Community College System
University of Hawaii
Maui Community College

Fall 1995

COURSE OUTLINE FORM

Course Alpha	:	PHYS 105
Course Name	:	Principles of Technology
Course Description	:	Presents fundamental theories and problem solving methods in physics as they relate to technology and its applications. Introduces experimental methods in physics and applications of modern technology to experimental science.
Semester Units	:	4
Hours per Week	:	3 hours lecture, 3 hours lab
Purposes and Standards	:	Associate Degree Requirement for Electronics and Computer Engineering Technology Program
Prerequisites	:	MATH 135, or satisfactory score on Math placement exam, or consent of instructor.
Recommended Preparation	:	Second-year standing in Electronics and Computer Engineering Technology Program
Date	:	October 3, 1995
Instructor Signature	:	John Pye

1. **COURSE OBJECTIVES:**

To provide students with an introduction to the history, philosophy, and general culture of physics in particular, and to science in general. To teach critical thinking and problem solving skills using applications of physics principles to modern technology. To emphasize the spirit of experimental science, and to teach skills in gathering and analyzing experimental data utilizing a variety of modern technological instruments, software, and equipment.

2. **GENERAL EDUCATION AND RELATIONSHIP TO OTHER COURSES:**

This is a one-semester laboratory course which fulfills the physics requirement for students in the Electronics and Computer Engineering Technology Program.

3. **TEXT AND MATERIALS:**

There is currently no text for this type of course. Instead, students will be introduced to and use a variety of multimedia programs in physics and technology to supplement lecture material and laboratory work.

4. **REFERENCE MATERIALS:**

There are numerous textbooks and reference materials in physics and technology available in the Library and in the instructor's office. There are also several reference and laboratory manuals available from the instructor. Most reference materials will be available in the classroom where students will work with the multimedia programs for easy reference. In addition, all reference and auxiliary materials will be made available on-line to facilitate the distance learning component of the course when it goes to our outreach centers.

5. **AUXILIARY MATERIAL AND CONTENT:**

Extensive handouts will be provided to the students and will ultimately be available on-line. Slides, videos, overhead transparencies, demonstration equipment and apparatus, and multimedia software and programs will also be used to illustrate concepts throughout the course. Extensive use of laboratory equipment and supplementary software, including LabView and NIDA packages, will be required to complete the laboratory component of the course. A laboratory project may also be assigned if time permits.

6. METHODS OF INSTRUCTION:

Lectures, discussion, visual aids, and demonstrations are used in this course. Students will also use computers with physics and technology multimedia programs for learning course content and testing their understanding of the material. Students will also participate in laboratory activities and experiments which involves the design of experiments using Labview and other software such as that from the NIDA Corporation (used in the Electronics courses), as well as the gathering and analysis of experimental data. Homework assignments will be given to practice problem solving skills, and all homework and laboratory assignments will be collected, graded, and discussed with students when returned. Students will also be required to do literature searches and analysis of modern technology and its impact on society utilizing their understanding of fundamental physics principles. Quizzes will also be given on each topic area, which are incorporated within the multimedia programs used with the lecture component of the course. The course is divided into seven units, covering introductory material and the major areas of physics applying to modern technology. A review session and an exam will be given on each unit, and there will also be a cumulative final exam. These exams will ultimately be made available on-line utilizing already existing software from various textbook publishers for easy management of remote sites.

7. COURSE CONTENT:

The course is divided into seven units, as follows:

Unit 1: Introductory/Review Material

1. Introduction to CAI
2. Introduction and Safety Procedures
3. Graphs
4. Trigonometric Functions

Unit 2: Basic Principles of Physics and Technology

1. Introduction to Physics
2. Introduction to Technology
3. Introduction to Problem Solving
4. Introduction to Measurement
5. Metric Conversion
6. Area Measurements
7. Volume Measurements
8. Measurement Techniques
9. Applications

Unit 3: Mechanics

1. Force
2. Bridge Building
3. Motion
4. Nature of Motion
5. Motion Transducers
6. Motion Transducer Operation
7. Momentum
8. Conservation Principles
9. Fluids
10. Applications

Unit 4: Energy

1. Work and Energy
2. Heat
3. Nature of Heat
4. Heat Transducers
5. Heat Transducer Operation
6. Thermodynamics
7. Conservation Principles
8. Energy and thermal pollution
9. Applications

Unit 5: Electricity and Magnetism

1. Electricity Review
2. Magnetism
3. Electromagnetism
4. Introduction to Rotating Machinery
5. Applications

Unit 6: Communications Technology

1. Introduction to Communications Technology
2. Waves
3. Sound
4. Radio and Television Technology
5. Introduction to Microwaves
6. Applications

Unit 7: Light and Optics

1. Introduction to Light
2. Nature of Light
3. Light Transducers
4. Light Transducer Operation
5. Introduction to Lasers
6. Fiberoptics
7. Applications

Laboratory Experiments for Principles of Technology:

Graphing techniques and functional relationships
Graphing techniques using a computer
Motion Transducers
Temperature Analysis
Heat Transducers
Electric Circuits
Tuning Circuits
Motors and Generators
Waveform Generator and Spectrum Analyzer
Light Transducers
Lasers
Fiberoptic Applications
Laboratory Project

8. **EVALUATION:**

Quizzes: From Multimedia Programs (compiled by computer)
15% of Course Grade

Exams: Seven unit-exams
40% of Course Grade

Labs: Graded laboratory reports/project
30% of Course Grade

Final: Cumulative Exam
15% of Course Grade

Grades: A: 90-100% B: 80-89% C: 70-79% D: 55-69%

MAUI COMMUNITY COLLEGE
PHYSICS 105 - PRINCIPLES OF TECHNOLOGY

Instructor: **John Pye**
Office: **Multi-Purpose Bldg. 1-C**
Phone: **242-1206 (office)**
244-9181 (messages)

Office Hours

Tu:	**4-5**	**Multi 1C**
Wed:	**12-1**	**Multi 1C**
Th:	**1-2**	**Multi 1C**
Th:	**5:30-6**	**Sci 22A**

and by appointment

This one semester course provides students with an introduction to the history, philosophy, and general culture of physics in particular, and to science in general. We will utilize critical thinking and problem solving skills using applications of physics principles to modern technology. We will also introduce principles of experimental science, learning skills in gathering and analyzing experimental data utilizing a variety of modern technological instruments, software, and equipment. We will also conduct literature searches and analysis of modern technological advances applying our understanding of the physical principles and processes involved.

LECTURE: 3 hours per week, times TBA, Fall 1996

LAB: 3 hours per week, times TBA, Fall 1996

REFERENCES AND MATERIALS:

1) Contemporary College Physics (2nd Ed) by Jones/Childers
2) Conceptual Physics (7th Ed) by Paul Hewitt
3) The Sciences, An Integrated Approach by Trefil/Hazen
4) Fundamentals of Physics by Halliday/Resnick
5) How Things Work (Reference books and CD-ROM)
6) LabVIEW, Student Edition User's Guide by Lisa Wells
7) Laboratory Notebook for recording of data. A bound quadrille laboratory notebook works best for this.
8) Calculator (must have scientific functions)

Unit 3: Mechanics (3 weeks)

1. Force
2. Bridge Building
3. Motion
4. Nature of Motion
5. Motion Transducers
6. Motion Transducer Operation
7. Momentum
8. Conservation Principles
9. Fluids
10. Applications

Unit 4: Energy (3 weeks)

1. Work and Energy
2. Heat
3. Nature of Heat
4. Heat Transducers
5. Heat Transducer Operation
6. Thermodynamics
7. Conservation Principles
8. Energy and thermal pollution
9. Applications

Unit 5: Electricity and Magnetism (2 weeks)

1. Electricity Review
2. Magnetism
3. Electromagnetism
4. Introduction to Rotating Machinery
5. Applications

Unit 6: Communications Technology (3 weeks)

1. Introduction to Communications Technology
2. Waves
3. Sound
4. Radio and Television Technology
5. Introduction to Microwaves
6. Applications

Unit 7: Light and Optics (3 weeks)

1. Introduction to Light
2. Nature of Light
3. Light Transducers
4. Light Transducer Operation
5. Introduction to Lasers
6. Fiberoptics
7. Applications