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LSC Use Only Proposal No:	UWUCC Use Only Proposal No: ~~12-249~~.
LSC Action-Date: AP-10/11/12	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 131 Physics I-C 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)		~~9/23/14~~
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	Gail S Sechrist	9/30/14

Received SEP 10 2014 Liberal Studies

Received APR 24 2012 Liberal Studies

COURSE SYLLABUS

I. CATALOG DESCRIPTION

PHYS 131 Physics I-C Lecture 3c-0l-3cr

Prerequisites: MATH 121 or 125, at least concurrently

A calculus based course in general college physics; topics covered are similar to those covered in PHYS 111 but treated in more depth through the use of calculus.

II. COURSE OBJECTIVES

Objective 1

The student will be able to make predictions about: motion, the behavior of fluids, longitudinal waves (sound) and thermodynamics.

Expected Student Learning Outcome 1 *Informed Learners*

Rationale: Homework and tests will include questions on Newton's laws of motion, Pascal's principle, wave motion, and the laws of Thermodynamics. Understanding these principles will empower students to make predictions about these phenomena outside the context of this class.

Objective 2

Students will make theoretical connections between the various topics discussed in the course describing theories from first principles and definitions.

Expected Student Learning Outcome 1 and *2 Informed Learners and Empowered Learners*

Rationale: Classroom lectures will provide foundational information and illustrative examples on the fundamental concepts of physics. Homework assignments will allow the students to elaborate on these concepts, and apply them to novel problems. Problems will often times connect various topics in the course. For example, a problem on electrostatics will require understanding of vector addition and force diagrams.

Objective 3

Students will demonstrate the ability to solve problems in the stated topic areas. This development and all descriptive material employ calculus when applicable.

Expected Student Learning Outcome 1 and 2 *Informed Learners and Empowered Learners*

Rationale: Assignments and class discussions will have students apply quantitative techniques to address physics problems. The bulk of this course will consist of problem solving. The ability to solve physics problems empowers students to solve quantitative problems in their future career.

Objective 4

The student will be able to recount events in the history of physics and the individuals, including women and minorities, responsible for them.

Expected Student Learning Outcome 1 and 2 *Informed Learners and Empowered Learners*

Rationale: Assigned readings from the text as well as outside sources will discuss the great moments in science, as well as contributions from women and minorities.

III. COURSE OUTLINE

A. Kinematics and vectors (7 hours)
1. Motion in straight line
2. Vectors
3. Motion in a plane
    a) Projectile motion
    b) Uniform circular motion
    c) Relative motion

B. Forces & Motion (4 hours)
1. Force & mass
2. Newton's laws of motion
3. Friction
4. Uniform circulation motion

C. Work and Energy (4 hours)
1. Work
2. Kinetic energy
3. Power
4. Potential energy
5. Conservative & non-conservative forces
6. Conservation of energy

D. Collisions (3 hours)
1. Center of mass
2. Momentum
3. Conservation of momentum
4. Impulse and momentum
5. Elastic and inelastic collisions

E. Rotational motion (4 hours)
1. Rotational kinematics
2. Torque
3. Moment of inertia
4. Kinetic energy, work, power
5. Conservation of angular momentum

F. Other mechanics topics (6 hours)
1. Rigid bodies in static equilibrium
2. Elasticity
3. Oscillatory motion
    a) Simple harmonic motion
    b) Energy of a simple harmonic oscillator
    c) Pendulum
4. Newton's universal law of gravity
5 Fluids
    a) Pressure
    b) Archimedes' principle
    c) Continuity
    d) Bernoulli's equation

G. Waves (4 hours)
1. Mathematical representation of waves
2. Speed of longitudinal and transverse waves

3. Superposition and interference
4. Standing waves
5. Sound waves
6. Doppler effect

H. Thermodynamics (7 hours)

1. Temperature
    a) Measuring temperature
    b) Temperature scales
    c) Thermal expansion
2. Heat and the first law of thermodynamics
    a) Heat capacity
    b) First law of thermodynamics
    c) Thermodynamic processes
    d) Heat transfer
3. Kinetic theory of gases
    a) Ideal gas
    b) Molecular view of pressure and temperature
    c) Heat capacity of an ideal gas
4. Entropy and the second law of thermodynamics
    a) Heat engines
    b) Second law of thermodynamics
    c) Entropy

Classroom exams (3 hours)
Final Exam (2 hours)

IV. EVALUATION METHODS

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

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, which will be consistent with the Undergraduate Attendance Policy in the IUP Undergraduate Catalog.

VII. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Halliday, David and Resnick, Robert; Fundamentals of Physics (9th Edition) John Wiley & Sons, Inc, 2011.

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 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 has been only section of this class offered since its inception, and there will continue to be only one section for the foreseeable future.

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, Otto Hann.

3) Students enrolled in this course will be required to read a research articles from a physics 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 is the introductory course for Physics, Pre-Engineering and Chemistry majors.

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

They are not necessary. The objectives of the courses have not changed; the objectives are being mapped to the new Liberal Studies Standards.

Sample Assignment

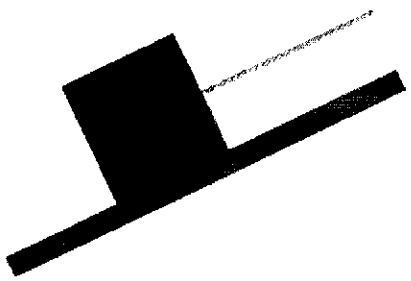
The first basic step in solving force and motion problems generally involves identifying all of the forces acting on an object. This tactics box provides a step-by-step method for identifying each force in a problem.

Identifying forces

1. Identify the object of interest. This is the object whose motion you wish to study.
2. Draw a picture of the situation. Show the object of interest and all other objects—such as ropes, springs, or surfaces—that touch it.
3. Draw a closed curve around the object. Only the object of interest is inside the curve; everything else is outside.
4. Locate every point on the boundary of this curve where other objects touch the object of interest. These are the points where contact forces are exerted on the object.
5. Name and label each contact force acting on the object. There is at least one force at each point of contact; there may be more than one. When necessary, use subscripts to distinguish forces of the same type.
6. Name and label each long-range force acting on the object. For now, the only long-range force is the gravitational force.

Apply these steps to the following problem: A crate is pulled up a rough inclined wood board by a tow rope. Identify the forces on the crate.

Part A

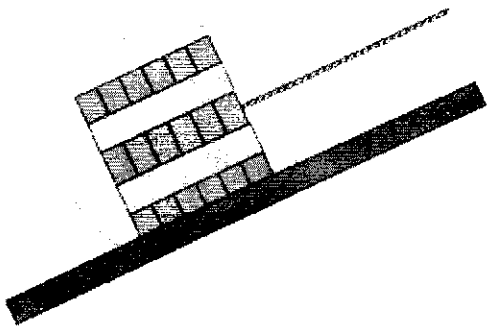


Which of the following objects are of interest?
Check all that apply.

ANSWER:

- ☐ rope
- ☐ earth
- ☐ wood board
- ☐ crate

Now that you have identified the object of interest, draw a sketch of the situation and draw a closed curve around the object, as shown in the figure below.



Part B

Identify the *contact* forces exerted on the crate.
Check all that apply.

ANSWER:

- ☐ tension
- ☐ spring force
- ☐ drag
- ☐ gravitational force
- ☑ normal force
- ☑ kinetic friction
- ☐ static friction
- ☐ thrust

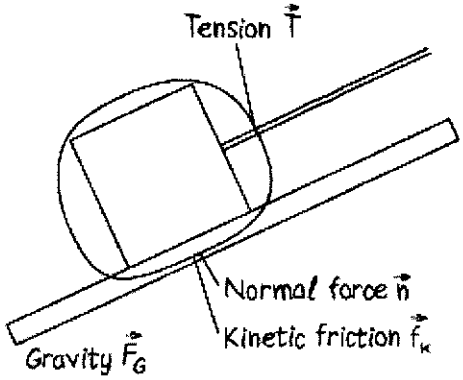
Part C

Identify the long-range forces acting on the crate.
Check all that apply.

ANSWER:

- ☐ drag
- ☐ static friction
- ☐ normal force
- ☐ spring force
- ☐ tension
- ☑ gravitational force
- ☐ kinetic friction
- ☐ thrust

Now that you have identified all the forces acting on the system, your final sketch describing the situation might look like this:



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.

OLD COURSE SYLLABUS

PHYS 131 Physics I-C Lecture

3c-0l-3cr
3 credits
3 lecture hours

Prerequisites: MATH 121, 125, at least concurrently

A calculus based course in general college physics; topics covered are similar to those covered in Physics 111 but treated in more depth through the use of calculus.

II. COURSE OBJECTIVES

1. To provide through demonstrations examples of: motion and its causes, the physics of fluids, longitudinal waves (sound) and thermodynamics.

2. To provide sound theoretical connections among the various topics developing the theories from first principles and definitions.

3. To develop in the student a facility for problem solving in the stated topic areas. This development and all descriptive material employs the calculus when applicable.

4. To provide an understanding of some of the "Great moment" in the history of physics and the individuals, including women and minorities, responsible for them.

III. COURSE OUTLINE

A. Kinematics and vectors (7 lectures)
   1. Motion in straight line
   2. Vectors
   3. Motion in a plane
      a) Projectile motion
      b) Uniform circular motion
      c) Relative motion

B. Forces & Motion (4 lectures)
   1. Force & mass
   2. Newton's laws of motion
   3. Friction
   4. Uniform circulation motion

C. Work and Energy (4 lectures)
   1. Work
   2. Kinetic energy
   3. Power
   4. Potential energy
   5. Conservative & non-conservative forces

   Conservation of energy

D. Collisions (3 lectures)
   1. Center of mass
   2. Momentum
   3. Conservation of momentum
   4. Impulse and momentum
   5. Elastic and inelastic collisions

E. Rotational motion (4 lectures)
   1. Rotational kinematics
   2. Torque

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F. Other mechanics topics (6 lectures)
1. Rigid bodies in static equilibrium
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