COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Engineering Physics II with Lab
COURSE NUMBER	NASC-0246
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Physical Sciences
CIP CODE	24.0101
CREDIT HOURS	5
CONTACT HOURS/WEEK	Class: 3 Lab: 4
PREREQUISITES	NASC-0245, Engineering Physics I with Lab **AND** MATH-0123, Calculus and Analytic Geometry II
COURSE PLACEMENT	None

COURSE DESCRIPTION
Engineering Physics II (and associated laboratory experience) is the continuation of Engineering Physics I (NASC-0245) using the tools of algebra, trigonometry, and calculus. Topics covered in this course will include electricity and magnetism, electromagnetic waves, and optics. Schedule: five hours of lectures and two hours of lab work per week. This course is currently being offered during spring semester only.

KANSAS SYSTEMWIDE TRANSFER: PHY 2030/2031/2032
The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

General Education Learning Outcome
☐ Basic Skills for Communication
☐ Mathematics
☐ Humanities
☒ Natural and Physical Sciences

TEXTBOOKS
http://kckccbookstore.com/

METHODS OF INSTRUCTION
A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels,

conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

The course outline is indicated below and is subject to change as course development dictates.

I. Electric Forces & Fields
   A. Electric Charge
   B. Coulomb's Law
   C. Electric Fields & Field Lines
   D. Conductors in Electrostatic Equilibrium
   E. Gauss's Law
II. Electrical Energy & Capacitance
   A. Electric Potential & Electric Potential Energy of Point Charge
   B. Charge Conductors & Equipotential Surfaces
   C. Capacitors
   D. Combination of Capacitors
   E. Energy in a Capacitor
   F. Capacitors with Dielectrics
III. Electric Current & Resistance
   A. Electric Current
   B. Drift Velocity
   C. Electric Circuits
   D. Resistance, Resistivity & Ohm's Law
   E. Electric Energy & Power
IV. Direct-Current Circuits
   A. Sources of emf
   B. Resistors in Series & Parallel
   C. Kirchhoff's Rules
   D. RC Circuits
   E. Household Circuits
V. Magnetism
   A. Magnets & Magnetic Fields
   B. Motion of a Charged Particle in Magnetic Field
   C. Magnetic Force on a Current-Carrying Conductor
   D. Magnetic Torque
   E. Ampere's Law
   F. Magnetic Force Between Current Carrying Conductors
   G. Magnetic Fields of Current Loops and Solenoids
VI. Induced Voltage & Inductance
   A. Magnetic Flux & Induced emf
   B. Faraday's Law of Induction & Lena's Law
   C. Motional emf
   D. Generators

E. Self-inductance & Mutual Inductance
F. RL Circuits
G. Energy Stored in Magnetic Fields

VII. Alternating Current Circuits & Electromagnetic Waves
A. Resistor, Inductor & Capacitor in AC Circuits
B. The RLC Series Circuits
C. Power in AC Circuits
D. Resonance in Series RLC Circuit
E. The Transformers
F. Maxwell's Equations
G. Antenna
H. Electromagnetic Waves Spectrum
I. Doppler Effects

VIII. Lights & Optics
A. Duel Nature of Light
B. Reflection & Refraction of Light
C. Law of Refraction
D. Dispersion & Prism
E. Huygens's Principle
F. Total Internal Reflection

IX. Mirrors & Lenses
A. Flat Mirrors
B. Image Formation by Spherical Mirrors
C. Images Formed by Refraction
D. Atmospheric Refraction
E. Lenses

X. Wave Optics
A. Interference
B. Young's Double-Slit Experiment
C. Reflection & Change of Phase
D. Interference in Thin Films
E. Diffraction & Single-Slit Diffraction
F. Diffraction Gratings
G. Polarization of Light Waves

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. The learner will be able to evaluate situations involving Engineering Physics II topics by choosing the appropriate conceptual frameworks.
B. The learner will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis in order to generate solutions to problems in Engineering Physics II topics.
C. The learner will be able to think critically by utilizing problem solving techniques to evaluate and analyze content rich, multi-step problems in Engineering Physics

II topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s).

D. The learner will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Engineering Physics II topics

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.