CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

LSC Use Only	UWUCC Use Only
Number LS-42	Number _____
Action Approved	Action _____
Date 1-19-89	Date _____

I. TITLE/AUTHOR OF CHANGE
COURSE/PROGRAM TITLE PY 131-Physics IC Lecture; PY 141-Physics IC Lab; PY 132-Physics IIC Lecture; PY 142-Physics IIC 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

College Curriculum Committee

College Dean*

Director of Liberal Studies
(where applicable)

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 to LSC 12/88
to UWUCC 12/88

Semester/Year to be implemented Fall 89

Date to be published in Catalog 1989

Revised 5/88

[Attach remaining parts of proposal to this form.]

LIBERAL STUDIES COURSE APPROVAL

We are submitting PY 131, PY 132, PY 141, and PY 142 together as a package because PY 131 and PY 132 are a two course lecture sequence. PY 141 and PY 142 are the laboratories associated with the lecture sequence.

PART I. BASIC INFORMATION

A. We are proposing the following categories for PY 131, PY 132, PY 141, and PY 142:
PY 131 and/or PY 132 taken by themselves constitute Natural Science non-laboratory courses. If PY 131 and/or PY 132 are taken with PY 141 and/or PY 142 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 131, PY 132, PY 141, and PY 142 should be listed as approved substitutes for the current General Education courses (PY 131, PY 132, PY 141, and PY 142).

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 the same as what is provided for beginning majors in that calculus is used in these courses. These are required courses for some chemistry and they are used as electives by other majors who have calculus in their background. 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
PY 131 Physics I-C Lecture — 3 lecture hours

Prerequisites: MA 121, 123 or 127, 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 moments" 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 & nonconservative forces
   6. 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
3. Moment of inertia
4. Kinetic energy, work, power
5. Conservation of angular momentum

F. Other mechanics topics (6 lectures)
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 lectures)
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 lectures)
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

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 (2 hours)

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Halliday, David and Resnick, Robert; Fundamentals of Physics (3rd Edition) John Wiley & Sons, Inc, 1988.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

PY 132 Physics II-C Lecture — 3 credits, 3 lecture hours

Prerequisites: MA 122, 124 or 128, at least concurrently

Continuation of Physics I-C; topics covered are similar to those covered in Physics II but are treated in more depth than through the use of the calculus.

II. COURSE OBJECTIVES

1. To provide through demonstrations examples of: electrostatics, D.C. and A.C. circuits, magnetism, electromagnetism, reflection, interference, and diffraction.

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.

III. COURSE OUTLINE

A. Electric Fields (6 lectures)
   1. Coulomb's law
   2. The electric field
   3. Calculating the electric fields of various charge distributions
   4. Motion of charged particles in a uniform field
   5. Electric flux
   6. Gauss' law
   7. Applications of Gauss' law

B. Electric Potential and Capacitance (6 lectures)
   1. Potential difference and electric potential
   2. Calculating potential from the field
   3. Calculating potential from the charge distribution
   4. ālculating field from potential
   5. Electric potential energy
   6. Calculation of capacitance
   7. Energy stored in capacitors
   8. Dielectrics

C. D.C. Circuits (4 lectures)
   1. Electric current
   2. Resistance and Ohm's law
   3. Energy and power in electric circuits
   4. Resistors in series and parallel
   5. Kirchhoff's rules
   6. Measuring instruments

D. Magnetic Fields and their Sources (6 lectures)

1. Definition and properties of the magnetic field
2. Motion of charged particles in a magnetic field
3. Magnetic force on a current
4. Torque on a current loop
5. Biot-Savart law
6. Ampere's law
7. Magnetism in matter

E. Faraday's law and Inductance (4 lectures)
1. Faraday's law of induction
2. Lenz's law
3. Induced electric fields
4. Inductance
5. LR circuit
6. Energy and the magnetic field

F. Electromagnetic Oscillations and A.C. Circuits (3 lectures)
1. Oacillations in an LC circuit
2. Series LCR circuit
3. Power in a A.C. circuit
4. Resonance
5. Transformer

G. Maxwell's Equations and Electromagnetic Waves (2 lectures)
1. Maxwell's equations
2. Plane electromagnetic waves
3. Energy of electromagnetic waves
4. Polarization

H. Geometric optics (3 lectures)
1. Reflection and refraction
2. Mirrors
3. Spherical refracting surfaces
4. Thin lenses
5. Optical instruments

I. Physical Optics (5 lectures)
1. Interference
2. Young's experiment
3. Intensity in double-slip interference
4. Interference in thin films
5. Single-slit diffraction
6. Intensity of the single-slit diffraction pattern
7. Resolving power
8. Diffraction grating

IV. EVALUATION METHODS

The final grade for this 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. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Halliday, David and Resnick, Robert; Fundamentals of Physics (3rd Edition) John Wiley & Sons, Inc. 1988.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

1 credit
3 lab hours

PY 141 Physics I-C Laboratory
Corequisite: PY 131

Sequence of physics laboratory at same level as Physics I-C; 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 142 Physics II-C Laboratory
Corequisite: PY 132

Sequence of physics laboratory at same level of Physics II-C; 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
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