THE OHIO STATE UNIVERSITY

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: October 12, 2010
Re: Semester Program Proposal for Undergraduate Physics Minor

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

The subject of this proposal is the Undergraduate Physics Minor; the other programs will be addressed in separate proposals.

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

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

Rationale for Changes to the Undergraduate Physics Major Program

There are no significant changes to the Physics minor program.

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

Course Listing and Curriculum Map for the Physics Minor

Requirements	Semester Course Number	Course Title	Semester Units		Quarter Equivalent Course Number	Quarter Credits	Notes	Relevant Learning Goals Achieved (see below)
Possible Prerequisite Courses Outside of Physics								
Introductory Math	Math 1251	Calc I	5		Math 151	5	Semester sequence has same content as quarter sequence	2
	Math 1258	Calc II	5		Math 152	5		
					Math 153	5		
Possible prerequisites, depending on courses in the Physics core below which are chosen.	Math 2249	CalcIII	3		Math 254	5	Content of current 254	2
	Math 2431	LinAlg/DiffEq	3		Math 415	4	Merges 415 and 568	2
					Math 513	3		
	CSE 1211	Intro to C++	2		CSE 202	4	Same content	3
Physics Courses Which Could be taken to Satisfy the Physics Minor								
Introductory	Physics 1250/1250H	Mechanics, Thermal Physics, Waves	5		Physics 131/131H	5	Semester sequence has same content as quarter sequence	1,2
	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	1,2,4
	Physics 2301	Dynamics of Particles and Waves II	4		Physics 262	4		
	Physics 2095	Introductory Seminar	1		Physics 295	1	Same Content	4
Upper Division	Physics 5400/5400H	E&M I	4		Physics 555	4	Semester course has all of 555 and some of 656	1,2,4
					Physics 656	4		
	Physics 5500/5500H	Quantum I	4		Physics 631	4	Semester course has all of 631 and some of 632	1,2,4
					Physics 632	4		
Physics Labs Core	Physics 3700	Methods in Experimental Physics	2		Physics 416	4	Same content	3
	Physics 4700	Intro Electronics for Physicists	3		Physics 517	4	Same content	3
	Physics 5700	Advanced Laboratory	3		Physics 616	4	Same content	3
	Physics 3455H	Honors Holography	3		Physics H455	4	Same content	3
Physics Electives:	Physics 3470	Optics	3		Physics 570	4	Same content	4
	Physics 5401H	E&M II	4		Physics 656	4	Semester course has some of 656 and all of 657	1,2,4
					Physics 657	4		
	Physics 5501H	Quantum II	4		Physics 632	4	Semester course has some of 632 and all of 633	1,2,4
					Physics 633	4		
	Physics 5600	Statistical Physics	4		Physics 621	4	Semester course has all of 621 and some of 622	1,2,4
					Physics 622	4		
	Physics 5300	Theoretical Mechanics	4		Physics 664	4	Enhanced content	1,2,4
	Physics 6802	Topics in Elementary Particle Physics	4		Physics 780.xx	4	Enhanced content	4
	Physics 6803	Topics in Astroparticle Physics	4		Physics 780.xx	4	Enhanced content	4
	Physics 6804	Topics in Atomic and Molecular Physics	4		Physics 780.xx	4	Enhanced content	4

Course Listing and Curriculum Map for the Physics Minor

Requirements	Semester Course Number	Course Title	Semester Units		Quarter Equivalent Course Number	Quarter Credits	Notes	Relevant Learning Goals Achieved (see below)
Physics Electives (continued):	**Physics 6805**	**Topics in Nuclear Physics**	**4**		**Physics 780.xx**	**4**	**Enhanced content**	**4**
	Physics 6806	**Topics in Condensed Matter Physics**	**4**		**Physics 780.xx**	**4**	**Enhanced content**	**4**
	Physics 6809	**Topics in Biophysics**	**4**		**Physics 780.xx**	**4**	**Enhanced content**	**4**
	Physics 6810	**Topics in Computational Physics**	**4**		**Physics 780.xx**	**4**	**Enhanced content**	**4**
	Physics 6820	**Special Topics**	**4**		**Physics 780.xx**	**4**	**Enhanced content**	**4**
Learning Goal	**1**	**Undergraduate Physics minors will be introduced to the fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity.**						
	2	**Undergraduate Physics minors will be exposed to powerful analytical and problem solving techniques in areas involving both physics and mathematics.**						
	3	**Undergraduate Physics minors will be introduced to experimental physics at the intermediate level.**						
	4	**Undergraduate Physics minors will acquire training in at least one area of physics at the intermediate level or beyond.**						

Semester Advising Form

Physics Minor Form							
Last name:					Address		
First Name:					City		
Middle:					Zip Code		
OSU ID							
lastname.#							
Expected graduation		(quarter)		(year)			

INSTRUCTIONS: Put grade next to appropriate course. Current semester courses should be listed as "IP" below.

Required Prereqs		
Course	**Credits**	**Grade**
Physics 1250	5	
Physics 1251	5	
Math 1251	5	
Math 1258	5	
CSE 1222	2	
Required Physics		
Course	**Credits**	**Grade**
2095	1	
2300	4	
Take 3 of the following courses, with at at least 1 from the list of courses marked *		
Course	**Credits**	**Grade**
Physics 3700 *	3	
Physics 4700 *	3	
Physics 5700 *	3	
Physics 2301	4	
Physics 5400	4	
Physics H5401	4	
Physics 5500	4	
Physics H5501	4	
Physics 5300	4	
Physics 5600	4	
Physics 3470	4	
Physics H3455	4	
Physics 68xx	4	

Signature of advisor _____ **Date** _____

Quarter Advising Sheet

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

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 are also being considered 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 may be offered during the summer prior and first two years 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 Advising Worksheet", which will be filled out for any physics major who will graduate with physics courses accumulated under both quarters and semesters.. The basic strategy is to combine credit hours accumulated under quarters, semesters, or both, in broad categories. The credit hours under quarters are weighted by 0.67, summed with semester hours for that same category, and compared to a minimum for that category. In addition, minima are defined for overall hours summed among groups of categories. The minima are chosen so that students are not penalized for course sequences taken partially under quarters and completed under semesters, while ensuring that the requirements of the program are still met. This worksheet will be filled out for every Physics 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.

Semester Transition worksheet for the Physics Minor.					
The following courses are prerequisites to the Physics courses required under the minor. Note which course was taken and the grade received.					
Course	**Credits**	**Grade**	**Course**	**Credits**	**Grade**
Physics 131	5		**Physics 1250**	5	
Physics 132	5		**Physics 1251**	5	
Physics 133	5				
Math 151	5		**Math 1251**	5	
Math 152	5		**Math 1258**	5	
Math 153	5				
CSE 202	4		**CSE 1222**	2	
Both courses below must be taken, but can be taken under either quarters or semesters.					
Course	**Credits**	**Grade**	**Course**	**Credits**	**Grade**
Physics 295	1		**2095**	1	
Physics 261	4		**2300**	4	
At least 3 courses must be taken under either quarters or semesters, with at least one of the courses chosen from those mared with a *.					
Course	**Credits**	**Grade**	**Course**	**Credits**	**Grade**
***Physics 416**	4		***Physics 3700**	3	
***Physics 416**	4		***Physics 4700**	3	
***Physics 416**	4		***Physics 5700**	3	
Physics 262	4		**Physics 2301**	4	
Physics 263	4		**Physics 5400**	4	
Physics 517	4		**Physics H5401**	4	
Physics 555	4		**Physics 5500**	4	
Physics 656	4		**Physics H5501**	4	
Physics 657	4		**Physics 5300**	4	
Physics 621	4		**Physics 5600**	4	
Physics 631	4		**Physics 3470**	4	
Physics 632	4		**Physics H3455**	4	
Physics 633	4		**Physics 68xx**	4	
Physics 664	4				
Physics H455	4				
Physics 780.xx	4				