COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Engineering Physics I with Lab
COURSE NUMBER	NASC-0245
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Physical Sciences
CIP CODE	24.0101
CREDIT HOURS	5
CONTACT HOURS/WEEK	Class: 3 Lab: 4
PREREQUISITES	MATH-0122, Calculus and Analytic Geometry I, and MATH-0123, Calculus and Analytic Geometry II
COURSE PLACEMENT	None

COURSE DESCRIPTION
Engineering Physics I (and associated laboratory experience) is the study of translational and rotational motion, force, work, mechanical and thermal energy, linear and angular momentum, mechanical waves, and fluid mechanics using the tools of algebra, trigonometry, and calculus. The course is for students of Science and Engineering. Schedule: five hours of lectures and two hours of lab work per week. The course is currently being offered during fall semester only.

KANSAS SYSTEMWIDE TRANSFER: PHY 1030/1031/1032
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
☐ Social and Behavioral Sciences

Institutional Learning Outcomes

☐ Communication
☒ Computation and Financial Literacy
☒ Critical Reasoning
☒ Technology and Information Literacy
☐ Community and Civic Responsibility
☐ Personal and Interpersonal Skills

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 tentative course outline is described below & is subject to change as the course development dictates.

I. Measurements & Units
   A. Introduction
   B. SI system
   C. Dimensional analysis
   D. Significant figures

II. Motion in 1D and Vectors
   A. Speed & velocity
   B. Average & instantaneous velocity & acceleration
   C. Free fall
   D. Vectors, properties of vectors & vector addition

III. Motion in 2D
   A. Position, velocity & acceleration vectors
   B. Projectile motion
   C. circular motion & relative motion

IV. Newton's Laws of Motion
   A. Force & Newton's 1^{st} & 2^{nd} laws
   B. Gravity & Newton's 3^{rd} law
   C. Friction
   D. Uniform & non-uniform circular motion
   E. Motion in accelerated frames & resistive forces

V. Energy & Momentum
   A. Work, work done by a constant force & varying force
   B. Kinetic energy, potential energy, conservative & non-conservative forces
   C. Isolated & non-isolated system
   D. Power, momentum, collision in 2D
   E. Center of mass, system of particles, rocket propulsion

VI. Rotational Dynamics
   A. Rotational motion, rotational kinetic energy, moment of inertia torque
   B. Rolling motion, angular momentum, conservation of angular momentum
   C. Precession, equilibrium

VII. Equilibrium & Elasticity
   A. Rigid object in equilibrium, center of gravity
   B. Elastic properties of solids

VIII. Gravitation
   A. Law of gravitation, free fall, gravitational field, potential energy
   B. Planetary & satellite motion

IX. Fluid Dynamics
   A. Pressure, Archimedes' principle, Bernoulli's equation
   B. Fluid dynamics & applications

X. Oscillatory Motion
   A. Simple harmonic motion, circular motion, pendulum
   B. Damped & forced oscillations

XI. Wave Motions & Sound Waves
   A. Traveling wave, waves on strings
   B. Reflection & transmission, sinusoidal waves, wave equation
   C. Sound wave, Doppler shifts, digital recording, interference
   D. Waves in boundary conditions, standing waves, non-sinusoidal wave pattern

XII. Heat & Thermodynamics
   A. Zeroth law of thermodynamics, thermal expansion
   B. Heat & internal energy first law of thermodynamics
   C. Ideal gas, equipartition of energy, molecular speed distribution
   D. Second law of thermodynamics, refrigerator, Carnot engine, entropy

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. 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 I topics.
B. The learner will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Engineering Physics I topics, selecting relevant information, selecting an approach to solving the problem and carrying out the analysis needed to generate and communicate solution(s).

C. 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 I topics.
D. The learner will be able to evaluate situations involving Engineering Physics I topics by choosing the appropriate conceptual frameworks.

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.