

**From:** [im2005im@gmail.com](mailto:im2005im@gmail.com) on behalf of [Richard Hughes](#)  
**To:** [James Fredal](#)  
**Cc:** [Andereck, Dave](#); [hughes.319@osu.edu](mailto:hughes.319@osu.edu); [fredal.1@osu.edu](mailto:fredal.1@osu.edu); [Vankeerbergen, Bernadette](#)  
**Subject:** Re: FW: feedback info for Physics Major  
**Date:** Wednesday, November 24, 2010 3:18:11 PM  
**Attachments:** [responseToAscCommittee.pdf](#)  
[physicsMajorAttachment2.pdf](#)

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Hi Jim

Here is the physics department's reply to your committee's comments on the Physics Major semester conversion proposal. I also include the main text of the proposal as well. I will update the info on curriculum.osu.edu shortly. Let me know if you have any questions regarding the response.

Regards

Richard Hughes

On Fri, Nov 19, 2010 at 3:15 PM, James Fredal <james.fredal@gmail.com> wrote:

- > Dave Andereck, Richard Huges, et al.
- > The Science Subcommittee of the Committee on Curriculum and Instruction met
- > on November 10th to discuss the proposed semester conversion for the Physics
- > Major. The subcommittee voted to approve these changes with contingency,
- > based upon their questions concerning a few points. We would like to
- > receive feedback on the following questions, after which the proposal will
- > move forward to the full CCI for final approval:
- >
- > 1. In transition to semesters, with the shift from 6 to 4 tracks, will
- > there be increased pressure on or demand for certain courses (in more
- > popular tracks), and are resources in place (in terms of staffing, class
- > space, lab space, etc) to fill this demand?
- >
- > 2. Will there be pressure on the demand for advising and are resources
- > in place (availability of staff, faculty, or advanced students/peers) to
- > fill this advising demand?
- >
- > 4. The course listing does not include research: x998, x999. Would it
- > make sense to including these course offerings in advising sheets to support
- > learning goal 6?
- >
- > 5. Is there a mistake on p. 16 concerning the advanced Physics Option?
- > The Physics 4700 course appears in SP 3rd year and also in AU 4th year.
- > Should one of these offerings be 3470?
- >
- > 6. If Physics 5700 is only offered for the first time SP2014, how does
- > this scheduling decision affect students who will graduate in 2013?
- >
- > 7. More generally, will it be possible for students to graduate on
- > time? Can students take enough labs concurrently (given limitations on
- > staffing and lab space) to complete their degree in four years?
- >
- > 8. In the curriculum map, the levels of the learning goals (beginning,
- > intermediate, advanced) for each course should somehow be indicated.
- >
- > Thank you for your continued work on the proposal.
- > Jim Fredal
- > Science Subcommittee Chair, CCI



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November 20, 2010

Jim Fredal  
Science Subcommittee Chair  
Committee on Curriculum and Instruction

Dear Jim:

Our response to the CCI Science Subcommittee concerns regarding the Physics Major Semester Conversion Program is listed below.

**1. In transition to semesters, from 6 to 4 options: will there be a lot of pressure on certain courses?**

The physics course content of the quarter-based option system was fairly similar across the options (save for the Advanced option). We don't anticipate any significant enrollment changes in our physics courses based on the reduction in offered options. The reduction from 6 to 4 options simply reflects the fact that most of our students fall into the 4 options kept under semesters, and that the two options removed are effectively captured by the new "Applied" Physics option. Note: we will be moving from the "Option" tag to the "Specialization" tag in the re-submitted version of our conversion proposal.

**2. Do you foresee any resource issues (staff, lab)?**

There will be some pressure on labs in the major program, since currently we offer each of the three upper division labs (416, 517, and 616) 3 times per year and usually once per quarter. We believe with some rearrangement of lab space in Smith Lab (which will allow more students in a given lab offering) as well as some increased offering of some of the labs (possibly once in one semester and twice in the other) we should be able to manage the numbers. We do expect a small increased need for TAs to help with the larger class-size lab offerings. We do not expect resource issues with any other courses in the major program.

**3. It is recommended that the transition plan address the role of advising: e.g. how many staff will work with students.**

The proposal text has been modified to address this.

- 4. The course listing does not include research: x998, x999. Including these would make sense to support learning goal 6.**

The course listing has been modified with these courses added.

- 5. Mistake: p. 16: Advanced Physics Option: Physics 4700 appears in SP 3<sup>rd</sup> year & AU 4<sup>th</sup> year. The one in AU 4<sup>th</sup> year should probably say 3470.**

Fixed. We have updated all of the sample plans to reflect this.

- 6. Physics 5700: if only offered for the first time SP2014, how does that affect students who will graduate in 2013?**

We think there is some confusion on this question. Physics 5700 is the semester version of Physics 616. Physics 616 is offered all quarters except summer presently, and Physics 5700 (as well as 3700 and 4700) will be offered both semesters starting Fall 2012.

- 7. More generally, is it possible for a student to graduate in time? Can students take enough labs concurrently?**

The 4-year plans indicate that students in all options graduate in 4 years. We also have sample plans for all mixtures of quarter years/semester years which indicate the same. It is true that the labs cannot be taken concurrently, but that is true under our present program. Generally students take the Data Analysis Lab (Physics 416 or 3700) in their second year, the Electronics Lab (Physics 517 or 4700) in their third year, and the Advanced Lab (Physics 616 or 5700) in their fourth year.

- 8. In the curriculum map, the levels of the learning goals (beginning, intermediate, advanced) should somehow be indicated.**

Fixed. We have added tags of “a” for Beginning, “b” for Intermediate, and “c” for Advanced in the curriculum map to address this.

If the committee would like any further clarification of these points, I would be happy to provide more information. Please don't hesitate to contact me.

Regards



Richard E. Hughes  
Vice Chair of Undergraduate Studies  
The Department of Physics  
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Department of Physics

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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 1251	Calc I	5	Math 151	5	Semester sequence has same content as quarter sequence	2a
	Math 1258	Calc II	5	Math 152	5		
				Math 153	5		
Upper Div Math	Math 2249	CalcIII	3	Math 254	5	Content of current 254	2b
	Math 2431	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
Research Courses	Physics 2193	Individual Studies	Var	Physics 593	Var	Intermed Level	6b
	Physics 4193	Individual Studies	Var	Physics 693	Var	Advanced Level	6c
	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 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 option: This option 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 1251					0		
	Math 1258					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 2249					0		
	Math 2431					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	5	3.335		3.335		
<b>GEC Writing 2</b>	Course:	Sp2012	5	3.335		3.335		
<b>GEC Soc Sci 1</b>	Course:	Wi2012	5	3.335		3.335		
<b>GEC Lit</b>	Course:	Sp2012	5	3.335		3.335		
<b>GEC Hist Stud</b>	Course:	Au2010	5	3.335		3.335		
<b>GEC Bio</b>	Course:	Wi2011	5	3.335		3.335		
<b>GEC Arts</b>	Course:	<b>Au2013</b>		0	3	3		
<b>GEC Culture</b>	Course:	<b>Au2012</b>		0	3	3		
<b>GEC Soc Sci 2</b>	Course:	<b>Au2012</b>		0	3	3		
<b>GEC Open 1</b>	Course:	<b>Au2013</b>		0	3	3		
<b>GEC Open 2</b>	Course:	<b>Sp2014</b>		0	3	3		
<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	>=10	
<b>Total GEC:</b>					Total GEC Sum=	47.01	>=40	





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>Physics Teaching Option</b>								
<b>Physics Elective</b>	Course:			0		0	>=3	
<b>Bio 2</b>	Course:			0		0		
<b>Chem 1</b>	Course:			0		0		
<b>Chem 2</b>	Course:			0		0		
<b>Earth Sci</b>	Course:			0		0		
<b>Geog</b>	Course:			0		0		
<b>Astronomy</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 =		100.031	120	
<b>Life Sciences Option</b>								
<b>Physics Elective</b>	Course:			0		0	>=3	
<b>Bio 2</b>	Course:			0		0		
<b>Chem 1</b>	Course:			0		0		
<b>Chem 2</b>	Course:			0		0		
<b>Chem 3</b>	Course:			0		0		
<b>Chem 4</b>	Course:			0		0		
<b>Chem Lab</b>	Course:			0		0		
<b>Chem Lab</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 =		100.031	120	

**Advanced Physics option: This option is designed for those intending graduate level (Ph.D.) studies in physics. It provides an excellent preparation for graduate school in physics. Assumes 1 year under quarters and 3 years under semesters.**

Year	Autumn Quarter	Credit hours	Comment		Spring Quarter	Credit hours	Comment
2012-2013	Physics 1250H	5	Honors Intro		Physics 1251H	5	Honors Intro
	Math 1251	5	Calc		Math 1252	5	Calc
	GEC	3	GEC #1		Bio 1113	4	GEC #2
	CSE 1222	2	Prereq				
	<b>Semester Sum</b>	<b>15</b>			<b>Semester Sum</b>	<b>14</b>	
2013-2014	Physics 2300	4	26x conv		Physics 2301	4	26x conv
	Physics 2095	1	Survey		Physics 3700	3	Data Ana Lab
	Math 2253	3	GEC #3		Math 2431	3	GEC #5
	GEC Lang 1	4	GEC Lang		GEC Lang 2	4	GEC Lang
	GEC	3	GEC #4		GEC	3	GEC #6
	<b>Semester Sum</b>	<b>15</b>			<b>Semester Sum</b>	<b>17</b>	
2014-2015	Physics 5500H	4	Quantum		Physics 5501H	4	Quantum
	Physics 5400H	4	E&M		Physics 5401H	4	E&M
	GEC Lang 3	4	GEC Lang		Physics 4700	3	Elec Lab
	GEC	3	GEC #7		GEC	4	GEC #8
	<b>Semester Sum</b>	<b>15</b>			<b>Semester Sum</b>	<b>15</b>	
2015-2016	Physics 5600	4	StatMech		Physics 5700	3	Adv Lab
	GEC	3	GEC #9		Physics 5300	4	Theor Mechanics
	GEC	3	GEC #10		GEC	3	GEC #11
	Free Elective	4			Free Elective	3	
	<b>Semester Sum</b>	<b>14</b>			<b>Semester Sum</b>	<b>16</b>	
				<b>Total SemHour</b>	<b>121</b>	=Total Sem Hours + 0.667*(Total Qtr Hours)	

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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 option: This option 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 Quarter	Credit hours	Comment	Spring Quarter	Credit hours	Comment
2012-2013	Physics 1250H	5	Honors Intro	Physics 1251H	5	Honors Intro
	Math 1251	5	Calc	Math 1252	5	Calc
	GEC	3	GEC #1	Bio 1113	4	GEC #2
	CSE 1222	2	Prereq			
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>14</b>	
2013-2014	Physics 2300	4	26x conv	Physics 2301	4	26x conv
	Physics 2095	1	Survey	Physics 3700	3	Data Ana Lab
	Math 2253	3	GEC #3	Math 2431	3	GEC #5
	GEC Lang 1	4	GEC Lang	GEC Lang 2	4	GEC Lang
	GEC	3	GEC #4	GEC	3	GEC #6
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>17</b>	
2014-2015	Physics 5500	4	Quantum	Physics Elec	4	Required Elective
	Physics 5400	4	E&M	Physics 4700	3	Elec Lab
	GEC Lang 3	4	GEC Lang	Tech Elec	4	Min 15 hours total
	GEC	3	GEC #7	GEC	4	GEC #8
	<b>Semester Sum</b>	<b>15</b>		<b>Semester Sum</b>	<b>15</b>	
2015-2016	Tech Elec	4	Min 15 hours total	Physics 5700	3	Adv Lab
	GEC	3	GEC #9	Tech Elec	4	Min 15 hours total
	GEC	3	GEC #10	Tech Elec	3	Min 15 hours total
	Free Elective	4		GEC	3	GEC #11
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>16</b>	
				<b>Total SemHour</b>	<b>121</b>	=Total Sem Hours + 0.667*(Total Qtr Hours)

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

“Tech Elec”: Applied Option requires minimum of 15 semester hours in a area chosen by the student.

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 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 1251	5	Calc	Math 1258	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 2431	3	Diffeq/LinAlg, GEC #5
	GEC	3	GEC #3	Chem 122	5	Premed
	Math 2249	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
	<b>Semester Sum</b>	<b>14</b>		<b>Semester Sum</b>	<b>13</b>	
			<b>Total Hours:</b>	<b>124</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 1251	5	Calc	Math 1258	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 2431	3	Diffeq/LinAlg, GEC #6
	Physics 3700	3	Data Ana Lab	GEC	3	GEC #7
	Math 2249	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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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.**