4 | | | | | |
| Physics 621 | 4 | | | | | |
| Physics 631 | 4 | | | | | |
| Physics 632 | 4 | | | | | |
| Physics 633 | 4 | | | | | |
| Physics 664 | 4 | | | | | |
| Physics H455 | 4 | | | | | |
| Physics 570 | 4 | | | | | |

Transition policy for the Physics Minor

Students who began their degree under quarters will not be penalized as we move to semesters, either in terms of progress towards their degree or their expected date of graduation. Transition plans are currently being developed for students who will be at a variety of different stages (one year towards degree, two years, etc.). We do not at present see a need for bridge courses in Physics for any students who are beyond the introductory (i.e. first year) Physics classes. However, bridge courses (1-2 credit semester hours) in Mathematical Methods in Physics are being considered for Physics majors who may be somewhat behind in math preparation due to the transition. Bridge courses will be available for students who have completed part of the 3-quarter introductory sequence in either of our service courses in Physics (i.e Physics 111-2-3 or 131-2-3). The bridge courses will be offered during the summer prior and first year after the transition. They may be offered the 2nd year after the transition.

To address the details of how students who have credits under both semesters and quarters will graduate, we have implemented a “Quarters to Semesters Transition Advising Worksheet”, which will be filled out for any physics major who will graduate with physics courses accumulated under both quarters and semesters.. The basic strategy is to combine credit hours accumulated under quarters, semesters, or both, in broad categories. The credit hours under quarters are weighted by 0.67, summed with semester hours for that same category, and compared to a minimum for that category. In addition, minima are defined for overall hours summed among groups of categories. The minima are chosen so that students are not penalized for course sequences taken partially under quarters and completed under semesters, while ensuring that the requirements of the program are still met. This worksheet will be filled out for every Physics Minor as part of the requirements for Physics 295 (or Physics 2095 under semesters), a course all Physics minors take. Students who are in Physics 295 in Autumn 2010 are the first group of students expected to graduate under semesters.

Semester Transition worksheet for the Physics Minor.

The following courses are prerequisites to the Physics courses required under the minor.
Note which course was taken and the grade received.

| Course | Credits | Grade | Course | Credits | Grade |
|-------------|---------|-------|--------------|---------|-------|
| Physics 131 | 5 | | Physics 1250 | 5 | |
| Physics 132 | 5 | | Physics 1251 | 5 | |
| Physics 133 | 5 | | | | |
| Math 151 | 5 | | Math 1151 | 5 | |
| Math 152 | 5 | | Math 1152 | 5 | |
| Math 153 | 5 | | | | |
| | | | | | |

The following courses are possible prerequisites to the elective Physics courses taken for the minor. Note which course was taken and the grade received.

| Course | Credits | Grade | Course | Credits | Grade |
|----------|---------|-------|-----------|---------|-------|
| Math 254 | 5 | | Math 2153 | 4 | |
| Math 415 | 4 | | Math 2174 | 3 | |
| Math 513 | 3 | | | | |
| CSE 202 | 4 | | CSE 1222 | 2 | |
| | | | | | |

Both courses below must be taken, but can be taken under either quarters or semesters.

| Course | Credits | Grade | Course | Credits | Grade |
|-------------|---------|-------|--------|---------|-------|
| Physics 295 | 1 | | 2095 | 1 | |
| Physics 261 | 4 | | 2300 | 4 | |
| | | | | | |

At least 3 courses must be taken under either quarters or semesters, with at least one of the courses chosen from those marked with a *.

| Course | Credits | Grade | Course | Credits | Grade |
|----------------|---------|-------|---------------|---------|-------|
| *Physics 416 | 4 | | *Physics 3700 | 3 | |
| Physics 517 | 4 | | *Physics 4700 | 3 | |
| Physics 616 | 4 | | *Physics 5700 | 3 | |
| Physics 262 | 4 | | Physics 2301 | 4 | |
| Physics 263 | 4 | | Physics 5400 | 4 | |
| Physics 517 | 4 | | Physics H5401 | 4 | |
| Physics 555 | 4 | | Physics 5500 | 4 | |
| Physics 570 | 4 | | Physics H5501 | 4 | |
| Physics 656 | 4 | | Physics 5300 | 4 | |
| Physics 657 | 4 | | Physics 5600 | 4 | |
| Physics 621 | 4 | | Physics 3470 | 4 | |
| Physics 631 | 4 | | Physics H3455 | 4 | |
| Physics 632 | 4 | | Physics 68xx | 4 | |
| Physics 633 | 4 | | | | |
| Physics 664 | 4 | | | | |
| Physics H455 | 4 | | | | |
| Physics 780.xx | 4 | | | | |