CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

LSC Use Only	
Number	LS-44
Action	
Date	

UWUCC Use Only	
Number	
Action	
Date	

I. TITLE/AUTHOR OF CHANGE SC 105 Physical Science I (Elementary Ed version)
COURSE/PROGRAM TITLE SC 105 Physical Science I (general version)
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

[signature]
College Curriculum Committee

[signature]
College Dean*

[signature]
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 SC 105 as a natural science laboratory course. If it is taken before or after SC 106, they will fulfill the two semester natural science sequence of option I of the knowledge area natural science requirement.

PART I. BASIC INFORMATION

A. We are proposing SC 105 for the Natural Science laboratory category. There is both a general version and an elementary education version of this course. Differences are in the laboratory part of the course.

B. We are requesting regular approval for this course.

C. During the transition from General Education to Liberal Studies SC 105 should be listed as an approved substitute for the current General Education course SC 105.

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

A. Intellectual Skills and Modes of Thinking:

2. Literacy - writing, reading, speaking, listening. Scientific literacy is a primary goal in the Elementary Ed/Special Ed version laboratory. In this laboratory individual students give oral presentations. The presentations must be developed through library searches which result in a written report following a prescribed format. The other members of the class are required to listen to and evaluate the oral presentation along with the instructor.

3. Understanding numerical data is a primary goal in the general version laboratory where measurements are made and calculations done as part of each and every laboratory exercise.

   Scientific inquiry -- primary goal. Accomplishment of scientific inquiry in this course is done via demonstrations in the lectures and through the laboratory activities. As an example of applying scientific inquiry in the lecture, a Venturi tube is set up before the class and air is run through the tube, which contains three vertical openings. Three ping-pong balls are then suspended in the airstream emitted through these openings. The two openings from the larger diameter of the Venturi tube cause the balls to be "floated" in the airstream at a height greater than the ball that is "floated" above the opening of the small diameter of the Venturi tube. Students are to determine the reasons for the difference in heights, utilizing knowledge of Bernoulli's Principle and energy considerations.

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, and transformed into other forms of energy.

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. Evaluations in all sections are based upon laboratory grades and examinations. Grade distribution information is shared by instructors from all sections.
General version: The laboratory manual that is used was written by some of the faculty members teaching the laboratory.
Elementary Ed/ Special Ed version: All laboratory sections are guided by the same objectives and procedures as listed in the syllabus.

B. The attached syllabus makes 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 attached syllabus clearly indicates how the reading requirement is fulfilled.

D. These courses are different from what is provided for beginning majors in that calculus nor trigonometry is used in this course. It is also only a one semester course. The General Version of SC 105 is elected, by all of the students who take this course, to fulfill the Natural Science requirement of the University. The Elementary Ed/ Special Ed variation is a required course for all Elementary Education and Early Childhood Education majors. It is an elective for some Special Education 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:

5. Continue learning even after the completion of their formal education -- Students will learn the language and concepts necessary to make knowledgeable judgements required of laymen in a technologically oriented society, e.g., to have the basic knowledge to understand the arguments concerning the needs for and dangers of nuclear energy.

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

SC 105 PHYSICAL SCIENCE I

4 credits
3 lecture hours
2 lab hours

A descriptive and conceptual course in physics for the non-science major. High school physics is not a prerequisite. Course content is designed to develop an understanding and appreciation of the physical world around us, to produce changes in attitude and background essential for our modern society, and to clarify the following topics: motion, heat, sound, light, electricity, magnetism, and the structure of matter.

II. COURSE OBJECTIVES

1. To develop and understanding of the role of physics in describing the phenomena of nature.

2. To provide the necessary experiences in the laboratory so that the processes of observation, classification and generalization may be used.

3. To be able to explain in terms of the physical processes involved some of the more common natural phenomena.

4. To be able to use mathematics both algebraic and graphical techniques to arrive at numerical answers for scientific problems.

5. To inculcate an attitude of appreciation for the importance of science in modern society.

6. To furnish a factual background as a foundation for making intelligent judgments concerning the worth of the applications of science.

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

PRODEDURE:

1. The use of lectures, demonstrations, films and other audio-visual aids to illustrate physical principles and develop a knowledge of them.

2. A sequence of laboratory exercises to provide "hands on" experiences with experimental techniques and instruments.

3. The use of homework assignments and outside readings to broaden the student's background.

4. 3 one-hour tests, a 2 hour final, weekly laboratory exercises, scheduled quizzes, and assigned homework to help evaluate the student's progress and his assimilation of the topics covered.

III. COURSE OUTLINE

39 lectures total

A. Measurement (1 lecture)
   1. Numbers and units

   2. Systems of measurement
      a. English
      b. Metric

   3. Vectors and Scalars

B. Motion (9 lectures)
   1. Fundamental Concepts
      a. Acceleration, velocity and displacement

   2. Describing motion
      a. Graphical techniques
      b. Use of formulas

   3. Kinematics - the how of motion
      a. Uniformly accelerated motion
      b. Motion
      c. Air resistance and motion

   4. Dynamics - the why of motion
      a. Newton and his laws
         1) Inertia
         2) Impulse and momentum
         3) Action and Reaction

   5. Motion about an axis
      a. Curvilinear versus linear

   6. Gravitation and Motion
      a. The universal force
      b. Kepler's Laws of planetary motion

C. Energy (8 lectures)
   1. Types
      a. Kinetic
      b. Potential

   2. Conservation of
      a. Collisions and other things

   3. Energy Transfer
      a. Work
      b. Heat

   4. Applications

D. Waves (8 lectures)
   1. Sound
      a. Echoes, the voice and the ear
      b. Resonance

c. Doppler Effect

2. Light
   a. Mirrors
   b. Lenses
   c. Color
      1) Rainbows and other phenomena

E. Electricity and Magnetism (5 lectures)
   1. Static Electricity
      a. Charged objects
         1) Forces of attraction and repulsion]
      b. Friction and induction
      c. Electric Fields

   2. Current Electricity
      a. Circuits
      b. Amps, volts and ohms
      c. Fuses and circuit breakers

   3. Magnetism and Electricity
      a. The interconnection
      b. Magnetic fields and forces

   4. Applications
      a. Motors
      b. Generators
      c. Appliances

   5. Electricity and the Body
      a. Health hazards

F. Modern Physics (2 lectures)
   1. Relativity - Einstein

   2. Quantum Theory - Planck
      a. Photon

   3. Dual Nature of Reality - D'Broglie
      a. Wave and/or particle

   4. You can't be too sure - Heisenberg
      a. How much can we know

G. The Atom (5 lectures)
   1. Its structure

   2. The nucleus
      a. Fission
      b. Fusion

   3. Atomic Energy - Good or Bad

H. The Kingdom of the Sun (1 lecture - but much of this is integrated into the study of motion)

1. The Solar System
   a. Planets and the sun

2. The earth, sun and moon
   a. Days, months and years

3. The earth and its motions in space
   a. Rotation
      1) Days and nights
   b. Revolution
      1) The seasons

IV. EVALUATION METHODS

The final grade for the course will be determined from 3 one-hour examinations, a two hour final, scheduled quizzes, assigned homework, and weekly laboratory

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

1. Readings - The student will:
   (1) receive a listing of enough books, science fiction stories and articles that he or she can cater to any interest and still not have to purchase the outside readings.
   (2) select one book, one science fiction book and two article readings from the list.
   (3) declare the choices to be read in laboratory by the third laboratory period on a printed card.
   (4) confirm the selection of readings on his or her card during the tenth laboratory period (reminds them to finish).
   (5) be presented with an individualized, computer-printed exam consisting of five multiple-choice questions per book and three multiple choice questions per article, for a total of 16 questions, or 30 T-F items, selected randomly from our question bank, and different each time. This exam will be completed in the first 20 minutes of the eleventh laboratory of the semster.
   (6) The graded test will be recorded with, but separate from, the laboratory grade and will count as one-half test in the normal grade structure of the course.

2. General Version
   a. Text - Introduction to Physical Science, Riban, McGraw-Hill, 1982

   b. Supplemental Text - Departmental Lab Manual available at Copies Now

3. Elementary Ed/Special Ed Version (1988-89)
   Text - Conceptual Physics, 5th Edition, Paul Hewitt, Little, Brown, 1985

SYLLABUS ADDENDUM

PHYSICAL SCIENCE I - ELEMENTARY EDUCATION AND SPECIAL EDUCATION VERSION
LABORATORY ONLY

I. LAB OBJECTIVES

1. To promote an understanding of the physical world through the formal investigation of the concepts of physics.

2. To make the student, as a future teacher, the competent vehicle to disseminate this information to the children in our schools.

3. To expose the student to the methodologies of concept development through the manipulation of equipment via demonstrations and/or hands-on activities.

4. To remove the stigma of "intimidation" by the subject of physics.

5. To develop an ability in the student to "improvise" that which is needed to produce effective demonstrations and/or hands-on activities.

II. LAB PROCEDURES

1. To replace the traditional one concept, quantitative investigation type lab with a non-traditional multiple concept development lab accomplished through individual student presentations.

2. To require individual student presentations that must be developed through referenced investigations, resulting in a written report following a prescribed format.

3. To require that the student presentations contain sufficient demonstrations/hands-on activities that will properly reinforce the concept being developed, utilizing "nuts-and-bolts" apparatus that can be found in their everyday environment.

4. To require that the student present their concept development as an oral presentation before their peers and instructor, while being evaluated by both.

SYLLABUS ADDENDUM

PHYSICAL SCIENCE I - GENERAL VERSION - LABORATORY ONLY

I. LAB OBJECTIVES

1. To allow the student to reinforce his/her understanding of the concepts learned in lecture through a series of hands-on laboratory exercises.

2. To become familiar with the systems of measurement and the instruments associated with those systems.

3. To become familiar with various analytical techniques, to include graphing and graphical analysis of the data.

4. To overcome the reluctance to manipulate simple apparatus in exploring phenomena.

5. To develop the ability to quantify data through the performance of a laboratory exercise and to analyze the data to produce meaningful physics relationships.

II. LAB EXERCISES

1. Measurement - The Use of Numbers and Units
2. Measuring Instruments and Systems
3. Graphing and Graphical Analysis
4. Some Other Types of Motion
5. Systems in Equilibrium
6. Conservation of Energy - Work and Machines
7. Conservation of Energy - Heat, Temperature, and Thermal Energy
8. Vibrations, Resonance, and Waves
9. Reflection, Refraction, and Mirrors
10. Refraction and Lenses
11. Some Other Properties of Light
12. Conservation of Energy and Electric Circuits
13. Astronomy Lab
    a. The Orbit of Mars
    b. Parallax
    c. The Earth and Its Motions in Space (Retrograde Loop of Mars)
    d. Triangulation.