Coffeyville Community College

#ENGR-211

COURSE SYLLABUS

FOR

ENGINEERING PHYSICS II

Ryan Willis
Instructor

COURSE NUMBER: ENGR 211 **COURSE TITLE:** Engineering Physics II

CREDIT HOURS: 5

INSTRUCTOR: Ryan Willis

OFFICE LOCATION: Math/Science Offices, Second Floor, Arts & Sciences Building

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OFFICE HOURS: See schedule posted on office door

PREREQUISITE(S): Engineering Physics I

REQUIRED TEXT AND MATERIALS: *Physics for Scientists and Engineers* 3rd ed. Douglas C. Giancoli Prentice Hall Publishing

COURSE DESCRIPTION: A theory and lab course which continues with heat, thermodynamics, optics, electricity and magnetism, and elements of modern physics. Calculus is used in the problem solving.

EXPECTED LEARNER OUTCOMES:

1. Apply the fundamental concepts of heat, temperature, and thermal expansion, and phase changes.
2. Apply the Laws of Thermodynamics to simple physics systems involving work in and out as well as heat flows.
3. State and apply the two laws of thermodynamics to discussions and problems solving relating to them.
4. Acquire an understanding of the elementary concepts of static electricity.
5. Acquire the ability to build and analyze DC circuits.
6. Gain a working knowledge of the electrical properties of more complex DC circuits including power consumption.
7. Become familiar with the physical and electrical properties of various meters and circuit constants.
8. Solve problems and discuss in detail the basic principles of magnetism.
9. Acquire sufficient understanding of torques caused by magnetic fields to work with conductors, motors, loops and solenoid problems.
10. Build and analyze mathematically an AC electrical circuit.

11. Solve for the more common electrical properties of basic AC circuits.
12. Gain a sufficient understanding of the nature and propagation of sound waves to solve for their quantitative properties.
13. Solve problems dealing with optical systems and their lenses.
14. Acquire a basic concept of the atom as it relates to stability, disintegration, and radioactivity.

LEARNING TASKS & ACTIVITIES:

Cognitive:	Unit Tests and Problems
Psychomotor:	Lab Exercises

ASSESSMENT OF OUTCOMES:

You will be evaluated according to homework, quizzes, lab work, and test scores.

ATTENDANCE POLICY:

Attendance in a physics course is essential for any degree of success in that course. When it is determined that lack of attendance is jeopardizing the success of the student, counseling will be in order to conclude whether the student should remain enrolled in the class. The student should not miss class periods for a course of this type. In each class period new ideas are presented which build upon the ideas of the previous class period. These ideas, in turn, lay the foundation for what will be discussed at the next class period. When a student is absent all information should be obtained from a fellow student concerning the assignment covered and to be covered. Absence is no excuse for being unaware of the progress and activities of the class. Attendance is expected for success in the class. **Attendance will not be taken.**

COMPETENCIES:

UNIT I TEMPERATURE, HEAT, & THERMODYNAMICS

THE STUDENT WILL KNOW AND BE ABLE TO APPLY THE FUNDAMENTAL CONCEPTS OF HEAT, TEMPERATURE, AND THERMAL EXPANSION, AND PHASE CHANGES

1. Use the Celsius, Fahrenheit, Kelvin, and Rankine thermometer scales in problem solving.
2. Solve problems dealing with thermal stress due to contraction and expansion of various materials.
3. Solve simple problems dealing with change of phase, temperatures, and heat capacities.

THE STUDENT WILL BE ABLE TO APPLY THE LAWS OF THERMODYNAMICS TO SIMPLE PHYSICS SYSTEMS INVOLVING WORK IN AND OUT AS WELL AS HEAT FLOWS

1. Solve simple problems dealing with heats of fusion and vaporization of water and other substances.
2. Solve simple problems dealing with heat conduction, convection, and radiation.
3. Solve problems relating to blackbody type radiators and the Stefan-Boltzman law.

THE STUDENT WILL BE ABLE TO STATE AND APPLY THE TWO LAWS OF THERMODYNAMICS TO DISCUSSIONS AND PROBLEMS SOLVING RELATING TO THEM

1. State the first law of thermodynamics and how it relates to energy, heat, and work.
2. Discuss and apply the concepts of adiabatic, isochoric, isothermal, and isobaric systems to problem solving.
3. Describe a CARNOT cycle and its relation to a heat machine.
4. Describe what is meant by ENTROPY and give examples.

UNIT 2 STATIC ELECTRICITY AND CAPACITORS

THE STUDENT WILL ACQUIRE AN UNDERSTANDING OF THE ELEMENTARY CONCEPTS OF STATIC ELECTRICITY

1. Define the terms, insulator, conductors, and semi-conductors as they relate to electricity.
2. Calculate force fields using Coulomb's law of electrostatics.
3. Calculate electrical potentials using Gauss' law.
4. Solve capacitor problems of voltage and charge for one or more capacitors in series and/or parallel circuits.

UNIT 3 RESISTANCE & SIMPLE CIRCUITS

THE STUDENT WILL ACQUIRE THE ABILITY TO BUILD AND ANALYZE DC CIRCUITS

1. Solve simple Ohm's law problems of circuit elements in series and/or parallel arrangements.
2. Solve simple DC circuit problems involving voltages, resistances, internal resistance and EMF's.

THE STUDENT WILL GAIN A WORKING KNOWLEDGE OF THE ELECTRICAL PROPERTIES OF MORE COMPLEX DC CIRCUITS INCLUDING POWER CONSUMPTION, VOLTAGE DROPS, AND THE CURRENT IN VARIOUS BRANCHES

1. Solve simple electrical power problems.
2. Solve simple and compound circuits using Kirchoff's rules for circuit analysis.

THE STUDENT WILL BECOME FAMILIAR WITH THE PHYSICAL AND ELECTRICAL PROPERTIES OF VARIOUS METERS AND CIRCUIT CONSTANTS

1. Describe in detail how to construct ammeters and voltmeters given desired parameters of E, I, and R.
2. Solve simple problems dealing with RC constants and describe their industrial applications.

UNIT 4 MAGNETIC FIELDS & FORCES

THE STUDENT WILL BE ABLE TO SOLVE PROBLEMS AND DISCUSS IN DETAIL THE BASIC PRINCIPLES OF MAGNETISM

1. Solve problems dealing with forces on charged particles moving within magnetic fields.
2. Describe the nature of and the forces exerted by man-made magnetic fields.

THE STUDENT WILL ACQUIRE SUFFICIENT UNDERSTANDING OF TORQUES CAUSED BY MAGNETIC FIELDS TO WORK WITH CONDUCTORS, MOTORS, LOOPS, AND SOLENOID PROBLEMS

1. Calculate the force on an electrical conductor in a given field.
2. Calculate the force between two conductors carrying current.
3. Calculate the torque on a circuit loop within a magnetic field.

UNIT 5 AC CIRCUITS, INDUCTANCE AND CAPACITANCE

THE STUDENT WILL BE ABLE TO BUILD AND ANALYZE MATHEMATICALLY AN AC ELECTRICAL CIRCUIT

1. Relate Lenz's and Faraday's laws to problem solving.
2. Solve electrical circuit problems involving R, I, C, and L in various combinations.

3. Solve simple AC problems involving AC circuits and phasors.

THE STUDENT WILL BE ABLE TO SOLVE FOR THE MORE COMMON ELECTRICAL PROPERTIES OF BASIC AC CIRCUITS

1. Solve for current, voltage, and AC power.
2. Solve for voltage relations and phase angles.
3. Solve AC circuits both series and parallel.
4. Solve for transformer and loading considerations of a given circuit.

UNIT 6 SOUND & LIGHT WAVES

THE STUDENT WILL GAIN A SUFFICIENT UNDERSTANDING OF THE NATURE AND PROPAGATION OF LIGHT WAVES TO SOLVE FOR THEIR QUANTITATIVE PROPERTIES

1. Define the terms: nodes, antinodes, principle of superposition, standing waves, amplitude, wave length, and wave velocity.
2. Solve problems of vibrating wires and strings dealing with frequencies and standing waves.
3. Solve problems of resonance with sound waves in open and closed tubes.

UNIT 7 OPTICS & NUCLEAR CONCEPTS

THE STUDENT WILL BE ABLE TO SOLVE PROBLEMS DEALING WITH OPTICAL SYSTEMS AND THEIR LENSES

1. Describe the nature of light, its velocity, reflection, and refraction.
2. Solve simple problems dealing with the process of reflection and refraction.
3. Solve simple optical problems relating to the use of thin lenses.
4. Describe the difference REAL and VIRTUAL images and describe how one might study these in the lab.

THE STUDENT WILL ACQUIRE A BASIC CONCEPT OF THE ATOM AS IT RELATES TO STABILITY, DISINTEGRATION, AND RADIOACTIVITY

1. Cite the factors which lead to a more stable atomic nucleus.
2. Describe the properties of Alpha, Beta, and Gamma rays emitted naturally from certain atoms.
3. Describe the terminology used to measure radioactivity in a biological system such as man.
4. Solve simple problems dealing with calculation of half-lifes of certain isotopes.
5. Describe the effects of certain barriers to designated forms of radiation.

This syllabus is subject to revision with prior notification to the student by the instructor.