

Cover/Signature Page - Abbreviated Template/Abbreviated Template with Curriculum

Institution Submitting Request: University of Utah
 Proposed Title: Astronomy & Astrophysics Emphasis for Physics BA/BS
 Currently Approved Title:
 School or Division or Location: College of Science
 Department(s) or Area(s) Location: Department of Physics and Astronomy
 Recommended Classification of Instructional Programs (CIP) Code¹ (for new programs): 40.0299
 Current Classification of Instructional Programs (CIP) Code (for existing programs): 00.0000
 Proposed Beginning Date (for new programs): Spring 2016
 Institutional Board of Trustees' Approval Date:

Proposal Type (check all that apply):

Regents' General Consent Calendar Items		
<i>R401-5 OCHE Review and Recommendation; Approval on General Consent Calendar</i>		
SECTION NO.		ITEM
5.1.1	<input type="checkbox"/>	Minor*
5.1.2	<input checked="" type="checkbox"/>	Emphasis*
5.2.1	<input type="checkbox"/>	(CER P) Certificate of Proficiency*
5.2.3	<input type="checkbox"/>	(GCR) Graduate Certificate*
5.4.1	<input type="checkbox"/>	New Administrative Unit
	<input type="checkbox"/>	Administrative Unit Transfer
	<input type="checkbox"/>	Administrative Unit Restructure
	<input type="checkbox"/>	Administrative Unit Consolidation
5.4.2	<input type="checkbox"/>	Conditional Three-Year Approval for New Centers, Institutes, or Bureaus
5.4.3	<input type="checkbox"/>	New Center
	<input type="checkbox"/>	New Institute
	<input type="checkbox"/>	New Bureau
5.5.1	<input type="checkbox"/>	Out-of-Service Area Delivery of Programs
5.5.2	<input type="checkbox"/>	Program Transfer
	<input type="checkbox"/>	Program Restructure
	<input type="checkbox"/>	Program Consolidation
5.5.3	<input type="checkbox"/>	Name Change of Existing Programs
5.5.4	<input type="checkbox"/>	Program Discontinuation
	<input type="checkbox"/>	Program Suspension
5.5.5	<input type="checkbox"/>	Reinstatement of Previously Suspended Program
	<input type="checkbox"/>	Reinstatement of Previously Suspended Administrative Unit

**Requires "Section V: Program Curriculum" of Abbreviated Template*

Chief Academic Officer (or Designee) Signature:

I certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

 Signature
 Printed Name:

Date:

¹ CIP codes must be recommended by the submitting institution. For CIP code classifications, please see <http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55>.

Program Request
University of Utah
Bachelor's Degrees in Physics with Astronomy & Astrophysics Emphases
04/06/2015

Section I: Request

The Department of Physics and Astronomy is requesting to add an Astronomy & Astrophysics Emphasis to its current Physics Degree. With the exception of one additional course currently under development, the proposed plan will use existing course offerings. The Department of Physics and Astronomy expects to implement this course whether or not the emphasis is approved. Therefore the impact on instructional activities is negligible. However, we expect that the implementation of an Astronomy & Astrophysics Emphasis will increase enrollment in the major, thereby making the existing, and proposed, courses in higher demand.

This proposed emphasis was approved in a meeting of the full Departmental faculty (both tenure-line and career-line) on April 7, 2015. The proposal was initiated by the Departmental Undergraduate Curriculum Committee and the Astronomy Development Committee. The proposal was then revised and approved by the entire astronomy faculty. This plan was brought to the full faculty at the annual retreat on March 23, 2015. After the initial discussion, a subcommittee met to make additional modifications. The final proposal was presented to the full faculty on April 7, 2015. After discussion, no further modifications were requested, and the faculty voted positively, 30 in favor, 0 opposed, with 0 abstentions, to approve the motion.

Section II: Need

In the past decade, the Department of Physics and Astronomy at the University of Utah has undertaken a broad array of activities to develop its strength in astronomy research and education. These include the following key activities as well as other not listed: Renaming the Department from "Physics" to "Physics and Astronomy." Hiring a large complement of new faculty with research programs in astronomy, astrophysics and allied areas. Developing multiple course offerings in astronomy and astrophysics. Implementing a Ph.D. Emphasis in Astronomy & Astrophysics. The most significant item yet to be implemented as part of this "astronomy initiative" is an undergraduate emphasis in Astronomy & Astrophysics.

Currently the department offers students the opportunity to complete a Physics Bachelor's Degree with a minor in Astronomy. There are several students currently enrolled who are working on this degree option, many more have expressed an interest in adding an Astronomy minor to their current Physics major. Students considering attending the University of Utah contact the department regularly to ask about an astronomy/astrophysics emphasis. Such a degree emphasis would be beneficial to the Department of Physics and Astronomy in recruitment, retention, and graduation.

Many Departments of Physics, Departments of Physics and Astronomy or Departments of Astronomy in the region offer degrees or emphases that are similar to the proposed emphasis. In the PAC-12, nine of the twelve universities have similar programs. In the Intermountain region, several of the universities have degrees in physics with astronomy/astrophysics emphases. In Utah, only BYU offers a degree with an astrophysics emphasis. Therefore, this is both a desirable emphasis in that it is common amongst our peers and in that it offers our students something less common in the state.

The Astronomy & Astrophysics emphasis will be similar to our current degree program, replacing several of the required courses with Astronomy electives, but maintaining the core sequence.

Section III: Institutional Impact

As the new program will be comprised mostly of existing courses, we expect the institutional impact to be minimal, with perhaps a slight increase in enrollment due to the desirability of this program. The required and elective Astronomy courses have sufficient capacity to permit a modest increase in enrollment. In addition, this change is expected to reduce the demand for some of the required courses that are currently over-subscribed, thereby better balancing the course enrollment. Therefore, there is no need for new facilities, faculty, or staff.

Section IV: Finances

As noted in Section III, there are no expected additional costs associated with this degree program. There is an expected increase in enrollment. The current advisor in the department already advises students interested in astrophysics, therefore, the only increase in the advisor's workload will be due to an increase in the number of Physics majors.

Section V: Program Curriculum

The proposed emphasis is similar to the current requirements. A core set of classes has been held intact, with the addition of astronomy and astrophysics electives selected to impart specialized knowledge of the methods and topics in astronomy. The total number of required classes is the same as the current physics degree track, with some variation in the total number of required hours based on the variation in the credit hours for each elective.

All Program Courses (with New Courses in Bold)

Course Prefix and Number	Title	Credit Hours
Required Physics/Astronomy Courses		
PHYS1970/1980	Undergraduate Seminar I & II	1,1
PHYS 2210/2220 (or 3210/3220, honors)	Physics for Scientists and Engineers I & II (or Physics for Scientists I & II)	4,4
PHYS 2215/2225	Physics Laboratory for Scientists and Engineers I & II	1,1
PHYS 3740	Introduction to Quantum and Relativity	3
PHYS 3760	Principles of Thermodynamics and Statistical Mechanics	3
PHYS 4410/4420	Classical Physics I & II	4,4
PHYS 5450	Introduction to Quantum Mechanics	4
ASTR/PHYS 2500	Foundations of Astronomy	3
Required Math Classes		
Math 1210/1220/2210 (or 1250/1260, honors)	Calculus I, II, & III (or Calculus for AP Students I & II)	4,4,3 (or 4,4)
Math 2250	Differential Equations and Linear Algebra	4

Course Prefix and Number	Title	Credit Hours
Math 3150	Partial Differential Equations for Engineering Students	2
Math 3160	Applied Complex Variables	2
Sub-Total		52 (or 49)
Elective Courses		
Select two topical classes		
ASTR/PHYS 3060	Intro to Astrophysics	3
ASTR/PHYS 3070	Intro to Galaxies	3
ASTR/PHYS 4080	Introduction to Cosmology	3
ASTR/PHYS 5560*	Stars and Stellar Populations	3
ASTR/PHYS5570*	Galaxies	3
ASTR/PHYS 5580*	Cosmology	3
ASTR/PHYS5590*	Stellar Astrophysics and Compact Objects	3
Select two practical classes		
PHYS 3719	Undergraduate Laboratory	4
PHYS 3730	Introduction to Computing in Physics	4
PHYS 3610	Electronics for Scientific Instrumentation	3
ASTR/PHYS 4060	Observational Astronomy for Scientists	3
PHYS 4999	Senior Honors Project	3
ASTR/PHYS 5015*	Observational Methods and Data Analysis	3
Select one 5000 level or higher Physics or Astronomy course		
PHYS/ASTR 5***		3-4
Sub-Total		15 - 18
Total Number of Credits		64 - 70

*classes acceptable only if advisable for the student

Program Schedule

Year 1 Fall	5 cr	Year 1 Spring	15 cr
Math 1210: Calculus I, 4		Math 1220: Calculus II, 4	
PHYS 1970: Undergraduate Seminar I, 1		PHYS 1980, Undergraduate Seminar I, 1	
		PHYS 3210: Physics for Scientists I, 4	
		PHYS 2215: Physics Laboratory for Scientists and Engineers I, 1	
Year 2 Fall	11 cr	Year 2 Spring	7 cr
Math 2210, Calculus III, 3		Math 2250: Differential Equations and Linear Algebra, 4	
PHYS 3220: Physics for Scientists II, Physics Laboratory for Scientists and Engineers II, 4,1		ASTR 3060: Intro to Astrophysics*, 3	

PHYS 2225: Physics Laboratory for Scientists and Engineers II, 1	
ASTR 2500, Foundations of Astronomy, 3	
Year 3 Fall 11 cr	Year 3 Spring 10 cr
Math 3150: Partial Differential Equations for Engineering Students, 2	PHYS 3760: Principles of Thermodynamics and Statistical Mechanics, 3
Math 3160: Applied Complex Variables, 2	PHYS 4420: Classical Physics II, 4
PHYS 3740: Introduction to Quantum and Relativity, 3	ASTR 4080: Introduction to Cosmology*, 3
PHYS 4410: Classical Physics I, 4	
Year 4 Fall 7 cr	Year 4 Spring 7 cr
PHYS 5450: Introduction to Quantum Mechanics, 4	PHYS 5***, 3-4
ASTR 4060: Observational Astronomy for Scientists*, 3	PHYS 4999: Senior Honors Project, 3

*indicates course fulfills flexible requirement



THE UNIVERSITY OF UTAH
College of Science

April 23, 2015

Martha Bradley-Evans
Senior Associate VP for Undergraduate Studies
132 Sill Center
CAMPUS

Dear Dr. Bradley:

I strongly conur with Dr. Carleton DeTar's endorsement of Dr. Adam Bolton and the Astronomy faculty's proposal to create a new degree emphasis in Astronomy and Astrophysics for BS and BA Physics degrees.

Dr. DeTar cites at least four compelling factors in support of the establishment of this emphasis: (1) strong undergraduate and graduate student interest in Astronomy and Astrophysics, (2) the documented success of similar programs at other universities, (3) the unanimous support our Physics and Astronomy faculty have expressed for the proposed plan, and (4) minimal implementation costs.

While the recent rechristening of the Department of Physics as "The Department of Physics and Astronomy" may be the most clear illustration of the growing prominence of astronomy at the University of Utah, the Department has also made new faculty hires, engaged in large-scale research collaborations, built new observational facilities, conducted intensive public outreach, and established a Ph.D. emphasis in the area of Astronomy and Astrophysics.

Because this plan would meet a significant need and demand expressed by University of Utah, because it can be established at minimal expense, and because it has been unanimously endorsed by the Physics and Astronomy chair and faculty, I enthusiastically endorse the proposal to establish a new undergraduate degree emphasis in Astronomy an Astrophysics.


Sincerely,

Henry S. White
Dean, College of Science, and
Distinguished Professor of Chemistry

MEMORANDUM

To: College of Science Curriculum Committee

From: Carleton DeTar


Date: April 7, 2015

Subject: BS/BA in Physics with an Astronomy and Astrophysics Emphasis

I am writing to endorse the proposal from the faculty of the Department of Physics and Astronomy to create a transcriptable degree emphasis in "Astronomy and Astrophysics" within the BS and BA Physics degrees,

A decade ago we added an astronomy component to our department and assumed a new name, the Department of "Physics and Astronomy". Over the years we have developed and added several course offerings in astronomy and astrophysics, ranging from lower division to advanced graduate level. We added an undergraduate minor in Astronomy and a PhD track with an emphasis in Astronomy and Astrophysics. The next logical step is the creation of an Astronomy and Astrophysics emphasis within the Physics BS and BA degrees. Similar options are quite common among our peer Physics and Astronomy departments.

We get regular inquiries from current and prospective Physics majors about degree options with an astronomy or astrophysics emphasis. We believe that offering students this choice will help in recruiting, retention, and graduation success.

This degree option is a variation on our most rigorous degree track, the "Pre-Professional" track. It retains the core of that track and makes carefully considered replacements of the remaining required courses with appropriate astrophysics/astronomy courses and electives. The result is a four-year degree program with slightly fewer required credits than the Pre-Professional track but slightly more than our Applied Physics track. We believe the result retains a rigor and depth appropriate to a BS or BA in Physics.

Adding this degree option can be done at minimal expense because the faculty and courses to support the program are already in place.

The degree emphasis has the unanimous support of our astronomy faculty. In a faculty meeting on April 7, 2015, consisting of both tenure-line and career-line faculty members, the entire faculty voted 30 yes, 0 opposed and 0 abstaining to approve the proposal.

For these reasons I endorse the proposed degree emphasis enthusiastically.