SYLLABUS

DATE OF LAST REVIEW: 02/2013

CIP CODE: 24.0101

SEMESTER: DEPARTMENTAL SYLLABUS

COURSE TITLE: Engineering Physics I

COURSE NUMBER: NASC0245

CREDIT HOURS: 5

INSTRUCTOR: DEPARTMENTAL SYLLABUS

OFFICE LOCATION: DEPARTMENTAL SYLLABUS

OFFICE HOURS: DEPARTMENTAL SYLLABUS

TELEPHONE: DEPARTMENTAL SYLLABUS

EMAIL: DEPARTMENTAL SYLLABUS

KCKCC-issued email accounts are the official means for electronically communicating with our students.

REQUISITES(S): MATH-0122

CO-REQUISITE(S): Engineering Physics Lab-I, NASC1245

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckccbookstore.com, for the required texts for your particular class.

COURSE DESCRIPTION:
This is the first semester course of a two semester sequential course. The course is designed primarily for those students who are majoring in physical science and pre-engineering. The course provides solid foundation for the undergraduate level physics and other branches of engineering and fulfills a requirement for those students who want to transfer their credits to any four-year college and university. The course covers mechanics, waves and heat and thermodynamics using mathematical tools algebra, calculus and preliminary differential equations. The student must be concurrently enrolled in NASC-1245-Engineering Physics I Lab. The course is offered during fall semester only.

METHOD OF INSTRUCTION:
A variety of methods is used depending on the content area. These include but 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 1st & 2nd laws
   B. Gravity & Newton’s 3rd 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

EXPECTED LEARNER OUTCOMES:
A. The learner will be able to demonstrate knowledge of measurements, units and dimensions, vectors and motion in two dimensions.
B. The learner will be able to demonstrate knowledge of various type linear and circular motions and gravity and gravitational motion.
C. The learner will be able to demonstrate knowledge of energy and momentum and moment of inertia and angular momentum.
D. The learner will be able to demonstrate knowledge of pressure, fluid pressure and fluid dynamics.
E. The learner will be able to demonstrate knowledge of mechanical waves and wave motion.
F. The learner will be able to demonstrate knowledge of heat and laws of thermodynamics.

COURSE COMPETENCIES:
The learner will be able to demonstrate knowledge of measurements, units and dimensions, vectors and motion in two dimensions.
1. The learner will be able to define standard units in the measurements of length, mass and time.
2. The learner will be able to perform various types of vector algebra used in physics.
3. The learner will be able to describe the kinematics of one- and two-dimensional motion of particles under the influence of constant and variable accelerations.

The learner will be able to demonstrate knowledge of various type linear and circular motions and gravity and gravitational motion.
4. The learner will be able to apply Newton’s Laws of motion, gravity and gravitational motion.
5. The learner will be able to calculate work done by various types of forces.
6. The learner will be able to use the Conservation of Mechanical Energy.

The learner will be able to demonstrate knowledge of energy and momentum and moment of inertia and angular momentum.
7. The learner will be able to locate the center of mass and determine the moment of inertia of extended objects by integration.
8. The learner will be able to describe the kinematics of rotational motion of extended objects.
9. The learner will be able to apply Newton’s Laws of Motion to rotating/rolling objects.
10. The learner will be able to calculate work and energy and use the Conservation of Mechanical Energy for rotating objects.
11. The learner will be able to determine the conditions for static equilibrium of extended objects.
12. The learner will be able to use Conservation of Momentum in collision processes.
13. The learner will be able to calculate angular momentum of rotating objects.
14. The learner will be able to describe oscillatory or simple harmonic motion of various systems.

The learner will be able to demonstrate knowledge of pressure, fluid pressure and fluid dynamics.
15. The learner will be able to describe fluids in static equilibrium and in motion.

The learner will be able to demonstrate knowledge of mechanical waves and wave motion.
16. The learner will be able to discuss different types of waves and analyze their motion.

The learner will be able to demonstrate knowledge of heat and laws of thermodynamics.
17. The learner will be able to define thermodynamic properties such as temperature, heat, internal energy, specific heat and entropy.
18. The learner will be able to use the Laws of Thermodynamics in thermodynamic processes.
19. The learner will be able to identify the Scientific method as a process of science.
20. The learner will be able to make measurements using the metric system.
21. The learner will be able to gather the data and present it in a form showing their analysis.
22. The learner will be able to produce graphs of data provided by the instructor or gathered by the learner.
23. The learner will be able to interpret graphs of data provided by the instructor or gathered by the learner.
24. The learner will demonstrate knowledge of the use of models in science.
25. The learner will be able to make predictions based on the use of models.
26. The learner will demonstrate the use of math as a tool of science.
27. The learner will be able to convert between the units of the metric and customary English units.
28. The learner will demonstrate ability in problem solving as it relates to physical science.
29. The learner will be able to understand and use the vocabulary customary in physical science.
30. The learner will be able to critically review selected science writings.
31. The learner will be able to apply the concepts of physical science to real life situations.
32. The learner will be able to recognize key concepts and/or principles of physical science.
33. The learner will be able to identify the Scientific method when used.
34. The learner will be able to use the metric system to make measurements.
35. The learner will be able to show their analysis by gather the data and present it in a coherent form.
ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is meant to provide and outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus in not intended to be a legal contract. Questions regarding the syllabus are welcome at any time.

Kansas City Kansas Community is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personal. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administrated without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center at 913-288-7670.