

<b>Fiscal Unit/Academic Org</b>	Physics - D0684
<b>Administering College/Academic Group</b>	Mathematical And Physical Sci
<b>Co-administering College/Academic Group</b>	
<b>Semester Conversion Designation</b>	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)
<b>Current Program/Plan Name</b>	Physics
<b>Proposed Program/Plan Name</b>	Physics
<b>Program/Plan Code Abbreviation</b>	PHYSICS-BS
<b>Current Degree Title</b>	Bachelor of Science

## 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		51	34.0	36	2.0
Required credit hours offered by the unit	Minimum	36	24.0	29	5.0
	Maximum	64	42.7	42	0.7
Required credit hours offered outside of the unit	Minimum	3	2.0	0	2.0
	Maximum	18	12.0	15	3.0
Required prerequisite credit hours not included above	Minimum	46	30.7	30	0.7
	Maximum	71	47.3	48	0.7

### 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

We have 4 different specializations which have differing requirements in the various rows of the above table. To make things more clear, we have attached copies of the above table for each of the 4 specializations.

Inspecting these tables, changes of more than 4 credit hours occur in two of the specializations: the Life Sciences Specialization and the Applied Physics Specialization.

The Life Sciences specialization has 5 more hours required in hours offered by the unit under semesters than under quarters. The primary change here is that we now require all 3 advanced labs for all of our students (which accounts for 3 credit hours of the 5 credit hour difference). Previously we required 3 labs for approximately half of the students in our program, and 2 labs for the other half. Since Physics is an experimental science, our faculty felt strongly that all 3 labs should be required of all students.

The additional of the third lab is a large part of the change for the Applied Physics option as well. In addition, for this option we also have increased the required hours outside the unit (this is the "applied" portion of this option) by 3 semester credit hours, in order that students have a strong foundation in the applied area they are focusing on.

## 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 majors acquire a basic mastery of fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity.
- Undergraduate Physics majors develop powerful analytical and problem solving skills in areas involving both physics and mathematics.
- Undergraduate Physics majors acquire a basic mastery of experimental physics.
- Undergraduate Physics majors acquire a basic mastery of data reduction and error analysis.
- Undergraduate Physics majors effectively communicate their physical understanding both professionally and colloquially (orally and in writing).
- Undergraduate majors are apprised of and encouraged to participate in academic research, industrial research and/or outreach activities which are consistent with their interest, ability and postgraduate plans.
- Undergraduate majors acquire expertise relevant to their chosen program option.

**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? Yes**

**Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar.**

For our assessment, we use a variety of direct and indirect methods, none of which depend upon whether the program is run under quarters or semesters. As a result, we do not anticipate any changes to our assessment practices under the semester system.

**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.

**Program Specialization/Sub-Plan Name**

Applied Physics (New)

**Program Specialization/Sub-Plan Goals**

- This is a flexible program that combines a strong foundation in physics with a set of technical electives designed for those with special interests.
- The program of technical electives could include courses of study from other sciences such as Astronomy, or other programs such as engineering, meteorology, economics, history of science, or primary education.

**Program Specialization/Sub-Plan Name**

Physics and Life Sciences (New)

**Program Specialization/Sub-Plan Goals**

- This option is designed for those intending to attend medical school. It satisfies typical medical school admission requirements, when combined with the required physics and prerequisite math courses in the physics core curriculum.

**Program Specialization/Sub-Plan Name**

Physics Teaching (New)

**Program Specialization/Sub-Plan Goals**

- This option is designed for those seeking secondary level certification in physics (i.e., to be a high school teacher). It is been designed to satisfy College of Education Master of Education (Physics Certification) curriculum.

**Program Specialization/Sub-Plan Name**

Advanced Physics (New)

**Program Specialization/Sub-Plan Goals**

- This program is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics.

## Pre-Major

Does this Program have a Pre-Major? No

## Attachments

- CCI subcommittee chair letter--PhysicsMajor.doc: CCI Subcommittee Chair Letter  
*(Other Supporting Documentation. Owner: Vankeerbergen, Bernadette Chantal)*
- programProposal\_mar10.pdf: Program Proposal  
*(Program Proposal. Owner: Hughes, Richard E)*
- Physics BS 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	10/11/2010 09:34 PM	Submitted for Approval
Revision Requested	Hughes,Richard E	10/18/2010 11:47 AM	Unit Approval
Submitted	Hughes,Richard E	10/21/2010 11:12 AM	Submitted for Approval
Approved	Hughes,Richard E	10/26/2010 10:35 AM	Unit Approval
Approved	Andereck,Claude David	10/28/2010 10:59 AM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	11/12/2010 08:15 AM	ASCCAO Approval
Submitted	Hughes,Richard E	11/24/2010 03:39 PM	Submitted for Approval
Approved	Hughes,Richard E	11/24/2010 03:48 PM	Unit Approval
Revision Requested	Andereck,Claude David	12/02/2010 02:25 PM	College Approval
Submitted	Hughes,Richard E	12/08/2010 05:50 AM	Submitted for Approval
Approved	Hughes,Richard E	12/08/2010 05:51 AM	Unit Approval
Revision Requested	Andereck,Claude David	12/08/2010 12:41 PM	College Approval
Submitted	Hughes,Richard E	01/19/2011 12:50 PM	Submitted for Approval
Approved	Hughes,Richard E	01/19/2011 01:10 PM	Unit Approval
Approved	Andereck,Claude David	01/19/2011 03:11 PM	College Approval
Revision Requested	Meyers,Catherine Anne	01/31/2011 09:24 AM	ASCCAO Approval
Submitted	Hughes,Richard E	02/09/2011 10:51 AM	Submitted for Approval
Approved	Hughes,Richard E	02/09/2011 10:52 AM	Unit Approval
Revision Requested	Andereck,Claude David	02/14/2011 11:54 AM	College Approval
Submitted	Hughes,Richard E	02/15/2011 05:48 AM	Submitted for Approval
Approved	Hughes,Richard E	02/15/2011 05:49 AM	Unit Approval
Approved	Andereck,Claude David	02/15/2011 11:37 AM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	03/07/2011 09:49 AM	ASCCAO Approval
Submitted	Hughes,Richard E	03/08/2011 10:46 AM	Submitted for Approval
Approved	Hughes,Richard E	03/08/2011 10:50 AM	Unit Approval
Revision Requested	Andereck,Claude David	03/08/2011 01:45 PM	College Approval
Submitted	Hughes,Richard E	03/08/2011 02:47 PM	Submitted for Approval
Approved	Hughes,Richard E	03/08/2011 02:48 PM	Unit Approval
Revision Requested	Andereck,Claude David	03/09/2011 10:47 AM	College Approval
Submitted	Hughes,Richard E	03/10/2011 07:46 AM	Submitted for Approval
Approved	Hughes,Richard E	03/10/2011 08:48 AM	Unit Approval
Revision Requested	Andereck,Claude David	03/10/2011 08:52 AM	College Approval
Submitted	Hughes,Richard E	03/10/2011 08:56 AM	Submitted for Approval
Approved	Hughes,Richard E	03/10/2011 08:59 AM	Unit Approval
Approved	Andereck,Claude David	03/10/2011 09:39 AM	College Approval
Pending Approval	Hanlin,Deborah Kay Vankeerbergen,Bernadette Chantal Meyers,Catherine Anne Jenkins,Mary Ellen Bigler Nolen,Dawn	03/10/2011 09:39 AM	ASCCAO Approval

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March 10, 2011

Larry Krissek  
Chair, Arts and Sciences CCI

Dear Larry:

It is a pleasure to forward to you the proposal for the BS major in Physics under semesters. The major has been modified from its present quarter version mainly by reduction of the number of tracks offered and 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 meetings on October 13 and 20, 2010, the Sciences Subcommittee of the CCI and the full CCI. Feedback from these discussions has now 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

To: Larry Krissek

From: James Fredal

Re: Proposed Semester Conversion Plan for Physics Major

December 30, 2010

The Sciences subcommittee of the CCI considered the semester conversion proposal for the Physics Major on November and voted to approve the proposal with several contingencies outlined below.

Because the Physics Major had not undergone revision since 1998, the Department and the Undergraduate Studies Committee used the conversion process to reconsider the major. The resulting proposal differs from the current Physics major in several ways.

- 1) The major went from 6 options or tracks to 4 specializations. Three of the less popular existing options were folded into one "Applied Physics" specialization for students in Engineering, Law, Journalism, and other sciences. The remaining four options, Advanced Physics, Physics and Life Sciences, and Physics Teaching options remain the same.
- 2) An honors option is now available for two upper division Physics sequences, reducing pressure on the required non-honors sequences and adding an enhanced option for students who are academically advanced.
- 3) A third lab course will now be required for all specializations. Previously, only the Advanced Physics option required the third lab course.
- 4) Material from the 3<sup>rd</sup> level writing course will now be included in the Advanced Lab: presentation of data results and analysis.

The Sciences subcommittee had several concerns about the proposed structural changes. Some of these concerns were minor errors having to do with consistency or clarifications. Other concerns were more substantive.

First, we wondered whether the reduction of options or tracks would put pressure on courses in some tracks with a larger number of students. However, it appears that the new Applied Physics track combined several of the less popular tracks and that in any case the demand for common required courses will remain the same.

Second, we asked about the new requirement for three labs for all specializations. The Physics department feels that with some rearrangement of lab space in Smith labs to allow larger classes, and a slight increase in TA staffing for the larger labs, that they will be able to accommodate the new requirement, and that limitations in lab offerings will not slow students' time to degree.

Finally, the subcommittee requested a more detailed transition plan. In the revised proposal, the transition plan describes the bridge courses that will be offered to

students who have partially completed the initial Physics sequence (111-112-113 and 131, 132, 133) and possibly also the Mathematical Methods in Physics sequence. The department will also implement a Transition Advising Worksheet, to be filled out for every student in the major to assist them in the transition. The worksheet and the transition process will be discussed in Physics 295 beginning in Autumn 2010. In addition, a website has been developed with descriptions of the changes and a range of sample transition schedules. With the dedicated Staff and Faculty advising, the current transition plan should provide students with ample opportunities to adjust their schedule to the semester system without being penalized.

With the current corrections and revisions to the proposal, I feel the contingencies delineated by the Sciences subcommittee have been met and therefore recommend consideration and approval of the proposed semester conversion plan for the Physics major within the Arts and Sciences CCI.



Department of Physics

Office of the Chair  
191 West Woodruff Avenue  
Columbus, OH 43210-1117

Phone (614) 292-2653  
Fax (614) 292-7557

To: Office of Academic Affairs  
From: James J. Beatty, Chair, Department of Physics  
Date: August 19, 2010  
Re: Semester Program Proposal for Undergraduate Physics Major

A handwritten signature in black ink that reads 'James J. Beatty'.

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 Major; 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 Major in Physics from the quarter system to the semester system.

The contents of this proposal have been 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 Major Program**

The changes to the physics major program can be summarized as follows:

- A. We have gone from a system of 6 options labeled A through F, to a system of 4 Specializations in which the names are more closely tied to the expected outcome for the student. Each of these specializations leads to a Bachelor of Sciences degree in physics. The specializations each consist of a common core of Physics, Math and prerequisite courses, along with additional required and/or recommended courses in Physics, Math, and/or other departments.
  - i) The Advanced Physics Specialization for grad school bound students (formerly Option A). This specialization is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics
  - ii) The Physics and Life Sciences Specialization for premed students (formerly Option D). This specialization is designed for those intending to attend medical school. It satisfies all of the OSU medical school admission requirements, when combined with the required physics and math courses in the physics core curriculum.
  - iii) The Physics Teaching Specialization for teaching high school physics (formerly Option E). This specialization is designed for those seeking secondary level certification in physics (i.e., to be a high school teacher). It is been designed to satisfy College of Education Master of Education (Physics Certification) curriculum.
  - iv) The Applied Physics Specialization for students interested in Engineering, Law, Journalism, other Sciences, etc. (formerly Options B,C,F). This specialization is a flexible program that combines a strong foundation in physics with a set of technical electives designed for those with special interests. The program of technical electives could include courses of study from other programs in the Colleges of Mathematical and Physical Sciences such as Astronomy, or the Engineering College, or other programs such as meteorology, economics, history of science, or primary education.
- B. We have included an Honors track for two of our upper division Physics sequences. This will reduce the overall class size for the two required subject areas of Quantum Mechanics and Electricity&Magnetism, as well as providing a challenging option for students who are academically more prepared.
- C. We now require 3 upper division lab courses. Previously, only the Option A (now Advanced Physics) students were required to take 3 labs. Since lab experience is potentially even more useful for students who will seek employment immediately after graduation (which is true of most of the students in the other options) this should positively impact their employment prospects.
- D. We include the 3rd writing course material in our Advanced Lab. The new GE template no longer has a 3rd writing requirement, and yet presentation of data results and analysis is an important educational goal for our students. However, there has been for some time a presentation and writing component to our advanced lab, and this change will be formalized under semesters.

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

**Course Listing and Curriculum Map for the Physics Major**

Requirements	Semester Course Number	Course Title	Semester Units	Quarter Equivalent Course Number	Quarter Credits	Notes	Relevant Learning Goals Achieved (see below)
<b>Prerequisite Courses:</b>							
<b>Introductory Math</b>	<b>Math 1151</b>	<b>Calc I</b>	<b>5</b>	<b>Math 151</b>	<b>5</b>	<b>Semester sequence has same content as quarter sequence</b>	<b>2a</b>
	<b>Math 1152</b>	<b>Calc II</b>	<b>5</b>	<b>Math 152</b>	<b>5</b>		
				<b>Math 153</b>	<b>5</b>		
<b>Upper Div Math</b>	<b>Math 2153</b>	<b>CalcIII</b>	<b>4</b>	<b>Math 254</b>	<b>5</b>	<b>Content of current 254</b>	<b>2b</b>
	<b>Math 2174</b>	<b>LinAlg/DiffEq</b>	<b>3</b>	<b>Math 415</b>	<b>4</b>	<b>Some material from 415 and 568 (topics still under discussion)</b>	<b>2b</b>
				<b>Math 568</b>	<b>3</b>		
<b>Computing</b>	<b>CSE 1222</b>	<b>Intro to C++</b>	<b>3</b>	<b>CSE 202</b>	<b>4</b>	<b>Same content</b>	<b>3a</b>
<b>Introductory Physics</b>	<b>Physics 1250/1250H</b>	<b>Mechanics, Thermal Physics, Waves</b>	<b>5</b>	<b>Physics 131/131H</b>	<b>5</b>	<b>Semester sequence has same content as quarter sequence</b>	<b>1a,2a</b>
	<b>Physics 1251/1251H</b>	<b>E&amp;M, Optics, Modern Physics</b>	<b>5</b>	<b>Physics 132/132H</b>	<b>5</b>		
				<b>Physics 133/133H</b>	<b>5</b>		
Note: Suitable honors and/or advanced versions of all above prerequisite courses are allowed as substitutions.							
<b>Physics Core:</b>							
<b>Intermediate</b>	<b>Physics 2300</b>	<b>Dynamics of Particles and Waves I</b>	<b>4</b>	<b>Physics 261</b>	<b>4</b>	<b>Semester sequence has same content as quarter sequence</b>	<b>1b,2b</b>
	<b>Physics 2301</b>	<b>Dynamics of Particles and Waves II</b>	<b>4</b>	<b>Physics 262</b>	<b>4</b>		
				<b>Physics 263</b>	<b>4</b>		
	<b>Physics 2095</b>	<b>Introductory Seminar</b>	<b>1</b>	<b>Physics 295</b>	<b>1</b>	<b>Same Content</b>	<b>6a</b>
<b>Upper Division</b>	<b>Physics 5400/5400H</b>	<b>E&amp;M I</b>	<b>4</b>	<b>Physics 555</b>	<b>4</b>	<b>Sem course has all of 555 and some of 656</b>	<b>1c,2c</b>
				<b>Physics 656</b>	<b>4</b>		
	<b>Physics 5500/5500H</b>	<b>Quantum I</b>	<b>4</b>	<b>Physics 631</b>	<b>4</b>	<b>Sem course has all of 631 and some of 632</b>	<b>1c,2c</b>
				<b>Physics 632</b>	<b>4</b>		
<b>Physics Labs Core</b>	<b>Physics 3700</b>	<b>Methods in Experimental Physics</b>	<b>3</b>	<b>Physics 416</b>	<b>4</b>	<b>Same content</b>	<b>3a,4a,5a</b>
	<b>Physics 4700</b>	<b>Intro Electronics for Physicists</b>	<b>3</b>	<b>Physics 517</b>	<b>4</b>	<b>Same content</b>	<b>3b,4b,5b</b>

**Course Listing and Curriculum Map for the Physics Major**

Requirements	Semester Course Number	Course Title	Semester Units	Quarter Equivalent Course Number	Quarter Credits	Notes	Relevant Learning Goals Achieved (see below)
	Physics 5700	Advanced Laboratory	3	Physics 616	4	Same content	3c,4c,5c
<b>Physics Electives:</b>							
	Physics 3455H	Honors Holography	3	Physics H455	4	Same content	3b,4b,5b
	Physics 3470	Optics	3	Physics 570	4	Same content	2b
	Physics 2193	Individual Studies	Var	Physics 593	Var	Intermed Level	6b
	Physics 4193	Individual Studies	Var	Physics 693	Var	Advanced Level	6c
Research Courses	Physics 2998	Undergrad Research	Var	Physics 699	Var	Intermed Level	6b
	Physics 4998	Undergrad Research	Var	Physics 699	Var	Advanced Level	6c
	Physics 4999	Undergrad Research	Var	Physics 783	Var	Like 4998+Thesis	6c
Grad introductory	Physics 6802	Topics in Elementary Particle Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6803	Topics in Astroparticle Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6804	Topics in Atomic and Molecular Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6805	Topics in Nuclear Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6806	Topics in Condensed Matter Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6809	Topics in Biophysics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6810	Topics in Computational Physics	4	Physics 780.xx	4	Enhanced content	1c,7c
	Physics 6820	Special Topics	4	Physics 780.xx	4	Enhanced content	1c,7c
<b>Additional Required Courses, Advanced Physics Option</b>							
	Physics 5401H	E&M II	4	Physics 656	4	Semester course has some of 656 and all of 657	1c,2c
				Physics 657	4		
	Physics 5501H	Quantum II	4	Physics 632	4	Semester course has some of 632 and all of 633	1c,2c
				Physics 633	4		
	Physics 5600	Statistical Physics	4	Physics 621	4	Semester course has all of 621 and some of 622	1c,2c
				Physics 622	4		

**Course Listing and Curriculum Map for the Physics Major**

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
<b><u>Additional Required Courses, Applied Physics Option</u></b>							
	1 Physics Elective From Above List		3	Elective	4	Same content	Course Depend
	15 Credit hours from Minor, Double Major		15		18	Enhanced content	Course Depend
<b><u>Additional Required Courses, Physics Teaching Option</u></b>							
	1 Physics Elective From Above List		3	Elective	3	Enhanced content	Course Depend
	Physics 5100		4	Physics 670	5	Enhanced content	7c
	Bio1 1113		4	Bio 113	5	Enhanced content	7c
	Earth Sci 1110		3	Earth Sci 110	3	Same content	7c
	Geog 5900		3	Geog 520	3	Same content	7c
	Astron 2191		3	Astron 291	3	Same content	7c
	Chem 1210		5	Chem 121	5	Semester sequence has same content as quarter sequence	7c
	Chem 1220		5	Chem 122	5		7c
				Chem 123	5		7c
<b><u>Additional Required Courses, Life Sciences Option</u></b>							
	1 Physics Elective From Above List		3	Elective	4	Same content	Course Depend
	Bio 1113		4	Bio 113	5	Enhanced content	7c
	Bio 1114		4	Bio 114	5	Enhanced content	7c
	Chem 1210		5	Chem 121	5	Semester sequence has same content as quarter sequence	7c
	Chem 1220		5	Chem 122	5		7c
				Chem 123	5		7c
	Chem 2510		4	Chem 251	4	Semester sequence has same content as quarter sequence	7c
	Chem 2520		4	Chem 252	4		7c
				Chem 253	4		7c
	Chem 2540		2	Chem 254	3	Same content	7c
	Chem 2550		2	Chem 255	3	Same content	7c

## Course Listing and Curriculum Map for the Physics Major

Requirements	Semester Course Number	Course Title	Semester Units	Quarter Equivalent Course Number	Quarter Credits	Notes	Relevant Learning Goals Achieved (see below)
Learning Goal	1	Undergraduate Physics majors acquire a basic mastery of fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity.					
	2	Undergraduate Physics majors develop powerful analytical and problem solving skills in areas involving both physics and mathematics.					
	3	Undergraduate Physics majors acquire a basic mastery of experimental physics					
	4	Undergraduate Physics majors acquire a basic mastery of data reduction and error analysis					
	5	Undergraduate Physics majors can effectively communicate their physical understanding both professionally and colloquially (orally and in writing).					
	6	Undergraduate majors are apprised of and encouraged to participate in academic research, industrial research and/or outreach activities which are consistent with their interest, ability and postgraduate plans.					
	7	Undergraduate majors acquire expertise relevant to their chosen program option					
	Learning Goal Level	a: Beginning; b: Intermediate; c: Advanced					

**COLLEGE OF ARTS AND SCIENCES BACHELOR OF SCIENCE: MAJOR PHYSICS**

<b>Last name:</b>			
<b>First Name:</b>			
<b>Middle:</b>			
<b>OSU ID</b>			
<b>lastname.#</b>			
<b>Expected graduation</b>		(quarter)	
<b>Additional Majors</b>			
<b>Additional Minors</b>			

Have you filed a degree application in the college office? Yes \_\_\_ No \_\_\_ (NOTE: This form is NOT a degree application)

**Major Program minimum grade of "C-" required. All coursework minimum grade average of "C" (2.00).**

INSTRUCTIONS: Put grade next to appropriate course. If course substitutions were made, cross out the relevant course and write in the substitution. Current quarter courses should be listed as "IP" below.

Core Prerequisite Courses			Physics Tech Elec	Credits	Grade	Required in Options
Course	Credits	Grade				
Physics 1250	5		Physics H5501	4		Advanced
Physics 1251	5		Physics H5401	4		Advanced
Math 1151	5		Physics 5300	4		Advanced
Math 1152	5		Physics 5600	4		Advanced
CSE 1222	3		Physics 3470	3		Not required
Math 2153	4		Physics H3455	3		Not required
Math 2174	3		Physics 68xx	4		Not required
			Physics 5100	4		Teaching
Note: Suitable honors and/or advanced versions of prerequisite courses are allowed as substitutions. Note the substitution in place of the above listed course and have the advisor initial the substitution.			Additional Prereq Courses	Credits	Grade	Required in Options
			Bio 1113	4		LifeSci, Teaching
			Bio 1114	4		LifeSci
			Chem 1210	5		LifeSci, Teaching
			Chem 1220	5		LifeSci, Teaching
			Earth Sci 1110	3		Teaching
Required Core Major Courses			Additional Major Courses	Credits	Grade	Required in Options
Core Physics	Credits	Grade				
2095	1		Chem 2510	4		LifeSci
2300	4		Chem 2520	4		LifeSci
2301	4		Chem 2540	2		LifeSci
3700	3		Chem 2550	2		LifeSci
4700	3		Geog 5900	3		Teaching
5400	4		Astronomy 2191	3		Teaching
5500	4					
5700	3					

Option	Additional Required hours beyond the above "Core Prerequisite" and "Core Major" courses	
Advanced	16	Advanced Physics option courses listed above
Applied	>=3 plus >=15	one of Physics Tech Elec from above list (list grade above) + applied tech elecs (list below)
Teaching	4 + 17 + 6	Physics 5100 + above Teaching option courses
Life Sciences	>=3 + 18 + 12	one of Physics Tech Elec from above list (list grade above) + above LifeSci option courses

Applied Physics Option Technical Electives		
Course Name	Credits	Grade
Prereq Courses		

**Physics Major Option (Advanced, Applied, Teaching, Life Sciences) \_\_\_\_\_**

**Signature of advisor \_\_\_\_\_ Date \_\_\_\_\_**

**COLLEGE OF ARTS AND SCIENCES BACHELOR OF SCIENCE: MAJOR PHYSICS**

<b>Last name:</b>			
<b>First Name:</b>			
<b>Middle:</b>			
<b>OSU ID</b>			
<b>lastname.#</b>			
<b>Expected graduation</b>		(quarter)	
<b>Additional Majors</b>			
<b>Additional Minors</b>			

Have you filed a degree application in the college office? Yes \_\_\_ No \_\_\_ (NOTE: This form is NOT a degree application)

**Major Program (Minimum grade of "C-" required. Minimum grade average of "C" (2.00))**

INSTRUCTIONS: Put grade next to appropriate course. If course substitutions were made, cross out the relevant course and write in the substitution. Current quarter courses should be listed as "IP" below.

Core Prerequisite Courses			Physics Tech Elec	Credits	Grade	Required in Options
Intro Physics	Credits	Grade	Physics 517	4		A,B
Physics 131	5		Physics 632	4		A,B
Physics 132	5		Physics 633	4		A
Physics 132	5		Physics 656	4		A,B
Math 151	5		Physics 657	4		A
Math 152	5		Physics 622	4		A
Math 153	5		Physics 664	4		A
Math 254	5		Physics 670	5		E
Math 415	4					
Math 513	3		<b>Additional Prereq Courses</b>	<b>Credits</b>	<b>Grade</b>	<b>Required in Options</b>
CSE 202	4		Earth Sci 110	5		E
			Bio 113	5		C,D,E
			Bio 114	5		D
			Chem 121	5		C,D,E
			Chem 122	5		C,D,E
			Chem 123	5		C,D,E
			<b>Additional Major Courses</b>	<b>Credits</b>	<b>Grade</b>	<b>Required in Options</b>
			Math 568	3		A,B
			Chem 251	4		C,D
			Chem 252	4		C,D
			Chem 253	4		D
			Chem 254	3		D
			Chem 255	3		D
			Geog 520	5		E
			Astronomy 291	5		E

Option	Additional Required hours beyond the above "Core Prerequisite" and "Core Major" courses	
<b>A</b>	28 + 3	28 Physics hours plus Math 568
<b>B</b>	12 + 16	12 Physics hours plus 16 hours of 200 level or above in MAPs or Engineering Colleges (list below)
<b>C</b>	4 + 20 + 8 + 8	4 Physics hours plus plus 25 additional prereq hours plus 8 additional 200 level courses (see above) plus 8 additional hours (list below)
<b>D</b>	25 + 18	25 additional prereq hours plus 18 additional 200 level courses (see above)
<b>E</b>	5 + 25 + 10	Physics 670 plus 25 additional prereq hours plus 10 additional 200 level courses (see above)
<b>F</b>	4 + 18	one of Physics 517, 622, 632, 656 (list grade above); plus 18 additional hours (list below)

Option Specific Technical Electives		
Course Name	Credits	Grade

**Physics Major Option (A,B,C,D,E,F) \_\_\_\_\_**

**Signature of advisor \_\_\_\_\_ Date \_\_\_\_\_**

## Transition policy

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 every 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 Major** as part of the requirements for Physics 295 (or Physics 2095 under semesters), a course all Physics majors take in the first quarter (or first semester) of their second (sophomore) year in the Physics program. **Students who are in Physics 295 in Autumn 2010 are the first group of students expected to graduate under semesters, and we have devoted approximately 20% of our available class time to discussing the semester transition alone.** We are confident that this **individual attention to every physics major who will graduate under semesters** will ensure a smooth transition from quarters to semesters.

As an added help, we have put together a website available for students which has both a description of the changes involved in moving from quarters to semesters, as well as sample plans for the majority of our students. The sample plans include examples for students with the following mix of years under quarters and semesters: (3Q1S, meaning 3 Quarters and 1 Semester), (2Q2S), (1Q3S), and of course (0Q4S). The website is:

<http://www.physics.ohio-state.edu/undergrad/majorSemesters.php>

We have 1 full time staff member and 1 faculty member who are charged with providing advising to all Physics majors. Sample transition plans for all students will be made up by the first quarter (or semester) of their second year in the program (usually the sophomore year), and kept on file. As long as students stick to these plans we do not anticipate any impediment to their graduation date. Students will be encouraged to seek advising help if they change their plans in any significant way.



## **Undergraduate Physics Major Program Supplemental Material**

The following pages contain supplemental material for the conversion of the Undergraduate Physics Major from quarters to semesters:

1. (1 page) An example curriculum plan for a student who spends their first 2 years in the Physics major under quarters, and the final two years under semesters.
2. (4 pages) For this same student, the result of the “Quarters to Semesters Transition Advising Worksheet” which helps the student and advisor confirm that the student has satisfied the program requirements.
3. (4 pages) There are then 4 sample semester plans, one for each of the 4 options we will have for the Physics Major under semesters.

**Example Curriculum; 2 years under quarters, plus 2 years under semesters.**

**Advanced Physics specialization: This specialization is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics. Assumes 2 years under quarters and 2 years under semesters.**

Year	Autumn Quarter	Credit Hours	Comment	Winter Quarter	Credit Hours	Comment	Spring Quarter	Credit Hours	Comment
2010-2011	Physics H131	5	Honors Intro	Physics H132	5		Physics H133	5	Honors Intro
	Math 150	5	Calc	Math 151	5		Math 152	5	Calc
	GEC	5	GEC	Bio 113	5	GEC	CSE 202	4	Prereq
	<b>Quarter Sum</b>	<b>15</b>		<b>Quarter Sum</b>	<b>15</b>		<b>Quarter Sum</b>	<b>14</b>	
2011-2012	Physics 261	4		Physics 262	4		Physics 263	4	
	Physics 295	1	Survey	Math 415	4	Diffeq, GEC Open	Physics 416	4	Data Ana Lab
	Math 254	5	Calc III	GEC	5	GEC	Math 568	3	LinAlg, GEC Open
	GEC	5	GEC	GEC	5	GEC	GEC	5	GEC
	<b>Quarter Sum</b>	<b>15</b>		<b>Quarter Sum</b>	<b>18</b>		<b>Quarter Sum</b>	<b>16</b>	
							<b>Total Qtr Hours:</b>	<b>93</b>	
Year	Autumn Semester	Credit Hours	Comment				Spring Semester	Credit Hours	Comment
2012-2013	Physics 5500H	4	Quantum				Physics 5501H	4	Quantum
	Physics 5400H	4	E&M				Physics 5401H	4	E&M
	GE	3	GE				Physics 4700	3	Elec Lab
	GE	3	GE				GE	4	GE
	<b>Semester Sum</b>	<b>14</b>					<b>Semester Sum</b>	<b>15</b>	
2013-2014	Physics 5600	4	StatMech				Physics 5700	3	Adv Lab
	GE	4	GE				Physics 5300	4	Theor Mechanics
	Free Elective	3	Free				GE	4	GE
	GE	3	GE				Free Elective	3	Free
	Free Elective	2							
	<b>Semester Sum</b>	<b>16</b>					<b>Semester Sum</b>	<b>14</b>	
							<b>Total SemHours:</b>	<b>59</b>	
							<b>Total Hours:</b>	<b>121</b>	
<b>Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GEC/GE requirements.</b>									



Topic Area	Course Name	Quarter/ Semester Planned	QCH = Quarter Credit Hours	CQH = 0.67*QCH	SCH = Semester Credit Hours	CQH+SCH	Minimum Required	Excess Over Minimum
<b>Introductory Math</b>	Math 151	Au2010	5	3.335		3.335		
	Math 152	Wi2011	5	3.335		3.335		
	Math 153	Sp2011	5	3.335		3.335		
	Math 1151					0		
	Math 1152					0		
<b>Advanced Math</b>	Math 254	Au2010	5	3.335		3.335		
	Math 415	Wi2012	4	2.668		2.668		
	Math 513/551 or 568/571	Sp2012	3	2.001		2.001		
	Math 2153					0		
	Math 2174					0		
<b>Total Math:</b>					Total Math Sum=	18.009	>=16	
<b>Computing</b>	CSE 202	Sp2011	4	2.668		2.668		
	CSE 1222					0		
					Total Computing Sum=	2.668	>=2	
<b>GEC: Each Topic Area must be fulfilled:</b>	Double counting allowed per GEC rules							
<b>GEC Writing 1</b>	Course:	Wi2012		0	3	3		
<b>GEC Writing 2</b>	Course:	Sp2012		0	3	3		
<b>GEC Soc Sci 1</b>	Course:	Wi2012		0	3	3		
<b>GEC Lit</b>	Course:	Au2011		0	3	3		
<b>GEC Hist Stud</b>	Course:	Au2010		0	3	3		
<b>GEC Bio</b>	Course:	Wi2011		0	3	3		
<b>GEC Open 1</b>	Course:	Wi2012		0	3	3		
<b>GEC Open 2</b>	Course:	Sp2012		0	3	3		
<b>GEC Arts</b>	Course:	<b>Au2013</b>	5	3.335		3.335		
<b>GEC Culture</b>	Course:	<b>Au2012</b>	5	3.335		3.335		
<b>GEC Soc Sci 2</b>	Course:	<b>Au2012</b>	5	3.335		3.335		
<b>GEC Lang1</b>	Course:	<b>Sp2013</b>		0	4	4		
<b>GEC Lang2</b>	Course:	<b>Au2013</b>		0	4	4		
<b>GEC Lang3</b>	Course:	<b>Sp2014</b>		0	4	4		
<b>GEC Lang4</b>	Course:			0		0		
<b>Total Lang:</b>					Total Lang Sum=	12	>=12	
<b>Total GEC:</b>					Total GEC Sum=	46.005	>=45	

Topic Area	Course Name	Quarter/ Semester Planned	QCH = Quarter Credit Hours	CQH = 0.67*QCH	SCH = Semester Credit Hours	CQH+SCH	Minimum Required	Excess Over Minimum
<b>Advanced Specialization</b>								
<b>E&amp;M</b>	Physics 656			0		0		
	Physics 657			0		0		
	Physics 5401	<b>Sp2013</b>			4	4		
<b>QM</b>	Physics 632			0		0		
	Physics 633			0		0		
	Physics 5501	<b>Sp2013</b>			4	4		
<b>Stat Mech</b>	Physics 621			0		0		
	Physics 622			0		0		
	Physics 5600	<b>Au2013</b>			4	4		
<b>Theor Mech.</b>	Physics 664			0		0		
	Physics 5300	<b>Sp2014</b>			4	4		
<b>Elec Lab</b>	Physics 517			0		0		
	Physics 4700	<b>Sp2013</b>			3	3		
	SUM (Advanced Option + Electives)=					19	>=19	
<b>Free Elec:</b>	Course:			2		2		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
	Total Credit Sum =					120.026	>=120	
<b>Applied Physics Specialization</b>								
<b>Physics Elective</b>	Course:			0		0	>=3	
<b>Tech Elec:</b>	Course:			0		0		
<b>Tech Elec:</b>	Course:			0		0		
<b>Tech Elec:</b>	Course:			0		0		
<b>Tech Elec:</b>	Course:			0		0		
<b>Tech Elec:</b>	Course:			0		0		
<b>Tech Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
<b>Free Elec:</b>	Course:			0		0		
	SUM (All Electives) =					0	>=24	
	Total Credit Sum =					99.026	120	



**Advanced Physics specialization: This specialization is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics.**

Year	Autumn	Credit Hours	Comment	Spring	Credit Hours	Comment
2012-2013	Physics 1250H	5	Honors Intro	Physics 1251H	5	Honors Intro
	Math 1151	5	Calc	Math 1152	5	Calc
	GE	3	GE	GE	3	GE
	CSE 1222	3	Prereq	Bio 1113	4	GE
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>17</b>	
2013-2014	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Physics 3700	3	Data Ana Lab
	Math 2153	4	GE	Math 2174	3	GE
	GE	3	GE	GE	3	GE
	GE	3	GE	GE	3	GE
<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>16</b>		
2014-2015	Physics 5500H	4	Quantum	Physics 5501H	4	Quantum
	Physics 5400H	4	E&M	Physics 5401H	4	E&M
	GE	3	GE	Physics 4700	3	Elec Lab
	GE	3	GE	GE	4	GE
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>15</b>	
2015-2016	Physics 5600	4	StatMech	Physics 5300	4	TheoretMechanics
	GE	4	GE	Physics 5700	3	Adv Lab
	Free Elective	3	Free	GE	4	GE
	Free Elective	3	Free	Free Elective	3	Free
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>14</b>	
				<b>Total Hours:</b>	<b>121</b>	

Courses in **BLUE** can only be scheduled by Robin Wyatt ([wyatt.60@osu.edu](mailto:wyatt.60@osu.edu))

Courses in **YELLOW** are only offered in the quarter/semester shown.

**GE:** We assume there are 11 GE category requirements that physics majors will have to satisfy, beyond those satisfied as part of their major. These are: 2 writing, 1 bio, 1 Lit, 1 Arts 1 Hist, 2 Soc, 1 Cult or Hist, 2 Open (we use upper division Math for this), plus Language. Language is a 3 4-credit hour courses under semesters. Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GE requirements.

**Applied Physics specialization: This specialization is a flexible program that combines a strong foundation in physics with a set of technical electives designed for those with special interests. The program of technical electives could include courses of study from other programs in the Colleges of Mathematical and Physical Sciences, or Engineering, or other programs such as meteorology, economics, history of science, or primary education. Courses utilized in pursuit of a minor, additional major, or dual degree are acceptable and encouraged. A minimum of 15 semester credit hours is required.**

Year	Autumn	Credit Hours	Comment	Spring	Credit Hours	Comment
1	Physics 1250	5	Intro	Physics 1251	5	Intro
	Math 1151	5	Calc	Math 1152	5	Calc
	GE	3	GE	GE	3	GE
	CSE 1222	3	Prereq	Bio 1113	4	GE
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>17</b>	
2	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Math 2174	3	GE
	Math 2153	4	GE	Physics 3700	3	Data Ana Lab
	Minor Elective	4	Applied Spec Req	Minor Elective	4	Applied Spec Req
	GE	3	GE	GE	3	GE
<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>17</b>		
3	Physics 5500	4	Quantum	Physics 4700	3	Elec Lab
	Physics 5400	4	E&M	Minor Elective	3	Applied Spec Req
	Minor Elective	4	Applied Spec Req	GE	4	GE
	GE	3	GE	Free Elective	3	Free
<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>13</b>		
4	Physics Elec	3	Required Elective	Physics 5700	3	Adv Lab
	GE	3	GE	GE	3	GE
	GE	4	GE	GE	3	GE
	Free Elective	4	Free Elective	GE	4	GE
<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>13</b>		
					<b>Total Hours:</b>	<b>121</b>

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Courses in **YELLOW** are only offered in the quarter/semester shown.

**GE: We assume there are 11 GE category requirements that physics majors will have to satisfy, beyond those satisfied as part of their major. These are: 2 writing, 1 bio, 1 Lit, 1 Arts 1 Hist, 2 Soc, 1 Cult or Hist, 2 Open (we use upper division Math for this), plus Language. Language is a 3 4-credit hour courses under semesters. Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GE requirements.**



**Physics and Life Sciences specialization: This specialization is designed for those intending to attend medical school. It satisfies all of the OSU medical school admission requirements, when combined with the required physics and math courses in the physics core curriculum.**

Year	Autumn	Credit Hours	Comment	Spring	Credit Hours	Comment
2012-2013	Physics 1250	5	Intro	Physics 1251	5	Intro
	Math 1151	5	Calc	Math 1152	5	Calc
	Bio 1113	4	GE	GE	3	GE
	CSE 1222	3	Prereq	Bio 1114	4	premed
	<b>Semester Sum</b>	<b>17</b>		<b>Semester Sum</b>	<b>17</b>	
2013-2014	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Math 2174	3	GE
	GE	3	GE	Chem 1220	5	Premed
	Math 2153	4	GE	Physics 3700	3	Data Ana Lab
	Chem 1210	5	Premed			
	<b>Semester Sum</b>	<b>17</b>		<b>Semester Sum</b>	<b>15</b>	
2014-2015	Physics 5500	4	Quantum	Physics 4700	3	Elec Lab
	Physics 5400	4	E&M	Chem 2520	4	Premed
	Chem 2510	4	premed	Chem 2550	2	Premed
	Chem 2540	2	premed	GE	3	GE
	GE	3	GE	GE	4	GE
	<b>Semester Sum</b>	<b>17</b>		<b>Semester Sum</b>	<b>16</b>	
2015-2016	Physics Elec	4	Required Elective	Physics 5700	3	Adv Lab
	GE	4	GE	GE	4	GE
	GE	3	GE	GE	3	GE
	GE	3	GE	GE	3	GE
	Biochem 4511	4	Premed	Anatomy 199	3	Premed: recommended
	<b>Semester Sum</b>	<b>18</b>		<b>Semester Sum</b>	<b>16</b>	
			<b>Total Hours:</b>	<b>133</b>		
Students will be advised to seek input from a pre-med advisor when selecting courses labeled "Premed".						
		Courses in <b>BLUE</b> can only be scheduled by Robin Wyatt ( <a href="mailto:wyatt.60@osu.edu">wyatt.60@osu.edu</a> )				
		Courses in <b>YELLOW</b> are only offered in the quarter/semester shown.				
<p><b>GE:</b> We assume there are 11 GE category requirements that physics majors will have to satisfy, beyond those satisfied as part of their major. These are: 2 writing, 1 bio, 1 Lit, 1 Arts 1 Hist, 2 Soc, 1 Cult or Hist, 2 Open (we use upper division Math for this), plus Language. Language is a 3 4-credit hour courses under semesters. Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GE requirements.</p>						

**Physics teaching specialization: This specialization is designed for those seeking secondary level certification in physics (i.e., to be a high school teacher). It is intended to satisfy College of Education Master of Education (Physics Certification) curriculum.**

Year	Autumn	Credit Hours	Comment	Spring	Credit Hours	Comment
2012-2013	Physics 1250	5	Intro	Physics 1251	5	Intro
	Math 1151	5	Calc	Math 1152	5	Calc
	GE	3	GE	Bio 1113	4	GE
	GE	3	GE	CSE 1222	3	Prereq
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>17</b>	
2013-2014	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Math 2174	3	GE
	Physics 3700	3	Data Ana Lab	GE	3	GE
	Math 2153	4	GE	GE	3	GE
	GE	3	GE	Free Elective	3	Free
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>16</b>	
2014-2015	Physics 5500	4	Quantum	Physics 4700	3	Elec Lab
	Physics 5400	4	E&M	GE	4	GE
	GE	4	GE	Geog 5900	3	MsEd
	Earth Sci 1110	3	MsEd	Astro 2191	3	MsEd
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>13</b>	
2015-2016	Physics 5100	4	MsEd	Physics 5700	3	Adv Lab
	GE	4	GE	GE	3	GE
	GE	3	GE	GE	3	GE
	Chem 1210	5	MsEd	Chem 1220	5	MsEd
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>14</b>	
					<b>Total Hours:</b>	<b>122</b>

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Courses in **YELLOW** are only offered in the quarter/semester shown.

**GE:** We assume there are 11 GE category requirements that physics majors will have to satisfy, beyond those satisfied as part of their major. These are: 2 writing, 1 bio, 1 Lit, 1 Arts 1 Hist, 2 Soc, 1 Cult or Hist, 2 Open (we use upper division Math for this), plus Language. Language is a 3 4-credit hour courses under semesters. Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GE requirements.

<b>Advanced Physics Specialization (Option A under quarters)</b>				
<b>Program Credit hour Requirements</b>	<b>A) Number of credit hours in current program (Quarter credit hours)</b>	<b>B) Calculated result for 2/3rds of current (Semester credit hours)</b>	<b>C) Number of credit hours required for proposed program (Semester credit hours)</b>	<b>D) Change in Credit hours</b>
<b>Total minimum credit hours required for completion of</b>	67	44.7	42	-2.7
<b>Minimum required credit hours offered by the unit</b>	64	42.7	42	-0.7
<b>Minimum required credit hours offered outside the unit</b>	3	2.0	0	-2.0
<b>Minimum required prerequisite credit hours not included above</b>	46	30.7	30	-0.7

<b>Applied Physics Specialization (Option F under quarters)</b>				
<b>Program Credit hour Requirements</b>	<b>A) Number of credit hours in current program (Quarter credit hours)</b>	<b>B) Calculated result for 2/3rds of current (Semester credit hours)</b>	<b>C) Number of credit hours required for proposed program (Semester credit hours)</b>	<b>D) Change in Credit hours</b>
<b>Total minimum credit hours required for completion of</b>	58	38.7	44	5.3
<b>Minimum required credit hours offered by the unit</b>	40	26.7	29	2.3
<b>Minimum required credit hours offered outside the unit</b>	18	12.0	15	3.0
<b>Minimum required prerequisite credit hours not included above</b>	46	30.7	30	-0.7

<b>Life Sciences Specialization (Option D under quarters)</b>				
<b>Program Credit hour Requirements</b>	<b>A) Number of credit hours in current program (Quarter credit hours)</b>	<b>B) Calculated result for 2/3rds of current (Semester credit hours)</b>	<b>C) Number of credit hours required for proposed program (Semester credit hours)</b>	<b>D) Change in Credit hours</b>
<b>Total minimum credit hours required for completion of</b>	54	36.0	41	5.0
<b>Minimum required credit hours offered by the unit</b>	36	24.0	29	5.0
<b>Minimum required credit hours offered outside the unit</b>	18	12.0	12	0.0
<b>Minimum required prerequisite credit hours not included above</b>	71	47.3	48	0.7

<b>Teaching Physics Specialization (Option E under quarters)</b>				
<b>Program Credit hour Requirements</b>	<b>A) Number of credit hours in current program (Quarter credit hours)</b>	<b>B) Calculated result for 2/3rds of current (Semester credit hours)</b>	<b>C) Number of credit hours required for proposed program (Semester credit hours)</b>	<b>D) Change in Credit hours</b>
<b>Total minimum credit hours required for completion of</b>	51	34.0	36	2.0
<b>Minimum required credit hours offered by the unit</b>	41	27.3	30	2.7
<b>Minimum required credit hours offered outside the unit</b>	10	6.7	6	-0.7
<b>Minimum required prerequisite credit hours not included above</b>	71	47.3	47	-0.3