PHYSICS DEPARTMENT
COURSE OUTLINE

PHYS 295 PHYSICS – ENGINEERING BRIDGE

A physics course for students in the Civil and Mining Engineering Bridge program. Topics will be reviewed and expanded beyond those covered in technology programs including thermal energy, mechanical waves, sound, geometrical and physical optics, elementary electricity and magnetism, simple AC and DC circuits.

OFFERED:	Q3
CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 2 lab
PRE-/CO-REQUISITES:	Open to ENGBRIDGE students or by permission of Physics Department

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REQUIRED MATERIALS:

Textbook: "Physics for Scientists & Engineers with Modern Physics", 6th edition, Serway, R.A. and Jewett, J.W.Jr.

Physics 295 lab manual
Graph paper (use millimetet/centimeter ruled graph paper)

DEPARTMENT POLICIES REGARDING TESTING:

1. Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Missed exams normally receive a zero grade. In exceptional circumstances such as medical issues or a documented illness, a make-up exam may be given or the test may be waived at the discretion of the instructor. The instructor should be notified prior to the exam.

2. The final exam will cover the entire course and will be 3 hours long. As stated in the current college calendar (p. 39) "students are expected to write tests and final exams at the scheduled time and place." Exceptions will only be considered for emergency circumstances as outlined in the calendar. Holidays or scheduled travel flights are not accepted.

DEPARTMENT POLICIES REGARDING LABS:

The student must satisfactorily complete the lab portion with a grade of 60% or higher in order to obtain credit for this course. Attendance is mandatory for all lab exercises. During lab periods students will be required to sign in and have all data approved (initialed) by the instructor as well. A lab may be made up at a later time only in the case of documented illness or other extenuating circumstances.

GRADING

The standard mark distribution for this course is as follows:

Midterms and other work	30%
Lab Performance and Reports	10%
Final Exam	60%
	100%

This distribution may be amended by the instructor (see your Instructor's Information sheet).

OUTLINE:

1. Thermal Energy

1.1. Review of Temperature
- 1.1.1 Temperature Scales
- 1.1.2 Thermal Equilibrium

1.2. Thermal Expansion
- 1.2.1 Mechanical model of materials
- 1.2.2 Linear expansion
- 1.2.3 Volume expansion
- 1.2.4 Capacity problems

1.3. Heat
- 1.3.1 Heat and thermal energy
- 1.3.2 Heat and mechanical work
- 1.3.3 Heat and temperature change
- 1.3.4 Specific heat capacity
- 1.3.5 Change of Phase
- 1.3.6 Latent heat of fusion and vaporization
- 1.3.7 Calorimetry

2. Mechanical Waves

2.1. Periodic Waves
- 2.1.1 Wave velocity, frequency, period, wavelength
- 2.1.2 Transverse and longitudinal waves
- 2.1.3 Travelling waves in space and time

2.2. Wave velocity in an elastic medium

2.3. Energy in waves

2.4. Interference of waves
- 2.4.1 Constructive and destructive interference
- 2.4.2 Effect of frequency, amplitude and direction
- 2.4.3 Standing waves
- 2.4.4 Standing waves in a string
- 2.4.5 Standing waves in air columns
- 2.4.6 Beats

2.5. Sound
- 2.5.1 Nature of pressure waves
- 2.5.2 Decibel scale
- 2.5.3 Doppler effect
- 2.5.4 Shock waves

3. Physical Optics

3.1. Conditions for stable interference of light waves
- 3.1.1 Coherence
- 3.1.2 Monochromaticity

3.2. Young's double slit experiment
- 3.2.1 Conditions for interference

- 6.1.3 Conductors and insulators
- 6.1.4 Coulomb's law

6.2. Electric field
- 6.2.1 Concept
- 6.2.2 Due to point charges
- 6.2.3 Electric field lines

6.3. Electric potential
- 6.3.1 Electric potential energy
- 6.3.2 Potential difference
- 6.3.3 Equipotential surface
- 6.3.4 Potential in a uniform field
- 6.3.5 Potential near a point charge

7. Electric Circuits

7.1. Parts of a circuit
- 7.1.1 Types of sources
- 7.1.2 Types of loads
- 7.1.3 Electric Current

7.2. Resistance
- 7.2.1 Ohm's law
- 7.2.2 Factors affecting resistance
- 7.2.3 Temperature dependence
- 7.2.4 Internal resistance of sources
- 7.2.5 Superconductors

7.3. Series circuits
- 7.3.1 Description
- 7.3.2 Characteristics

7.4. Parallel circuits
- 7.4.1 Description
- 7.4.2 Characteristics

7.5. Series-parallel circuits

7.6. Kirchhoff's Rules
- 7.6.1 Junction (current) rule
- 7.6.2 Loop (voltage) rule

8. Magnetic Fields

8.1. Description

8.2. Force on a charge
- 8.2.1 Characteristics
- 8.2.2 Magnetic flux density
- 8.2.3 Generator principle

8.3. Magnetic force on a conductor
- 8.3.1 In a uniform field
- 8.3.2 Torque on a loop
- 8.3.3 Motor principle

9. Alternating Current