**COURSE OUTLINE: PHY 105**
**D Credit – Degree Applicable**
**COURSE ID 004041**
**Cyclical Review: March 2019**

**COURSE DISCIPLINE :** PHY

**COURSE NUMBER :** 105

**COURSE TITLE (FULL) :** Algebra-based Physics: A

**COURSE TITLE (SHORT) :** Algebra-based Physics: A

**CALIFORNIA STATE UNIVERSITY SYSTEM C-ID :** PHYS 105 - Algebra/Trigonometry-Based Physics A

**CATALOG DESCRIPTION**

PHY 105 is a general course that focuses on properties of matter, mechanics, heat, wave motion, and sound. It includes lectures, demonstrations, problems, and laboratory work.

Total Lecture Units:3.00

Total Laboratory Units: 1.00

**Total Course Units: 4.00**

Total Lecture Hours:54.00

Total Laboratory Hours: 54.00

Total Laboratory Hours To Be Arranged: 0.00

**Total Contact Hours: 108.00**

**Total Out-of-Class Hours: 108.00**

Prerequisite: MATH 102, MATH 110, or MATH 110B.

**ENTRY STANDARDS**

| | Subject | Number | Title | Description | Include |
|---|---|---|---|---|---|
| 1 | MATH | 102 | Trigonometry | Demonstrate understanding of geometric properties of parallel lines, congruent and similar polygons, and circles; | Yes |
| 2 | MATH | 102 | Trigonometry | solve applications problems involving polygons, parallel lines, circles, and solids; | Yes |
| 3 | MATH | 102 | Trigonometry | graph trigonometric functions; | Yes |
| 4 | MATH | 102 | Trigonometry | solve trigonometric equations; | Yes |
| 5 | MATH | 102 | Trigonometry | apply the basic definitions of trigonometry to solve right triangle application problems; | Yes |
| 6 | MATH | 110 | Precalculus | solve equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic; | Yes |
| 7 | MATH | 110 | Precalculus | apply functions to model real world applications; | Yes |
| 8 | MATH | 110 | Precalculus | solve linear, non-linear, and absolute value inequalities; | Yes |
| 9 | MATH | 110 | Precalculus | graph the following types of functions and relations: polynomial, rational, exponential, logarithm, and conic section; | Yes |
| 10 | MATH | 110 | Precalculus | graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs; | Yes |
| 11 | MATH | 110 | Precalculus | solve exponential and logarithmic equations; | Yes |
| 12 | MATH | 110 | Precalculus | solve linear and non-linear systems of equations and inequalities; | Yes |
| 13 | MATH | 110 | Precalculus | evaluate a trigonometric function at an angle whose measure is given in degrees and | Yes |
| 14 | MATH | 110 | Precalculus | simplify trigonometric expressions; | Yes |
| 15 | MATH | 110 | Precalculus | solve trigonometric equations; | Yes |
| 16 | MATH | 110 | Precalculus | apply the basic definitions of trigonometry to solve right triangle application problems; | Yes |
| 17 | MATH | 110 | Precalculus | represent a vector (a quantity with magnitude and direction) in the form <a,b> | Yes |
| 18 | MATH | 110B | Precalculus II | apply the Fundamental Theorem of Algebra and related theorems to find the roots of a | Yes |
| 19 | MATH | 110B | Precalculus II | simplify trigonometric expressions; | Yes |
| 20 | MATH | 110B | Precalculus II | apply the laws of sines and cosines to solve application problems; | Yes |
| 21 | MATH | 110B | Precalculus II | use mathematical induction to prove formulas; | Yes |

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|---|---|---|---|---|---|
| 22 | MATH | 110B | Precalculus II | represent a vector in in the form < a , b > and ai+bj; | Yes |
| 23 | MATH | 110B | Precalculus II | solve applications using vectors. | Yes |

**EXIT STANDARDS**

1 Analyze the motion of objects with constant acceleration;
2 apply Newton's laws of motion to the dynamics of physical systems;
3 use conservation laws to predict the state of dynamical systems;
4 calculate state properties, such as pressure, volume, and temperature, of fluid and thermodynamic systems;
5 collect quantitative data from observations of laboratory experiments;
6 using a spreadsheet program, organize data in tables, and present data using graphs;
7 use the properties of waves and superposition to solve physical problems including problems about resonance, oscillations, standing waves, sound, and interference.

**STUDENT LEARNING OUTCOMES**

1 apply physical laws to model real world phenomena
2 demonstrate proficiency in using and interpreting graphs
3 use technology to collect and analyze data

**COURSE CONTENT WITH INSTRUCTIONAL HOURS**

| | Description | Lecture | Lab | Total Hours |
|---|---|---|---|---|
| 1 | Class Introduction, Representing Motion<br>• Position, Velocity, Acceleration<br>• S.I. Units<br>• Scientific Notation<br>• Algebra/Trig Review | 4 | 0 | 4 |
| 2 | Motion in One Dimension<br>• Uniform Motion<br>• Instantaneous Velocity<br>• Constant Acceleration<br>• Free Fall<br>• Graphing Motion | 4 | 0 | 4 |
| 3 | Motion in Two Dimensions and Vectors<br>• Using Vectors<br>• Motion on a Ramp<br>• Projectile Motion<br>• Circular Motion | 3 | 0 | 3 |

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|---|---|---|---|---|
| 4 | Force and Motion<br>• Catalog of Forces<br>• Newton's Laws<br>• Free-Body Diagrams | 3 | 0 | 3 |
| 5 | Applying Newton's Laws<br>• Equilibrium<br>• Mass/Weight<br>• Normal Forces<br>• Friction/Drag | 4 | 0 | 4 |
| 6 | Circular Motion, Orbits and Gravity<br>• Centripetal Acceleration<br>• Apparent Forces<br>• Newton's Gravity<br>• Gravity and Orbits | 3 | 0 | 3 |
| 7 | Rotational Motion and Torque<br>• Angular Variables<br>• Rigid Body Rotation<br>• Moment of Inertia<br>• Rotational Dynamics | 3 | 0 | 3 |
| 8 | Equilibrium and Elasticity<br>• Torque and Static Equilibrium<br>• Springs and Hooke's Law<br>• Stretching and Compressing Materials | 2 | 0 | 2 |
| 9 | Impulse and Momentum<br>• Impulse and Momentum Theorem<br>• Conservation of Momentum<br>• Collisions | 3 | 0 | 3 |
| 10 | Energy and Work<br>• Conservation of Energy<br>• Work as an Energy Flow<br>• Kinetic Energy<br>• Potential Energy<br>• Power | 4 | 0 | 4 |
| 11 | Using Energy<br>• Transforming Energy and Efficiency<br>• Energy in the Body<br>• Thermal Energy | 4 | 0 | 4 |

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|---|---|---|---|---|
| 12 | Thermal Properties of Matter<br>• Ideal Gas Law<br>• Gas Processes<br>• Thermal Expansion<br>• Specific Heat and Phase Changes<br>• Heat Transfer | 4 | 0 | 4 |
| 13 | Fluids<br>• Pressure<br>• Buoyancy<br>• Bernoulli's Equation | 3 | 0 | 3 |
| 14 | Oscillations<br>• Harmonic Motion<br>• Types of Oscillations | 2 | 0 | 2 |
| 15 | Traveling Waves and Sound<br>• Energy and Intensity<br>• Decibel Scale | 2 | 0 | 2 |
| 16 | Superposition and Standing Waves<br>• Waves on a String<br>• Harmonics<br>• Speech and Hearing<br>• Beats | 3 | 0 | 3 |
| 17 | Additional Content, Demonstrations, Classroom Group Work, Exams, and Quizzes | 3 | 0 | 3 |
| 18 | Lab | 0 | 54 | 54 |
| | | | | **108** |

**OUT OF CLASS ASSIGNMENTS**

1 Assigned Homework Problems
2 Supplemental Instruction (optional)
3 Pre-Lecture Reading
4 Pre-Lab Reading

**METHODS OF EVALUATION**

1 Graded Homework
2 Quizzes
3 Exams/Midterms
4 Written laboratory reports for each experiment completed in the laboratory
5 Final Exam

## METHODS OF INSTRUCTION

- [x] Lecture
- [x] Laboratory
- [ ] Studio
- [x] Discussion
- [x] Multimedia
- [x] Tutorial
- [ ] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [ ] Field Activities (Trips)
- [ ] Guest Speakers
- [x] Presentations

## TEXTBOOKS

| Title | Type | Publisher | Edition | Medium | Author | IBSN | Date |
|---|---|---|---|---|---|---|---|
| College Physics, a Strategic Approach | Required | Pearson | 4 | | Knight | 0-134-60903-4 | 2018 |
| Student Workbook for College Physics: A Strategic Approach Volume 1 (Chs 1-16) | Supplemental | Pearson | 4 | | Knight | | 2018 |
| Lab Manual, Physics 105, Glendale Community College | Required | Glendale Community College | | | Various | | 2018 |