SUFFOLK COUNTY COMMUNITY COLLEGE

COLLEGE COURSE SYLLABUS FORM

To meet the ideals of Suffolk County Community College, new courses should, if appropriate, consider issues arising from elements of cultural diversity in areas of textbook choice, selection of library and audio-visual materials, and teaching methodology. (Please note that a course syllabus is not the same as a course outline. A course syllabus outlines the general requirements for a course. A course outline is the specific document created by the individual faculty member to distribute to a specific course section. Please see the Faculty Handbook for further details as to what to include in a course outline. A SAMPLE course outline should be attached below.)

I. Course Number and Title:

(Be sure to consider whether this course is a 100- or 200-level course and give a rationale for the decision.)

PHY245 Physics 3

II. Catalog Description:

PHY245: Thermodynamics, waves, group and phase velocity, Fourier series, oscillation in physical systems, AC circuit theory, Maxwell's equations, electromagnetic waves, and geometrical and physical optics. (4 hrs. lecture/recitation.) Prerequisite: MAT203, MAT204, PHY230, PHY232. Corequisite: PHY246.

Note: Fulfills SUNY General Education Requirements for Natural Sciences.

III. *Learning Outcomes: *(Main concepts, principles, and skills you want students to learn from this course)*

Upon completion of this course, students will be able to:

A. Apply differential equations to solve problems in harmonic motion, AC circuits, physical optics.
B. Apply laws of thermodynamics in models of heat engines and refrigerators.
C. Use phasor notation to solve problems involving AC circuits.
D. Apply calculus and differential equations in formulating principles and solving problems.
E. Apply critical thinking skills in analyzing multi-step word problems and formulating solutions.
F. Be prepared for future undergraduate studies in physics subfields such as quantum mechanics at four-year institutes.
G. Successfully transfer to competitive engineering/science programs.

IV. Programs that Require this Course: *(List or indicate none.)*

- Engineering Science / A.S. Degree
- Liberal Arts and Sciences: Science Emphasis – Physics option / A.S. Degree

ALL FORMS MUST BE SUBMITTED ELECTRONICALLY

V. Major Topics Required:

A. Vibrations and waves including simple, damped and driven harmonic motion
B. Gas laws, mean free path and equipartition theorem, entropy
C. Heat engines, Carnot cycle and refrigerators
D. Heat capacity, specific heat and transfer of heat
E. Simple AC circuit theory including RC, LC, and LCR circuits
F. Maxwell's equations, electromagnetic spectrum and geometric optics
G. Application of laws of reflection and refraction in mirrors and lenses
H. Physical optics such as interference and diffraction

VI. Special Instructions:

A. Prerequisite(s) to this Course: *(List or indicate none)*
MAT203, MAT204, PHY230, PHY232

B. Course(s) that Require this Course as a Prerequisite:
(List courses or indicate none)
PHY246

C. External Jurisdiction: *(List credentialing organization/association if appropriate or indicate none.)*
None.

VII. Supporting Information: *(Examples – newspapers, journals, Internet resources, CD-ROMS, Videos, other teaching materials, textbooks, etc.)*

Required Textbook:

- Physics for Scientists and Engineers, by Giancoli, pub. Pearson

VIII. Optional Topics: *(List or indicate none)*

None.

IX. Evaluation of Student Performance:

List possible methods to be used for evaluating students' achievement of the course's learning outcomes.

Lecture tests/midterm/final, homeworks assignments, quizzes.

COURSE OUTLINE

Course Number and Title: PHY 245 Physics III

1. OUTCOMES OF THE COURSE:

Upon completion of this course, students will be able to:

A. Apply differential equations to solve problems in harmonic motion, AC circuits, physical optics.
B. Apply laws of thermodynamics in models of heat engines and refrigerators.
C. Use phasor notation to solve problems involving AC circuits.
D. Apply calculus and differential equations in formulating principles and solving problems.
E. Apply critical thinking skills in analyzing multi-step word problems and formulating solutions.
F. Be prepared for future undergraduate studies in physics subfields such as quantum mechanics at four-year institutes.
G. Successfully transfer to competitive engineering/science programs.

2. PROCEDURES FOR ACCOMPLISHING THESE OUTCOMES:

List of possible methods to be used for achievement of the course's outcomes:

Lectures, classroom discussions, analyzing and solving word problems in-class, assigning & checking homework, use of visual aids (including online videos and/or simulations), demonstrations.

3. STUDENT REQUIREMENTS FOR COMPLETION OF THE COURSE:

List of possible requirements (subject to the specific procedures chosen above) for completion of the course:

- Complete all non-optional lecture tests (STRONGLY REQUIRED).
- Submit periodic homework assignments on time.
- Complete periodic quizzes.
- Read all of the assigned chapters in the textbook.
- Participate in classroom discussions.
- Participate in analyzing and solving analytical problems in class.

4. TEXTBOOK:

Required Textbook:

- Physics for Scientists and Engineers, by Giancoli, pub. Pearson

5. WEEKLY OUTLINE TOPICS TO BE COVERED:

This is a suggested schedule, with exams. Instructors always have the flexibility to adjust the timeline of this schedule and number of exams according to their needs. However, the topics listed below should be followed closely.

Week 1 Week 2	• Simple harmonic motion and examples; simple harmonic, damped and driven oscillators; resonance
Week 3	• AC circuits as simple harmonic, damped and driven oscillators; impedance, reactance; LR and LRC AC circuits; resonance AC circuits
Week 4	Exam • Wave motion; traveling wave; the wave equation; superposition; introduction to reflection, transmission, interference, refraction, diffraction
Week 5-6	• Standing waves: vibrating string and air columns; resonance • Sound waves; beats; Doppler effect; shock waves
Week 6 Week 7	• Maxwell's equations; wave equation from Maxwell's equations; light as electromagnetic wave; speed of light; energy in EM waves; Poynting vector; radiation pressure
Week 8	Exam • Geometrical optics: ray model of light; formation of images by mirrors; reflection; refraction and index of refraction; Snell's law; dispersion; total internal reflection
Week 9	• Lenses; formation of images by lenses; magnification; the human eye; magnifying glass; telescope; microscope
Week 9-10	• Physical optics: wave nature of light; interference; Young's double-slit experiment; intensity in the double-slit interference pattern; thin film interference; Michelson interferometer
Week 10-11	• Diffraction by single slit; intensity in single-slit diffraction pattern; diffraction of double-slit experiment; diffraction limit; diffraction grating; spectrometer and spectroscopy; X-ray diffraction; polarization
Week 12-13	Exam • Temperature; thermal expansion; the ideal gas law; kinetic theory of gases; distribution of molecular speeds; real gases and change of phase; Van der Waals equation of state; mean free path
Week 13-14	• First law of thermodynamics; internal energy; specific heat; calorimetry; latent heat; molar specific heats for gases; equipartition of energy; adiabatic expansion of gases; heat transfer
Week 14	• Second law of thermodynamics; heat engines; Carnot engine; refrigerators; entropy
Week 15	Exam(s)

6. LIST OF SUPPLEMENTARY READINGS:

None.