LSC Use Only Proposal No:	UWUCC Use Only Proposal No: 13-14c 14-56.
LSC Action-Date: AP-10/4/12	UWUCC Action-Date: App-9/30/14 Senate Action Date: App 11/4/14

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) **Stan Sobolewski**	Email Address **sobolews@iup.edu**
Proposing Department/Unit **Physics**	Phone **7-4590 or 7-2370**

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

1. Course Proposals (check all that apply)

_____ New Course _____ Course Prefix Change _____ Course Deletion

X Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

Current course prefix, number and full title: **PHYS 111 Physics I Lecture**

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate

X This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

_____ Learning Skills X Knowledge Area _____ Global and Multicultural Awareness _____ Writing Intensive (include W cover sheet)

_____ Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

_____ Global Citizenship _____ Information Literacy _____ Oral Communication

_____ Quantitative Reasoning _____ Scientific Literacy _____ Technological Literacy

3. Other Designations, as appropriate

_____ Honors College Course _____ Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

_____ Catalog Description Change _____ Program Revision _____ Program Title Change _____ New Track

_____ New Degree Program _____ New Minor Program _____ Liberal Studies Requirement Changes _____ Other

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)		4/23/2012
Department Chairperson(s)		4/23/2012
College Curriculum Committee Chair		4/23/12
College Dean		4/23/12
Director of Liberal Studies (as needed)		9/25/14
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs		9/30/14

Received SEP 10 2014 Liberal Studies

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COURSE SYLLABUS

I. CATALOG DESCRIPTION

PHYS 111 Physics I Lecture 3c-0l-3cr

Prerequisites: Elementary algebra and trigonometry
General college physics; mechanics, wave motion and sound.

II. COURSE OBJECTIVES

(1) Students will be able to describe the main concepts of classical mechanics, heat, and sound. Students will provide illustrative examples and will be able to demonstrate their application to related sciences and their use in modern technology.

EUSLO 1 *Informed Learners*

Rationale: Homework and tests will include questions on mechanics, heat, and sound. Working on these questions and solving these problems will inform the learner about the topics in the course.

(2) The students will describe the motion of bodies under the influence of forces by applying the laws and theories of physics.

EUSLO 1 *Informed Learners and* EUSLO 2 *Empowered Learners*

Rationale: Homework problems will require students to understand the laws of physics. Selected questions in the homework or tests will require the student to use a variety of problem solving strategies. This will inform the learner about the laws of physics, as well as empowering him or her to solve such problems.

(3) Students will be able to perform quantitative analysis of relatively simple physical systems involving motion using algebra and trigonometry.

EUSLO 1 *Informed Learners and* EUSLO 2 *Empowered Learners*

Rationale: Homework problems will require the students to quantitatively analyze simple physical systems. The ability to analyze simple physical systems will empower the learner to solve other such problems in the future.

(4) Students will solve problem sets to develop the required mathematical skills and knowledge necessary to handle the concepts quantitatively.

EUSLO 1 *Informed Learners and* EUSLO 2 *Empowered Learners*

Rationale: Homework problems will require the students to quantitatively analyze simple physical systems. A majority of the homework problems will require algebraic solutions.

(5) The students will identify the outstanding contributions of individuals, including women and minorities, in the history of physics.

EUSLO 1 *Informed Learners*

Rationale: Assignments and readings will mention the "great moments" Students will demonstrate knowledge and understanding of the interrelationships within and across disciplines.

III. COURSE OUTLINE

A. Kinematics (6 hours)
1. Distance and displacement
2. Velocity and speed
3. Uniformly accelerated motion
4. Vectors
5. Velocity and acceleration in two dimensions
6. Projectile motion
7. Relative velocity

B. Dynamics (3 hours)
1. Newton's law of motion
2. Applications of Newton's laws
3. Tension and friction

C. Circular motion and equilibrium (5 hours)
1. Angular velocity and acceleration
2. Centripetal acceleration
3. Newton's law of universal gravitation
4. Torques and rotational equilibrium
5. Center of mass and center of gravity

D. Work and energy (3 hours)
1. Work -energy principle
2. Mechanical energy
3. Conservation of energy

E. Linear momentum (3 hours)
1. The concept of momentum
2. Conservation of momentum
3. Elastic and inelastic collisions

F. Rotational dynamics (2 hours)
1. Torques and moments of inertia
2. Angular momentum and its conservation

G. Vibrations and waves (5 hours)
1. Simple harmonic motion
2. The reference circle
3. Examples of simple harmonic systems
4. Transverse and longitudinal waves
5. Standing waves
6. Sound waves in air
7. Doppler effect

H. Properties of liquids and solids (5 hours)
1. Stress and strain
2. Elastic moduli
3. Pressure and its measurement
4. Archimedes' principle
5. Bernoulli's equation

6. Viscosity

I. Thermodynamics (7 hours)

1. Temperature
2. Gas laws
3. Kinetic theory of gases
4. Specific heat capacity
5. Transfer of heat
6. The first law of thermodynamics
7. The second law of thermodynamics
8. Entropy

Three one hour exams (3 hours)
Final exam (2 hours)

IV. EVALUATION METHODS

The final grade for the course will be determined from problem assignments collected and graded at least weekly; three one-hour examinations consisting of word problems to be solved, definitions of terms, and short essays; final examination.

The final grade for the course will be determined as follows:
20% Problem assignments collected and graded daily.
60% Three one-hour examinations consisting primarily of word problems to be solved, but also definitions of important terms and short essays.
20% Cumulative final examination (2 hours)

V. GRADING SCALE

Score			**Grade**
100 %	to	90%	A
89%	to	80%	B
79%	to	70%	C
69%	to	60%	D
Less than		60%	F

VI. ATTENDANCE POLICY

Students are expected to attend all lectures. Individual faculty members assigned to this course will determine the specific attendance requirements for this course. In certain situations, such as illness, personal emergency or active military duty, students will be excused for missing class if a written excuse or other proof of absence is provided to the instructor. Individual faculty members will determine how the assignments or other work will be made up in the event of an excused absence. The course attendance policy will be consistent with the Undergraduate Attendance Policy in the IUP Undergraduate Catalog.

VII. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: College Physics, (9th Edition) Hugh D. Young, Robert Geller (2012)

VIII. SPECIAL RESOURCES

None noted.

IX . BIBLIOGRAPHY

Bueche, F., Hecht, **Schaum's Outline of College Physics**, 11th Edition 2011, McGraw-Hill;

Giancoli, D. **Physics for Scientists and Engineers with Modern Physics,** 4th edition, 2008, Addison-Wesley

Knight, R., **Physics for Scientists & Engineers with Modern Physics**, 3rd Edition, 2013, Addison-Wesley

Serway, R., **Physics for Scientists & Engineers** 9th Edition, 2009, Brooks Cole

Wolfson, R., Essential **University Physics**, 2nd Edition, 2012 Addison-Wesley

Young, H., **College Physics,** 9th edition May 6, 2012, Addison Wesley

Young, H., Freedman, R., **University Physics with Modern Physics**, 11th Edition 2011, Addison Wesley

Liberal Studies Course Approval Checklist
Instruction Sheet

Use this checklist for all Liberal Studies categories other than writing-intensive sections; a different checklist is available for this. If you have questions, contact the Liberal Studies Office, 103 Stabley, telephone 357-5715

This checklist is intended to assist you in developing your course to meet IUP's Criteria for Liberal Studies and to arrange your proposal in a standard order for consideration by the Liberal Studies Committee (LSC) and the University-Wide Undergraduate Curriculum Committee. (UWUCC) When you have finished, your proposal will have these parts:

_X_ Standard UWUCC Course Proposal Cover Sheet, with signatures and Liberal Studies course designation checked

_X_ Course syllabus in UWUCC format

NA_ UWUCC course analysis questionnaire Needed only if this is a new course not previously approved by the University Senate These are not considered by the LSC but will be forwarded to the UWUCC along with the rest of the proposal after the LSC completes its review

This is not a new course; it has been approved by the University Senate

_X_ Assignment instructions for one of the major course assignments and a grading rubric or grading criteria for that assignment

_X_ Answers to the four questions listed in the Liberal Studies Course Approval General Information (one page)

Submit the original of the completed proposal to the Liberal Studies Office (103 Stabley) In addition to the signed hard copy, email the proposal as a Word or RTF file attachment to Liberal-Studies@iupedu

Please Number All Pages

Liberal Studies Course Approval General Information
On a separate sheet of paper, please answer these questions

(Do not include this sheet or copies of the questions in your proposal; submit only the answers)

1) There are weekly meetings with faculty involved in this course to discuss courses progress. All sections use the same text book and share common homework problems.

2) This is an introductory course in physics for science majors. The bulk of the course content is on the concepts of physics and problem solving. While minorities and women are not an emphasis of the course, ethnic and racial minorities as well as women are discussed when appropriate. For example, in the history of the development of nuclear fission, Lise Meitner was the female scientist who initially developed the fission reaction. Although she did the research, the results were published under the name of her colleague.

3) Students enrolled in this course will be required to read a research articles from a journal selected by the instructor. The article will be from journals aimed at the general science community, such as *Science* or *Scientific American*. One article will be assigned for the entire class to read. One or two questions on an exam will be based on this article.

4) This class will use slightly less mathematics than the introductory physics class for majors, PHYS 131. The topics covered are essentially the same, but calculus is not used in problem solving.

Part II SUMMARY OF CHANGE

The primary objectives, topics and course activities are not being significantly changed. The purpose of this course revision is to map the course objectives to the new Liberal Studies Expected Undergraduate Student Learning Objectives. (EUSLO) This has been incorporated into the course objectives above.

Part III letters of support

None are necessary – The objectives of the courses have not changed, the objectives are being mapped to the new Liberal Studies Standards.

I. CATALOG DESCRIPTION

PHYS 111 Physics I Lecture **3c-0l-3cr**

Prerequisites: Elementary algebra and trigonometry

General college physics; mechanics, wave motion and sound.

II. COURSE OBJECTIVES

(1) Introduce the students to the main concepts of classical mechanics, heat and sound. This includes presentations of illustrative examples and demonstrations of their application, to related sciences and their use in modem technology.

(2) To develop an understanding of a broad spectrum of laws and theories used to describe motion of bodies under the influence of forces.

(3) To be able to perform quantitative analysis of relatively simple physical systems involving motion using algebra and trigonometry.

(4) To use problem sets to develop the required mathematical skills and knowledge necessary to handle the concepts quantitatively.

(5) Provide an understanding of some of the "great moments" in the history of physics and the individuals, including women and minorities, responsible for them.

III. COURSE OUTLINE

A. Kinematics (6 hours)
1. Distance and displacement
2. Velocity and speed
3. Uniformly accelerated motion
4. Vectors
5. Velocity and acceleration in two dimensions
6. Projectile motion
7. Relative velocity

B. Dynamics (3 hours)
1. Newton's law of motion
2. Applications of Newton's laws
3. Tension and friction

C. Circular motion and equilibrium (5 hours)
1. Angular velocity and acceleration
2. Centripetal acceleration
3. Newton's law of universal gravitation
4. Torques and rotational equilibrium
5. Center of mass and center of gravity

D. Work and energy (3 hours)
1. Work -energy principle
2. Mechanical energy
3. Conservation of energy

E. Linear momentum (3 hours)

1. The concept of momentum
2. Conservation of momentum
3. Elastic and inelastic collisions

F. Rotational dynamics (2 hours)
1. Torques and moments of inertia
2. Angular momentum and its conservation

G. Vibrations and waves (5 hours)
1. Simple harmonic motion
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5. Standing waves
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1. Stress and strain
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4. Archimedes' principle
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6. Viscosity

I. Thermodynamics (7 hours)
1. Temperature
2. Gas laws
3. Kinetic theory of gases
4. Specific heat capacity
5. Transfer of heat
6. The first law of thermodynamics
7. The second law of thermodynamics
8. Entropy

IV. EVALUATION METHODS

The final grade for the course will be determined from problem assignments collected and graded at least weekly; three one-hour examinations consisting of word problems to be solved, definitions of terms, and short essays; final examination.

Grading Scale: A: ≥ 90% B: 80-89% C: 70-79% D: 60-69% F: <60%

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: College Physics, (8th Edition) Hugh D. Young, Robert Geller 2008

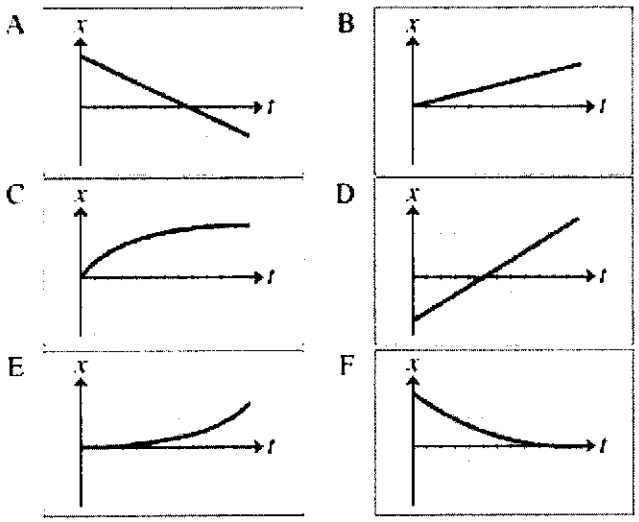
VI. ATTENDANCE POLICY

Students are expected to attend all lectures and complete all labs. Individual faculty members assigned to this course will determine the specific attendance requirements for this course. In certain situations, such as illness, personal emergency or active military duty, students will be excused for missing class if a written excuse or other proof of absence is provided to the instructor. Individual faculty members will determine how the assignments or other work will be made up in the event of an excused absence. The

course attendance policy will be consistent with the Undergraduate Attendance Policy in the IUP Undergraduate Catalog.

Sample assignment

Displacement versus Time Graphs Conceptual Question



Description: Conceptual question on determining the correct displacement versus time graph based on a short description of the situation.
The motions described in each of the questions take place at an intersection on a two-lane road with a stop sign in each direction. For each motion, select the correct position versus time graph. For all of the motions, the stop sign is at the position $x = 0$, and east is the positive x direction.

Part A

A driver ignores the stop sign and continues driving east at constant speed.

Hint A.1 Determining velocity from a position versus time graph

The slope on a position versus time graph is the rise (change in position) over the run (change in time). In physics, the ratio of change in position over change in time is defined as the velocity. Thus, the slope on a position versus time graph is the velocity of the object being graphed.

Hint A.2 Driving east

Since east is defined as the positive x direction, a car traveling east must have a positive velocity. A positive velocity is represented as a positive slope on a position versus time graph.

Hint A.3 Constant speed

Since velocity is represented by the slope on a position versus time graph, a car moving at constant speed must be represented by a line of constant slope.

Part B

A driver ignores the stop sign and continues driving west at constant speed.

Hint B.1 Determining velocity from a position versus time graph

The slope on a position versus time graph is the rise (change in position) over the run (change in time). In physics, the ratio of change in position over change in time is defined as the velocity. Thus, the slope on a position versus time graph is the velocity of the object being graphed.

Hint B.2 Driving west

Since east is defined as the positive x direction, a car traveling west must have a negative velocity. A negative velocity is represented as a negative slope on a position versus time graph.

Hint B.3 Constant speed

Since velocity is represented by the slope on a position versus time graph, a car moving at constant speed must be represented by a line of constant slope.

Part C

A driver, traveling west, slows and stops at the stop sign.

Hint C.1 Determining velocity from a position versus time graph

The slope on a position versus time graph is the rise (change in position) over the run (change in time). In physics, the ratio of change in position over change in time is defined as the velocity. Thus, the slope on a position versus time graph is the velocity of the object being graphed.

Hint C.2 Driving west

Since east is defined as the positive x direction, a car traveling west must have a negative velocity. A negative velocity is represented as a negative slope on a position versus time graph.

Hint C.3 Acceleration

Since velocity is represented by the slope on a position versus time graph, a car that accelerates must be represented as a curve with changing slope. If a car slows, then the slope of the graph must approach zero. If a car's speed increases, the slope must become more positive or more negative (depending upon which direction it is moving).

Part D

A driver, after stopping at the stop sign, accelerates to the east.

Hint D.1 Determining velocity from a position versus time graph

The slope on a position versus time graph is the rise (change in position) over the run (change in time). In physics, the ratio of change in position over change in time is defined as the velocity. Thus, the slope on a position versus time graph is the velocity of the object being graphed.

Hint D.2 Driving east

Since east is defined as the positive x direction, a car traveling east must have a positive velocity. A positive velocity is represented as a positive slope on a position versus time graph.

Hint D.3 Acceleration

Since velocity is represented by the slope on a position versus time graph, a car that accelerates must be represented as a curve with changing slope. If a car slows, then the slope of the graph must approach zero. If a car's speed increases, the slope must become more positive or more negative (depending upon which direction it is moving).

TYPICAL GRADING SCHEME (This may be changed at the discretion of the instructor)

This assignment is delivered on-line. Each student will access the web site and answer each question sequentially.

Question-specific feedback and follow-up text only appear when students are shown whether their answer is correct.

The students will have six attempts per question. If the student exhausts all attempts or gives up, the correct answer will be shown immediately.

There is a 3% reduction for each incorrect answer.

Deduct 3% credit for incorrectly answering any other type of question before the last attempt.

Students can view hints. There are questions within the hints which the student may answer for credit

Credit will be given for questions answered correctly in the hint.

Bonus credit of 2% will be given if the student does not open the hint

Deduct 3% credit for exhausting all attempts or giving up on a question in a hint.