

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

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Devki Talwar or Stanley Sobolewski	Email Address sobolews@iup.edu
Proposing Department/Unit Physics	Phone (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		
<u>Current</u> Course prefix, number and full title		<u>Proposed</u> 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. ☐ Other: (e.g., Women's Studies, Pan-African) ☐ This course is also proposed as an Honors College Course.		
3. Program Proposals ☐ New Degree Program ☐ Program Title Change ☐ Program Revision ☐ New Minor Program ☒ New Track ☐ Other		
<u>Current</u> program name		<u>Proposed</u> program name, if changing
4. Approvals Department Curriculum Committee Chair(s) Department Chair(s) College Curriculum Committee Chair College Dean Director of Liberal Studies * Director of Honors College * Provost * Additional signatures as appropriate: (include title) UWUCC Co-Chairs		Date 9/7/2011 9/7/2011 9/22/11 9/22/11 10/24/11 9/23/11 10/25/11

Received

OCT 13 2011

Liberal Studies

Received

SEP 22 2011

Liberal Studies

Part I. Curriculum Proposal Cover Sheet (see above)

Part II. Description of Curriculum Change

1. Catalog description

Bachelor of Science –Physics/ Nanomanufacturing Technology 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: 46

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

Required PSU Capstone:

NMTT 311 Materials, Safety, and Equipment Overview for Nanofabrication 3cr

NMTT 312 Basic Nanofabrication Process 3cr

NMTT 313 Thin Films in Nanofabrication 3cr

NMTT 314 Lithography and Patterning Techniques 3cr

NMTT 315 Materials Modification in Nanofabrication 3cr

NMTT 316 Characterization, Packaging, and Testing of Nanofabrication Structures 3cr

Additional Required Courses:

PHYS 231 Electronics 4cr

PHYS 350 Intermediate Experimental Physics I 3cr

PHYS 355 Computer Interfacing 3cr

PHYS 475 Physics of Semiconductor Devices I 3cr

PHYS 476 Physics of Semiconductor Devices II 3cr

Other Requirements: 17-23

CHEM 111 General Chemistry I 4cr

CHEM 112 General Chemistry II 4cr

COSC 110 Problem Solving & Structural Programming 3cr

COSC 250 Introduction to Numerical Methods 3cr

Foreign Language Intermediate Level (2) 0-6cr

Free Elective: 7-13

Total Degree Requirements: 120

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

(2) 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.

2. Detailed Description of the Bachelor of Science – Physics/ Nanomanufacturing Technology Track (NMT)

Rational and Justification for the Physics/ Nanomanufacturing Technology Track

Nanotechnology manufacturing is a rapidly growing, high tech industry. The growth of this field led to the development of the Nanotechnology center at Penn State University. This multi-million dollar facility offers certificates in Nanotechnology manufacturing; several PASHEE schools collaborate with the NMT center and offer degrees incorporating the educational opportunities of the NMT center. IUP is one of them, and a few years ago, the B.S. in Applied Physics / Nanotechnology Track was implemented.

From the physics department's internal analysis, brought about by the five-year review, we have decided to consolidate our degree offerings. Due to the similar nature of the programs offered by the Physics department, consolidating programs into tracks has benefits for the student as well as the department. All tracks of the physics major will take the same core sequence of courses; increasing the enrollment in these courses to a viable level. In years past, low enrolled courses have been canceled, resulting in a serious disruption in the student progression toward timely graduation.

The Nanomanufacturing program is being moved from a track in the Applied Physics program to a track in the Bachelors of Science – Physics program. Technically, this is a new track. However, the students in the Bachelor of Science – Physics/ Nanomanufacturing Technology Track will be taking the same courses as the Bachelor of Science – Applied Physics/ Nanomanufacturing Technology Track. In the near future, the Bachelor of Science – Applied Physics/ Nanomanufacturing Technology Track will be eliminated. Students in the eliminated BS Applied Physics/ NMT Track will be able to easily change to the BS in Physics /NMT track. The department is also restructuring other degrees, so the change in this program is brought about by changes in other physics programs.

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

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

Students in current B.S. Applied Physics / Nanomanufacturing Technology Track will be able to transfer to the new B.S. Physics / Nanomanufacturing Technology Track without any difficulty.

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 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. The maximum enrollment is 25. Up to this point in time the class maximum has been 16, so there is still room for expansion in that class. 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 Physics Department would remain unchanged following this rearrangement - the students in the separately listed Applied Physics Program (now deleted) would transfer into the new track.

5. Intended implementation date (semester and year).

The program will be implemented in the fall of 2011.

Part IV. Periodic Assessment

The evaluation of this program will follow the departmental procedures for evaluation

1. 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 departments 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 and 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.

Part V. Course Proposals

No new courses are being proposed

Part VI. Letters of Support or Acknowledgement

NA