LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
	App-10/20/11	11-33b	App-10/25/11	App-11/08/11

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Stanley Sobolewski/Devki Talwar	sobolews@iup.edu talwar@iup.edu
Proposing Department/Unit	**Phone**
Department of Physics	724 357 2370

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

☐ New Course ☐ Course Prefix Change ☐ Course Deletion
☐ Course Revision ☐ Course Number and/or Title Change ☐ Catalog Description Change

Current Course prefix, number and full title	*Proposed course prefix, number and full title, if changing*

2. Additional Course Designations: check if appropriate

☐ This course is also proposed as a Liberal Studies Course.
☐ This course is also proposed as an Honors College Course.
☐ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

☐ Catalog Description Change ☐ Program Revision
☐ New Degree Program ☐ Program Title Change ☐ Other
☐ New Minor Program ☑ New Track

Current program name	*Proposed program name, if changing*
	Bachelors of Science in Physics/Pre Engineering Track

4. Approvals		**Date**
Department Curriculum Committee Chair(s)		9/7/2011
Department Chair(s)		9/7/2011
College Curriculum Committee Chair		9/22/11
College Dean		9/22/11
Director of Liberal Studies *		10/24/11
Director of Honors College *		
Provost *		9/23/11
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail Sechrist	10/25/11

Received
OCT 13 2011
Liberal Studies

Received
SEP 22 2011
Liberal Studies

Revised 4/19/2011 & 9/7/11

Part I. Curriculum Proposal Cover Sheet (see above)

Part II. Description of Curriculum Change

1. Complete catalog description for the new track. This includes both the description about the track and the list of courses and credits for the new track.

Catalog Description

Bachelor of Science – Physics / Pre- Engineering Track

Liberal Studies: As outlined in Liberal Studies section with the following specifications:		44
Mathematics: MATH 125 **Natural Science:** PHYS 131-141 and 132-142 **Liberal Studies Electives:** 3cr, MATH 126, no courses with PHYS prefix		
Major:		34
Required Core Courses:		
PHYS 131 Physics I-C Lecture	*cr (1)	
PHYS 132 Physics II-C Lecture	*cr (1)	
PHYS 141 Physics I-C Lab	*cr (1)	
PHYS 142 Physics II-C Lab	*cr (1)	
PHYS 331 Modern Physics	3cr	
PHYS 345 Optics	3cr	
PHYS 441 Classical Mechanics	3cr	
PHYS 451 Electricity and Magnetism	3cr	
Additional Required Physics Courses: (2)		
PHYS 231 Electronics	4cr	
PHYS 342 Thermal and Statistical Physics	3cr	
PHYS 350 Intermediate Experimental Physics I	3cr	
PHYS 355 Computer Interfacing	3cr	
PHYS 401 Theoretical Physics	3cr	
PHYS 461 Quantum Mechanics I	3cr	
PHYS 472 Nuclear Physics or 490 Solid State Physics	3cr	
Controlled Electives: as required per engineering program		
Chemical Engineering:		6-8
CHEM 231 Organic Chemistry I	4cr	
CHEM 232 Organic Chemistry II	4cr	
Civil Engineering:		
MATH 216 Probability and Statistics for Natural Sciences	3cr	
—— Technical elective	3-4cr	
Electrical Engineering:		
MATH 216 Probability and Statistics for Natural Sciences	3cr	
—— Technical elective	3-4cr	
Industrial Engineering:		
MATH 216 Probability and Statistics for Natural Sciences	3cr	
—— Technical elective 3-4cr	3-4cr	
Materials Science and Engineering:		
CHEM 231 Organic Chemistry I	4cr	
CHEM 232 Organic Chemistry II	4cr	
Mechanical Engineering:		
—— Technical electives	6-8cr	
Other Requirements:		23-29
CHEM 111 General Chemistry I	4cr	
CHEM 112 General Chemistry II	4cr	
COSC 110 Problem Solving and Structured Programming	3cr	
COSC 250 Intro to numerical methods	3cr	
MATH 225 Calculus III	3cr	
MATH 241 Differential Equations	3cr	
MATH 342 Advance Math for Applications	3cr	
Foreign Language Intermediate Level (3)	0-6cr	
Free Electives – if no automatic transfer into the University of Pittsburgh		5-13

Special Requirements:

Two years at University of Pittsburgh School of Engineering (4)

(#) Total Degree Requirements: **120**

(1) Credits are counted in the Liberal Studies Natural Science requirement.

(2) courses may be taken at Pitt

(3) 6cr of computer programming will substitute for the foreign language requirement: COSC 110, COSC 210 or higher-level computer science courses (COSC 250 recommended), with department permission.

(4) A 2.8 cumulative GPA is required for transfer to the University of Pittsburgh. Students transferring to Pitt do not need a second writing intensive class. Students need at most 64 additional credits from Pitt to receive the engineering degree.

(#) See advisory paragraph "Timely Completion of Degree Requirements" in the section on Requirements for Graduation. Students earn two degrees, hence the high credit count.

2. Detailed Description of the Bachelor of Science - Physics/Pre- Engineering Track

Rationale and Justification for the Physics/Pre- Engineering Track

For more than twenty years, there has been an articulation agreement between the University of Pittsburgh and IUP regarding a 3/2 BS Natural Science pre-engineering program. Prospective students enrolled in this program spend 3 years at IUP and complete introductory core science and liberal study course requirements. After completing 90 to 92 credits of the required course work, the students are eligible to apply to their chosen engineering department and spend 2 years at University of Pittsburgh to earn a BS degree in engineering. In view of the advances in the field of engineering, the IUP Physics Department and University of Pittsburgh School of Engineering have agreed that the students should take more Physics courses at IUP – specifically PHYS 441 Classical Mechanics, PHYS 355 Computer Interfacing, PHYS 345 Optics, and PHYS 350 Intermediate experimental Physics.

It is worth mentioning that many of the skills required of an engineer intersect those of a physicist. They take the same science and math classes, require a cogent understanding of the natural world, and use similar data gathering techniques. More than half of the IUP Physics Department's seminar speakers typically come from a school of engineering. Therefore, it makes sense that a dual degree engineering program would come out of the Physics department.

Pre-engineering students have an administrative connection to the physics department. The pre-engineering advisor is always a physics department faculty member; the first two year course sequence is the same as physics major. Pre-engineering students also participate in the Physics Club; these students feel that Physics is their home department. Therefor it follows that the most appropriate place for the pre-engineering program is in the physics department.

The benefit of the Pre-engineering program for the students is: lower class size, an institutional concentration on instruction, and cost. The more classes a student takes at IUP, the less he/she will spend for his/her education at Pittsburgh. The Classical Mechanics, Optics, Electromagnetic Theory and Computer interfacing courses taken at IUP have counterparts at the engineering school. Earning more physics credits at IUP may decrease the total student's cost of education. The contact from Pitt engineering program has also agreed with the idea that students taking more physics will improve the quality of the incoming transfer student.

Part III. Implementation - Provide answers to the following questions:

1. How will the proposed new track affect students already in the existing program?

Students in the current B.S. Natural Science / pre-engineering program will be able to transfer to the new B.S. Physics / pre-engineering track without much difficulty. The Natural Science Pre-engineering students are required to take the same sequence of introductory courses; the courses they are currently taking are perquisites to upper level physics course. The upper level physics courses will be able to accommodate the pre-engineering students. (see resource questions to follow)

2. Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty.

While it is anticipated that the enrollment in some of the upper level class will increase, the number will not increase past the occupancy limit of classrooms in Weyandt Hall. There will be no additional need for added sections, and therefore no additional faculty resources will be required

3. Are other resources adequate? (Space, equipment, supplies, travel funds)

Most classrooms where physics courses are taught can hold 30 to 50 students; currently there are about 20 per class, so space is adequate. Equipment and supplies are only an issue in one class, PHYS 350. Up to this point in time the class maximum has been 16, so there is still room for expansion in that class. Historically, students have worked in groups of two in this class. If students in this course work in groups of three, rather than two, then up to 24 students could be accommodated. Each laboratory experiment has enough tasks to keep three students just as busy as two students. Travel funds are not required.

4. Do you expect an increase or decrease in the number of students as a result of these revisions? If so, how will the department adjust?

The total number of students in the BS Physics program would increase due to the addition of Pre-Engineering students. Students in the Natural Science Pre-Engineering track would transfer into this new track. The Pre-Engineering students might take some of their upper level physics courses, (PHYS 342, PHYS 350 and PHYS 355 for example) at the engineering school. Since pre engineering students will take junior and senior level courses at the engineering school, this program revision will have less of an impact on those courses.

Part IV. Periodic Assessment

Departments are responsible for an on-going review of curriculum. Include information about the department's plan for program evaluation:

The department evaluates both students currently in the program as well as graduates. Current students are assessed at the beginning and at the end of the program. During the first week of the

first physics course, (PHYS 131) all students must take the Force Concept Inventory (FCI), a nationally recognized assessment on physics thinking. The test distinguishes between Aristotelian thinkers and Newtonian thinkers. Students below a certain score are required to talk to their advisor during the second week of class. During this advisement meeting, the advisor will ask about the student's background, performance in other courses and will advise the student to seek extra help, especially in the physics department's tutoring center. Advisers will carefully monitor the progress of students in this category. At the end of the same semester, students will again take the FCI and the improvement of the class as a whole as well as the target individuals will be examined. If over a few semesters, a sufficient number of students do not show a significant gain in their scores, the department will consider a modification of the introductory course sequence. The second assessment is given to students in their eighth semester. This assessment is a collection of physics problems from the various topics in physics that the students must solve. While there is no target score, this assessment identifies the areas where our students might perform better. The result of this program evaluation has resulted in the development of the new course PHYS 401, which shows the students connection between various topics in physics. These two assessments have a yearly cycle, the first in the fall and the second in the spring.

The department also surveys graduates. We asked them what their current position is, the usefulness of different courses, and ways to change the program for the better. While we are happy to learn that most of our graduates are successful in their field and have positive things to say about our program, there has not been a major change as a result of this assessment.

Students enrolled in the physics education program also take the ETS administered PRAXIS II test. When this assessment was first required, some of our students did not achieve a satisfactory score. Over the years we have changed our advising policy to include meetings with the Physics education majors twice per month. Since we have invoked this policy, all of our Physics education majors have passed the PRAXIS II test on the first attempt.

Additionally, since the pre-engineering students enter the program with the intent of matriculating at an engineering school, the issue of student tracking becomes important. The Physics Department will develop a pre-engineering tracking form. This form will be filled out at the student's initial registration. The intended engineering school, as well as the coursework completed will be evaluated and recorded by the pre engineering advisor during the advising and registration session every semester. The tracking forms of the pre-engineering students who have left IUP will be collected and kept in a separate folder in the department office. Once per semester the pre-engineering tracking forms will be reviewed, and the students who have left IUP will be reminded to send their credits back to IUP and complete the application for graduation so the student will earn the B.S. in Physics.

Part V. Course Proposals

There are no new courses proposals.

Part VI. Letters of Support or Acknowledgement

This track will replace the Natural Science Pre-engineering Track. Departments that are affected by this change have been contacted. These letters acknowledgement are in the Natural Science pre engineering track program deletion. They are also attached below.

E mails with read receipts were sent to the chairs of Philosophy, Political Science and Economics.

Stanley Sobolewski

From: Stanley Sobolewski <sobolews@iup.edu> **Sent:** Tuesday 5 April 2011 1:49 PM **To:** 'mmacleod@iup.edu' **S**
Notification of Change in pre-engineering currculum

Dr. MacLeod,

The College of Natural Science and Mathematics is reorganizing some of its programs. The Pre-Engineering Progr moved from the Natural Science Department into the Physics Department, as a track in the B.S. Physics Degree. T result in curriculum changes.

Specifically, the new track will not have a proscribed Philosophy course. In the NSM pre-engineering track, PHIL 2 required. This constraint is being removed since the track is being deleted. The number of students involved in th fewer than ten per year.

For our curriculum process, all I need is verification that I have informed your department of this change, hence a acknowledgement is all I need.

Thanks,

Stan.

Stan, Thank you. I'm aware of the change.

Mary MacLeod
Associate Professor
Department of Philosophy, Chair
Indiana University of Pennsylvania

mmacleod@iup.edu

Stanley Sobolewski

From: Stanley Sobolewski <sobolews@iup.edu> **Sent:** Tuesday 5 April 2011 1:49 PM **To:** 'jfsitton@iup.edu' **Subj** Notification of Change in pre-engineering currculum

Dr. Sitton,

The College of Natural Science and Mathematics is reorganizing some of its programs. The Pre-Engineering Progr moved from the Natural Science Department into the Physics Department, as a track in the B.S. Physics Degree. T result in curriculum changes.

Specifically, the new track will not have a proscribed Social Science course. In the NS pre-engineering track, PLSC 111 were required. This constraint is being removed since the track is being deleted. The number of students inv change is fewer than ten per year.

For our curriculum process, all I need is verification that I have informed your department of this change, hence a acknowledgement is all I need.

Thanks,

Stan.

Your message

To: jfsitton@iup.edu
Subject: Notification of Change in pre-engineering currculum
Sent: 4/5/2011 1:49 PM

was read on 4/5/2011 3:39 PM.

Stanley Sobolewski

From: Stanley Sobolewski <sobolews@iup.edu> **Sent:** Tuesday 5 April 2011 1:49 PM **To:** 'Nicholas.Karatjas@iup
Subject: Notification of Change in pre-engineering currculum

Dr. Karatjas,

The College of Natural Science and Mathematics is reorganizing some of its programs. The Pre-Engineering Progr
moved from the Natural Science Department into the Physics Department, as a track in the B.S. Physics Degree. T
result in curriculum changes.

Specifically, the new track will not have a proscribed Social Science course. In the NSM pre-engineering track, ECC
required. This constraint is being removed since the track is being deleted. The number of students involved in th
fewer than ten per year.

For our curriculum process, all I need is verification that I have informed your department of this change, hence a
acknowledgement is all I need.

Thanks,

Stan.

Stan -

Thank you for letting us know about the change in the Pre-Engineering Program. I acknowledge that we are now a
ECON 121 will no longer be required.

Nick Karatjas

Chairperson

Department of Economics