

<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		86	57.3	57	0.3
Required credit hours offered by the unit	Minimum	40	26.7	29	2.3
	Maximum	64	42.7	45	2.3
Required credit hours offered outside of the unit	Minimum	0	0.0	0	0.0
	Maximum	45	30.0	26	4.0
Required prerequisite credit hours not included above	Minimum	46	30.7	28	2.7
	Maximum	49	32.7	28	4.7

**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**

There is a small decrease in the maximum amount of required prerequisite hours from 32.7 to 28. One change here is the reduction in hours for the CSE prereq from 2.7 semester hours under quarters to 2 semester hours. Also, we reduced the amount of required upper division prerequisite hours in Math in our advanced Physics option. These students usually have the best Math preparation, and we would rather let them decide which Math courses to use to complement their Physics training. The advanced Physics option now has 9 credit hours that the students can use to devote toward free electives.

## 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.

<b>Program Specialization/Sub-Plan Name</b>	Applied Physics (New)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• This is a flexible program that combines a strong foundation in physics with a set of technical electives designed for those with special interests.</li> <li>• 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.</li> </ul>
<b>Program Specialization/Sub-Plan Name</b>	Physics and Life Sciences (New)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
<b>Program Specialization/Sub-Plan Name</b>	Physics Teaching (New)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
<b>Program Specialization/Sub-Plan Name</b>	Advanced Physics (New)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• This program is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics.</li> </ul>

## Pre-Major

**Does this Program have a Pre-Major? No**

## Attachments

- Physics BS cover letter.doc: NMS Division of Arts and Sciences cover letter  
*(Letter from the College to OAA. Owner: Andereck, Claude David)*
- physicsMajorAttachment\_jan19.pdf: Info for attachment 2 above.  
*(Program Proposal. Owner: Hughes, Richard E)*

## Comments

- J. Fredal will provide feedback from Sciences CCI Subcommittee. *(by Vankeerbergen, Bernadette Chantal on 11/12/2010 08:15 AM)*

**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
Pending Approval	Hanlin,Deborah Kay Vankeerbergen,Bernadette Chantal Meyers,Catherine Anne Jenkins,Mary Ellen Bigler Nolen,Dawn	01/19/2011 03:11 PM	ASCCAO Approval

Division of Natural and Mathematical Sciences

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November 29, 2010

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, and the Sciences Subcommittee of the Arts and Sciences CCI. Feedback from these discussions 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



Department of Physics

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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>							
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		
Upper Div Math	Math 2153	CalcIII	4	Math 254	5	Content of current 254	2b
	Math 2174	LinAlg/DiffEq	3	Math 415	4	Some material from 415 and 568 (topics still under discussion)	2b
				Math 568	3		
Computing	CSE 1211	Intro to C++	2	CSE 202	4	Same content	3a
<b>Physics Core:</b>							
Introductory	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		
Intermediate	Physics 2300	Dynamics of Particles and Waves I	4	Physics 261	4	Semester sequence has same content as quarter sequence	1b,2b
	Physics 2301	Dynamics of Particles and Waves II	4	Physics 262	4		
				Physics 263	4		
	Physics 2095	Introductory Seminar	1	Physics 295	1	Same Content	6a
Upper Division	Physics 5400/5400H	E&M I	4	Physics 555	4	Sem course has all of 555 and some of 656	1c,2c
				Physics 656	4		
		Physics 5500/5500H	Quantum I	4	Physics 631	4	Sem course has all of 631 and some of 632
				Physics 632	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 Labs Core	Physics 3700	Methods in Experimental Physics	3	Physics 416	4	Same content	3a,4a,5a
	Physics 4700	Intro Electronics for Physicists	3	Physics 517	4	Same content	3b,4b,5b
	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



**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><u>Additional Required Courses, Advanced Physics Option</u></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		
	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
	Bio 113		4	Bio 113	5	Enhanced content	7c
	Earth Sci 110		3	Earth Sci 110	3	Same content	7c
	Geog 520		3	Geog 520	3	Same content	7c
	Astron 291		3	Astron 291	3	Same content	7c
	Chem 121		5	Chem 121	5	Semester sequence has same content as quarter sequence	7c
	Chem 122		5	Chem 122	5		7c
				Chem 123	5		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)
<b><u>Additional Required Courses, Life Sciences Option</u></b>							
	<b>1</b>	<b>Physics Elective From Above List</b>	<b>3</b>	<b>Elective</b>	<b>4</b>	<b>Same content</b>	<b>Course Depend</b>
		<b>Bio 113</b>	<b>4</b>	<b>Bio 113</b>	<b>5</b>	<b>Enhanced content</b>	<b>7c</b>
		<b>Bio 114</b>	<b>4</b>	<b>Bio 114</b>	<b>5</b>	<b>Enhanced content</b>	<b>7c</b>
		<b>Chem 121</b>	<b>5</b>	<b>Chem 121</b>	<b>5</b>	<b>Semester sequence has same content as quarter sequence</b>	<b>7c</b>
		<b>Chem 122</b>	<b>5</b>	<b>Chem 122</b>	<b>5</b>		<b>7c</b>
				<b>Chem 123</b>	<b>5</b>		<b>7c</b>
		<b>Chem 251</b>	<b>4</b>	<b>Chem 251</b>	<b>4</b>	<b>Semester sequence has same content as quarter sequence</b>	<b>7c</b>
		<b>Chem 252</b>	<b>4</b>	<b>Chem 252</b>	<b>4</b>		<b>7c</b>
				<b>Chem 253</b>	<b>4</b>		<b>7c</b>
		<b>Chem 254</b>	<b>2</b>	<b>Chem 254</b>	<b>3</b>	<b>Same content</b>	<b>7c</b>
		<b>Chem 255</b>	<b>2</b>	<b>Chem 255</b>	<b>3</b>	<b>Same content</b>	<b>7c</b>
<b>Learning Goal</b>	<b>1</b>	<b>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.</b>					
	<b>2</b>	<b>Undergraduate Physics majors develop powerful analytical and problem solving skills in areas involving both physics and mathematics.</b>					
	<b>3</b>	<b>Undergraduate Physics majors acquire a basic mastery of experimental physics</b>					
	<b>4</b>	<b>Undergraduate Physics majors acquire a basic mastery of data reduction and error analysis</b>					
	<b>5</b>	<b>Undergraduate Physics majors can effectively communicate their physical understanding both professionally and colloquially (orally and in writing).</b>					
	<b>6</b>	<b>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.</b>					
	<b>7</b>	<b>Undergraduate majors acquire expertise relevant to their chosen program option</b>					
	<b>Learning Goal Level</b>	<b>a: Beginning; b: Intermediate; c: Advanced</b>					





## 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.

**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 Hist Stud	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 Soc Sci 1	5	GEC	Math 568	3	LinAlg, GEC Open
	GEC Lit	5	GEC	GEC Writing 1	5	GEC	GEC Writing 2	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
	GEC Culture	3	GEC				Physics 4700	3	Elec Lab
	GEC Soc Sci 2	3	GEC				GEC Lang 1	4	GEC
	<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
	GEC Lang 2	4	GEC				Physics 5300	4	Theor Mechanics
	Free Elective	3	Free				GEC Lang 3	4	GEC
	GEC Arts	3	GEC				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>		

**Majors will be encouraged to seek input from Arts and Sciences Advisors to ensure they satisfy GEC requirements.**





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	





**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
	GEC	3	GEC #1	GEC	3	GEC #2
	CSE 1222	2	Prereq	Bio 1113	4	GEC #3
	<b>Semester Sum</b>	<b>15</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	3	Calc III, GEC #4	Math 2174	3	Diffeq/LinAlg; GEC #7
	GEC	3	GEC #5	GEC	3	GEC #8
	GEC	3	GEC #6	GEC	3	GEC #9
<b>Semester Sum</b>	<b>14</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
	GEC	3	GEC #10	Physics 4700	3	Elec Lab
	GEC	3	GEC #11	GEC Lang 1	4	GEC
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>15</b>	
2015-2016	Physics 5600	4	StatMech	Physics 5300	4	TheoretMechanics
	GEC Lang 2	4	GEC	Physics 5700	3	Adv Lab
	Free Elective	4	Free	GEC Lang 3	4	GEC
	Free Elective	3	Free	Free Elective	4	Free
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>15</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.

**GEC:** We assume there are 11 GEC 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 GEC 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
	GEC Hist Stud	3	GEC	GEC Writing 1	3	GEC
	CSE 1222	2	Prereq	Bio 1113	4	GEC
	<b>Semester Sum</b>	<b>15</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	Diffeq/LinAlg; GEC Open
	Math 2153	3	Calc III; GEC Open	Physics 3700	3	Data Ana Lab
	Minor Elective	4	Applied Spec Req	Minor Elective	4	Applied Spec Req
	GEC Writing 2	3	GEC	GEC Lit	3	GEC
	<b>Semester Sum</b>	<b>15</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	GEC Lang 1	4	GEC
	GEC Soc Sci 1	3	GEC	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
	GEC Sco Sci 2	3	GEC	GEC Arts	3	GEC
	GEC Lang 2	4	GEC	GEC Culture	3	GEC
	Free Elective	3	Free Elective	GEC Lang 3	4	GEC
	Free Elective	3	Free			
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>13</b>	
				<b>Total Hours:</b>	<b>121</b>	

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**GEC: We assume there are 11 GEC 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 GEC 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	GEC #1; premed	GEC	3	GEC #2
	CSE 1222	2	Prereq	Bio 1114	4	premed
	<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	Diffeq/LinAlg, GEC #5
	GEC	3	GEC #3	Chem 122	5	Premed
	Math 2153	3	Calc III, GEC #4	Physics 3700	3	Data Ana Lab
	Chem 121	5	Premed			
	<b>Semester Sum</b>	<b>16</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 252	4	Premed
	Chem 251	4	premed	Chem 255	2	Premed
	Chem 254	2	premed	GEC	3	GEC #7
	GEC	3	GEC #6	GEC Lang 1	4	GEC Lang
	<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
	GEC Lang 2	4	GEC Lang	GEC Lang 3	4	GEC Lang
	GEC	3	GEC #8	GEC	3	GEC #10
	GEC	3	GEC #9	GEC	3	GEC #11
	Biochem	3	Premed	Anatomy 199	3	Premed: recommended
	<b>Semester Sum</b>	<b>17</b>		<b>Semester Sum</b>	<b>16</b>	
			<b>Total Hours:</b>	<b>130</b>		
<b>Students will be advised to seek input from a pre-med advisor when selecting courses labeled "Premed".</b>						
		<b>Courses in BLUE can only be scheduled by Robin Wyatt (<a href="mailto:wyatt.60@osu.edu">wyatt.60@osu.edu</a>)</b>				
		<b>Courses in YELLOW are only offered in the quarter/semester shown.</b>				
<b>GEC: We assume there are 11 GEC 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 GEC requirements.</b>						

**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
	GEC	3	GEC #1	Bio 1113	4	GEC #3; MsEd
	GEC	3	GEC #2	CSE 1222	2	Prereq
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>16</b>	
2013-2014	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Math 2174	3	Diffeq/LinAlg, GEC #6
	Physics 3700	3	Data Ana Lab	GEC	3	GEC #7
	Math 2153	3	Calc III, GEC #4	GEC	3	GEC #8
	GEC	3	GEC #5	Free Elective	3	Free
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>16</b>	
2014-2015	Physics 5500	4	Quantum	Physics 4700	3	Elec Lab
	Physics 5400	4	E&M	GEC Lang2	4	GEC Lang
	GEC Lang1	4	GEC Lang	Geog 520	3	MsEd
	Earth Sci	3	MsEd	Astro 291	3	MsEd
				Physics 5100	4	MsEd
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>17</b>	
2015-2016	Physics Elec	4	Required Elective	Physics 5700	3	Adv Lab
	GEC Lang3	4	GEC Lang	GEC	3	GEC #10
	GEC	3	GEC #9	GEC	3	GEC #11
	Chem 121	5	MsEd	Chem 122	5	MsEd
	<b>Semester Sum</b>	<b>16</b>		<b>Semester Sum</b>	<b>14</b>	
			<b>Total Hours:</b>	<b>124</b>		

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**GEC: We assume there are 11 GEC 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 GEC requirements.**