LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		09-110 08-74a	R-3/10/09 Apprv 11/10/09	APP 1/26/10

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Devki Talwar/Stanley Sobolewski	talwar@iup.edu/sobolews@iup.edu
Proposing Department/Unit Physics	Phone 7-4590 or 7-2370

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

X 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)

X Catalog Description Change X Program Revision

3. Program Proposals

New Degree Program | Program Title Change | Other

New Minor Program | New Track

Current program name BA in Physics	*Proposed program name, if changing*

4. Approvals		**Date**
Department Curriculum Committee Chair(s)	[signature]	4/6/09
Department Chair(s)	[signature]	4/8/09
College Curriculum Committee Chair	[signature]	04/06/09
College Dean	[signature]	04/07/09
Director of Liberal Studies *	[signature]	12/15/09
Director of Honors College *		
Provost *	[signature] (rm)	5/12/09
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail Sechrist	11/18/09

Received
NOV 18 2009
Liberal Studies

Received
APR 06 2009
Liberal Studies

Part I. Curriculum Proposal Cover Sheet (see above)

Part II. Description of Curriculum Change

1. Catalog description

Note: The revised catalog description applies to the Department's **"Bachelor of Arts – Physics"** program in the appropriate form. This includes both the description about the program and the list of courses and credits for the revised program.

Bachelor of Arts – Physics

Liberal Studies: As outlined in Liberal Studies section with the following specifications:			48
Mathematics: MATH 125			
Natural Science: PHYS 131-141 and 132-142			
Liberal Studies Electives: 3cr, MATH 126, no courses with PHYS prefix			
Major:			25
Required 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 231	Electronics	4cr	
PHYS 331	Modern Physics	3cr	
PHYS 350	Intermediate Experimental Physics I	3cr	
PHYS 441	Classical Mechanics	3cr	
PHYS 451	Electricity and Magnetism	3cr	
PHYS 461	Quantum Mechanics I	3cr	
Controlled Electives:			
Two additional PHYS majors course		6cr	
Other Requirements: (1)			25-31
COSC 110	Problem Solving and Structured Programming	3cr	
MATH 225	Calculus III	3cr	
MATH 241	Differential Equations	3cr	
MATH 342	Advanced Mathematics for Applications	4cr	
Additional Natural Science Sequence		6cr	
Additional Social or Natural Science Sequence (advanced)		6cr	
Foreign Language Intermediate Level (2,3)		0-6cr	
Free Electives:			16-22
Total Degree Requirements:			120

(1) Credits are counted in the Liberal Studies Natural Science requirement.
(2) Intermediate-level Foreign Language may be included in Liberal Studies electives.
(3) 6cr of computer language may substitute for the foreign language requirement: COSC 110 and 210 or higher-level computer science courses (COSC 250 recommended), with department permission.

2. Summary of changes:

We have made the following changes in the **"Bachelor of Arts – Physics"** program: (i) Liberal studies credits are changed from 50 to 48 due to changes in the MATH 125, 126 credits, (ii) Major required course credits have been changed from 28 to 25 due to the changes of credits in the new courses PHYS 441, 451, 461. PHYS 351 will be an elective in the new program, (iii) Other requirements are not changed, (iv) Free elective credits are changed from 14-20 to 19-22. We have deleted the courses PHYS 222 (2cr), PHYS 223 (2cr), PHYS 322 (2cr), PHYS 323 (2cr) and added 2 new courses i.e., PHYS 441 (3cr), and PHYS 451 (3cr) and revised the PHYS 473 (4cr) course by changing its number of credits from 4 to 3 and the course number to PHYS 461.

2 (a) Comparison of current and proposed program.
Bachelor of Arts – Physics

Old Program

Liberal Studies: As outlined in Liberal Studies section with the following specifications: **Mathematics:** MATH 123 **Natural Science:** PHYS 131-141 and 132-142 **Liberal Studies Electives:** 4cr, MATH 124, no courses with PHYS prefix			50
Major:			
Required Courses:			28
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 222	Mechanics I	2cr	
PHYS 223	Mechanics II	2cr	
PHYS 231	Electronics	4cr	
PHYS 322	Electricity and Magnetism I	2cr	
PHYS 323	Electricity and Magnetism II	2cr	
PHYS 331	Modern Physics	3cr	
PHYS 350	Intermediate Experimental Physics I	3cr	
PHYS 351	Intermediate Experimental Physics II	3cr	
PHYS 473	Quantum Mechanics I	4cr	
Controlled Electives:			
One additional PHYS majors course		3cr	
Other Requirements: (1)			22-28
Additional Mathematics and Computer Science			
COSC 110	Problem Solving and Structured Programming	3cr	
MATH 241	Differential Equations	3cr	
MATH 342	Advanced Mathematics for Applications	4cr	
Additional Natural Science Sequence		6cr	
Additional Social or Natural Science Sequence (advanced)		6cr	
Foreign Language Intermediate Level (2,3)		0-6cr	
Free Elective:			14-20
Total Degree Requirements:			120

(1) Credits are counted in the Liberal Studies Natural Science requirement.
(2) Intermediate-level Foreign Language may be included in Liberal Studies electives.
(3) 6cr of computer language m ay substitute for the foreign language requirement: COSC 110 and 210 or higher-level computer science courses (COSC 250 recommended), with department permission.

New Program

Liberal Studies: As outlined in Liberal Studies section with the following specifications: **Mathematics:** MATH 125 **Natural Science:** PHYS 131-141 and 132-142 **Liberal Studies Electives:** 3cr, MATH 126, no courses with PHYS prefix			48
Major:			
Required Courses:			25
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 231	Electronics	4cr	
PHYS 331	Modern Physics	3cr	
PHYS 350	Intermediate Experimental Physics I	3cr	
PHYS 441	Classical Mechanics	3cr	
PHYS 451	Electricity and Magnetism	3cr	
PHYS 461	Quantum Mechanics I	3cr	
Controlled Electives:		6cr	
Two additional PHYS majors courses			
Other Requirements: (1)		6cr	
Additional Mathematics and Computer Science:			25-31
COSC 110	Problem Solving and Structured Programming	3cr	
MATH 225	Calculus III	3cr	
MATH 241	Differential Equations	3cr	
MATH 342	Advanced Mathematics for Applications	4cr	
Additional Natural Science Sequence		6cr	
Additional Social or Natural Science Sequence (advanced)		6cr	
Foreign Language Intermediate Level (2,3)		0-6cr	
Free Elective:			16-22
Total Degree Requirements:			120

(1) Credits are counted in the Liberal Studies Natural Science requirement.
(2) Intermediate-level Foreign Language may be included in Liberal Studies electives.
(3) 6cr of computer language may substitute for the foreign language requirement: COSC 110 and 210 or higher-level computer science courses (COSC 250 recommended), with department permission.

2 (b) List of all associated course changes

Course Proposals Associated with Program Revisions

New #	Old #	Title	New Format	Old Format	Revision
PHYS 441	N/A	Classical Mechanics	3c-01-3cr	N/A	New Course
PHYS 451	N/A	Electricity & Magnetism	3c-01-3cr	N/A	New Course
PHYS 461	PHYS 473	Quantum Mechanics I	3c-01-3cr	4c-01-4cr	Revised
	PHYS 222	Mechanics I		2c-01-2cr	Deleted
	PHYS 223	Mechanics II		2c-01-2cr	Deleted
	PHYS 322	Electricity & Magnetism I		2c-01-2cr	Deleted
	PHYS 323	Electricity & Magnetism II		2c-01-2cr	Deleted
	PHYS 351	Intermediate Experimental Physics II		0c-6l-3cr	Deleted

3. Need for the changes

From the physics departments' student assessment plan, it has become clear that the students do not make broad connections between the various sub-disciplines in our physics programs. Therefore, the department decided to restructure its Bachelor of Science (BS) and Master of Science (MS) degree programs. In this restructuring process 2 new dual level courses are proposed (i) PHYS 441/541: Classical Mechanics, (ii) PHYS 451/551: Electricity & Magnetism, and (iii) revised the PHYS 461/561: Quantum Mechanics I. PHYS 351 Intermediate Experimental Physics II will be removed from the program; primarily for logistical reasons. The material in the deleted course is covered adequately in PHYS 350 Intermediate Physics I. With these new/revised courses the department has decided to offer some of its major courses in alternate years to make our programs more efficient and to effectively use of the department resources. It should be noted that this program revision will have no effect on the liberal study components, the titles of the physics programs or the degree designations.

3 (a) Rationale/Justification

PHYS 441/541 Classical Mechanics

The proposed course will replace the existing PHYS 222 and PHYS 223 – a two semester sequence for a total of four credit hours which covers intermediate and advance levels of mechanics. The sequential course offerings in both semesters are not currently suitable or required for all the physics department programs and as a result it is impossible to insure adequate enrollment in both courses every year. The new dual level 3 credit PHYS 441/541 will be a required course for all physics majors but may be attended by anyone who meets the prerequisites. It will cover the classical mechanics of particles and systems, including Newtonian mechanics, oscillations, gravitation, the calculus of variations, Lagrangian mechanics, central force systems, non-inertial reference frames and rigid bodies.

PHYS 451/551 Electricity and Magnetism

The proposed course will replace the existing PHYS 322 and PHYS 323 – a two semester sequence for a total of four credit hours which covers Electricity and Magnetism at advances levels. The sequential course offerings in both semesters are not currently suitable or required for all the physics department programs and as a result it is impossible to insure adequate enrollment in both courses every year. The new dual level 3 credit PHYS 451/551 will be a required course for all physics majors but may be attended by anyone who meets the prerequisites. It will cover intermediate and advanced

level of Electricity and Magnetism with topics including Electrostatic, Electric Fields in Matter, Magnetostatics, Magnetic Fields in Matter, Electrodynamics, Electromagnetic Waves, Potential and Fields.

PHYS 461/561 Quantum Mechanics I

The proposed 3 credit dual level course will replace the existing 4 credit course as part of the major curriculum revision in the Physics Department. PHYS 461/561 will cover material from the junior/senior undergraduate level to the first year graduate level of Quantum Mechanics. This course is planned to be offered in sequence with a graduate level course PHYS 661 Advanced Quantum Mechanics. The Department felt it appropriate to reduce the number of credit hours for the existing course to mesh it with most of the other 3 credit dual level courses. The course contents have been slightly modified to present the core of quantum mechanics at the undergraduate level along with topics at the first year graduate level covering topics including Historical developments, Schrodinger Equation, One-dimensional Quantum Mechanical Systems, Harmonic Oscillator, Schrodinger Equation in 3-Dimensions, The Hydrogen Atom, Anomalous Zeeman Effect, etc.

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

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

   For current students, the physics department will allow the new courses to count in lieu of the ones in the current catalog.

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.**

   The change in the Mathematics sequence has been approved, and any impact on faculty resources has been examined by the Mathematics Department. The physics department consolidation will result in fewer courses necessary for the degree. This, in combination with a course, rotation sequence, will result in a decrease in required resources.

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

   Yes.

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?**

   There will be no change in the number of students.

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 assessment of the proposed changes describe in this proposal will be performed as part of the Physics Departments' overall curriculum assessment policies.

Part V. Course Proposals

Four new courses are proposed by the physics department for this program change.

Part VI. Letters of Support or Acknowledgement

N/A