CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

LSC Use Only	UWUCC Use Only
Number LS-41	Number ________
Action ________	Action ________
Date ________	Date ________

I. TITLE/AUTHOR OF CHANGE
COURSE/PROGRAM TITLE PY 111-Physics I Lecture; PY 121-Physics I Lab; PY 112-Physics II Lecture; PY 122-Physics II Lab
DEPARTMENT Physics
CONTACT PERSON Mr. Richard Roberts / Dr. John Fox

II. THIS COURSE IS BEING PROPOSED FOR:

_____ Course Approval Only
_____ Course Approval and Liberal Studies Approval
__X__ Liberal Studies Approval only (course previously has been approved by the University Senate)

III. APPROVALS

Richard D. Roberts
Department Curriculum Committee

John L. Fox
Department Chairperson

Douglas O. Moss
College Curriculum Committee

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College Dean*

Charles D. Cashdollar
Director of Liberal Studies (where applicable)

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Provost (where applicable)

*College Dean must consult with Provost before approving curriculum changes. Approval by College Dean indicates that the proposed change is consistent with long range planning documents, that all requests for resources made as part of the proposal can be met, and that the proposal has the support of the university administration.

IV. TIMETABLE

Date Submitted	Semester/Year to be implemented	Date to be published in Catalog
to LSC 12/88	Fall 89	1989
to UWUCC 12/88		

Revised 5/88

[Attach remaining parts of proposal to this form.]

LIBERAL STUDIES COURSE APPROVAL

We are submitting PY 111, PY 112, PY 121, and PY 122 together as a package because PY 111 and PY 112 are a two course lecture sequence. PY 121 and PY 122 are the laboratories associated with the lecture sequence.

PART I. BASIC INFORMATION

A. We are proposing the following categories for PY 111, PY 112, PY 121, and PY 122:
PY 111 and/or PY 112 taken by themselves constitute Natural Science non-laboratory courses. If PY 111 and/or PY 112 are taken with PY 121 and/or PY 122 then they constitute Natural Science Laboratory courses.

B. We are requesting regular approval for this course.

C. During the transition from General Education to Liberal Studies PY 111, PY 112, PY 121, and PY 122 should be listed as approved substitutes for the current General Education courses (PY 111, PY 112, PY 121, and PY 122).

PART II. WHICH LIBERAL STUDIES GOALS WILL YOUR COURSE MEET?

A. Intellectual Skills and Modes of Thinking:

3. Understanding numerical data is a primary goal particularly in the laboratory where measurements are made and calculations done as part of each and every laboratory exercise. In the lecture courses numerical calculations are done as part of the problems that are assigned on at least a weekly basis. An extensive portion of these courses is devoted to problem analysis and solution.

5. Scientific inquiry -- primary goal. Students would certainly acquire this skill by participation in laboratory experiments and weekly problem assignments.

B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person:

Primary goal -- Understanding major trends in science and technology. Activities include, for example, studying how electric power is generated and transmitted to our homes.

PART III. DOES YOUR COURSE MEET THE GENERAL CRITERIA FOR LIBERAL STUDIES?

A. The physics department will use the following strategies to assure that basic equivalency exists:
All sections are guided by the same objectives as listed in the syllabus. The equivalency of content and assignments is assured by the use of the same textbook for all sections. Evaluations in all

sections are based upon homework grades and examinations. Grade distribution information is shared by instructors from all sections. Textbook selection is a group decision made by all instructors of these courses. Laboratory guidelines are similar except that the laboratory manuals that are used were written by some of the faculty members teaching the courses.

B. The attached syllabi make explicit that these courses will include perspectives and contributions of ethnic and racial minorities and of women wherever appropriate to the subject matter. In addition, faculty will be sensitive about language and choice of examples.

C. The following is a justification of an exception to the reading requirement.
The primary purpose of these courses is the development of higher level quantitative skills. They are directed toward scientific inquiry with emphasis on abstract logical thinking and application of mathematical analysis to the models developed. Although we have invoked this exception, students are encouraged to read selections on the history of science and about the scientists who were responsible for the development of science as we know it today.

D. These courses are different from what is provided for beginning majors in that calculus is not used in these courses. These are required courses for biology, geology, science, some chemistry, safety science, and medical technology majors. They are sometimes used as electives by other majors. All majors, physics or others, have historically been introduced to the subject through an introductory course that is considered bibliographic in nature. The course covers science from the earliest history of man to the science topic in today's newspaper. All major subject areas in physics are touched upon in this course. The more recent discoveries are discussed with attention being given to the implications of these discoveries to the future of the students seated in that classroom.

E. Our courses will contribute to the Liberal Studies Criteria as follows:

2. Define and analyze problems, frame questions, evaluate available solutions, and make choices -- This is exactly the nature of the problem solving skills that we develop in these courses. One of the ways that we do this is by assigning numerous word problems to be solved by students as part of the requirements of the course. Numerous examples are also presented in class.

PART IV. DO YOUR COURSES MEET THE CRITERIA FOR THE CURRICULUM CATEGORY IN WHICH THEY ARE TO BE LISTED?

Yes -- See enclosed course syllabi.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

3 credits
3 lecture hours

PY 111 Physics I Lecture
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 modern 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 lectures)
   1. Distance & displacement
   2. Velocity & speed
   3. Uniformly accelerated motion
   4. Vectors
   5. Velocity & acceleration in two dimensions
   6. Projectile motion
   7. Relative velocity

B. Dynamics (3 lectures)
   1. Newton's laws of motion
   2. Applications of Newton's laws
   3. Tension & friction

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

D. Work & energy (3 lectures)

1. Work-energy principle
2. Mechanical energy
3. Conservation of energy

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

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

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

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

I. Thermodynamics (7 lectures)
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 (2 hours).

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Buckwalter, G.L. and Riban, D.M. College Physics, McGraw-Hill, 1987.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

3 credits
3 lecture hours

PY 112 Physics II Lecture
Prerequisite: PY 111

Electricity and magnetism, heat, light, atomic and nuclear physics, and an elementary introduction to relativity and quantum theory.

II. COURSE OBJECTIVES

(1) To develop an understanding of the essential features of elementary electricity and magnetism.

(2) To develop an understanding of geometric optics as well as elementary wave optics and modern physics.

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

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

(5) To provide thorough demonstrations and examples of electrostatics, D.C. and A.C. circuits, magnetism, electromagnetism, reflection, refraction, interference, diffraction, and radioactivity.

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

III. COURSE OUTLINE

A. Electrostatics (5 lectures)
1. Coulomb's law
2. Electric field
3. Pentential energy and potential
4. Potential difference
5. Capacitors
6. Dielectrics

B. D.C. circuits (5 lectures)
1. Electric current
2. Resistance and Ohm's law
3. Voltage sources
4. Energy & power in electric circuits
5. Resistors in series and parallel
6. Kirchhoff's rules
7. Ammeters, voltmeters, and the Wheatstone Bridge

C. Magnetism (6 lectures)
1. Magnetic force on moving charges

2. Magnetic fields produced by moving charges
3. Magnetic force on currents
4. Magnetic properties of materials
5. Induced voltages; Faraday's law & Lenz's law
6. Inductors
7. Motors, generators, & transformers

D. A.C. circuits (3 lectures)
1. RC, RL and RCL alternating-current circuits
2. Power & rms values in AC circuits
3. Resonance
4. Electrical safety

E. Light and geometric optics (5 lectures)
1. Nature of electromagnetic waves
2. Reflection, refraction and dispersion
3. Mirrors
4. Thin lens & lens combinations
5. Lens aberrations
6. Optical instruments
7. The human eye

F. Physical optics (3 lectures)
1. Young's double-slit experiment
2. Thin-film interference
3. Diffraction
4. Diffraction grating
5. Polarization

G. Theory of special relativity (2 lectures)
1. Michelson-Morley experiment
2. Einstein's postulates
3. Consequences of special theory of relativity

H. Quantum physics (6 lectures)
1. The wave-particle nature of EM radiation
2. The wave-particle nature of matter
3. The Bohr model of the atom
4. The laser
5. Quantum mechanics and the Pauli exclusion principle
6. Solid-state band theory & semiconductors

I. The nucleus (4 lectures)
1. Nuclear structure & forces
2. Radioactive decay
3. Elementary particles
4. Ionizing radiation & safety
5. Nuclear fission & fusion

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, definition of terms, and short essays; final examination (2 hours).

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Buckwalter, G.L. and Riban, D.M. College Physics, McGraw-Hill 1987.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

1 credit
3 lab hours

PY 121 Physics I Laboratory
Corequisite: PY 111

Physics laboratory at the level of Physics I; exercises in mechanics, wave motion, and sound.

II. COURSE OBJECTIVES

Basic training in laboratory techniques such as graphing, error analysis, etc.

III. COURSE OUTLINE

Laboratory exercises (one experiment each week)

1. Measurement
2. Error
3. Acceleration of a freely falling body
4. Uniformly accelerated motion: the Atwood machine
5. Graphs and empirical equations
6. Air tracks and friction
7. Impulse and momentum
8. Collisions: Elastic and inelastic
9. Rotational motion
10. Half life of a water column
11. The harmonic oscillator
12. Standing waves
13. Forced harmonic oscillator with damping

IV. EVALUATION METHODS

The final grade for the course will be determined as follows:
50% laboratory reports
40% weekly quizzes or prelab questions
10% subjective evaluation

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Laboratory manual written by several members of the Physics Department.

VI. SPECIAL RESOURCE REQUIREMENTS

One packet of linear graph paper.

COURSE SYLLABUS

I. CATALOG DESCRIPTION — 1 credit, 3 lab hours

PY 122 Physics II Laboratory
Corequisite: PY 112

Physics laboratory at the level of Physics II; exercises in optics, electricity and magnetism, and radioactivity.

II. COURSE OBJECTIVES

Basic training in laboratory techniques such as graphing, error analysis, etc.

III. COURSE OUTLINE

Laboratory exercises (one experiment each week)

1. Intro to D.C. circuits
2. Null method of measurement
3. Electrical measurements
4. The oscilloscope and its applications
5. Exponential functions and servo systems
6. Capacitors, Inductors
7. Non-linear circuit elements
8. RCL circuits
9. Intro to nuclear counting
10. Linear amplification
11. Measurement of radioactivity
12. Spectroscopic analysis of atomic emission spectra
13. Optical phenomena

IV. EVALUATION METHODS

The final grade for the course will be determined as follows:
50% laboratory reports
40% weekly quizzes or prelab questions
10% subjective evaluation

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Laboratory manual written by several members of the Physics Department.