MODESTO CITY SCHOOLS

COURSE OUTLINE

COURSE TITLE: Advanced Placement Physics

COURSE NUMBER: 548

RECOMMENDED GRADE LEVEL: 11-12

ABILITY LEVEL: Advanced

DURATION: 1 Year

CREDIT: 5 units per semester

GRADING FORMAT: Weighted

MEETS GRADUATION REQUIREMENTS: Science

REQUIRED FOR GRADUATION: No

SCHOOLS OFFERED: Beyer, Davis, Downey, Johansen, Modesto, Elliott

CBEDS CODE: 2608

MEETS UNIVERSITY OF CALIFORNIA ENTRANCE REQUIREMENTS: Yes

MEETS CALIFORNIA STATE UNIVERSITY ENTRANCE REQUIREMENTS: Yes

REPLACES:

Course Description:

This is a college-level introductory physics course that prepares the student to take the Advanced Placement Physics examination. The topics covered include mechanics, kinetic theory, thermo dynamics, electricity and magnetism, and waves and optics.

Recommended Prerequisites: CP Biology or Pre-AP Biology or CP Chemistry or Pre-AP Chemistry and Pre-Calculus with "C" or better and teacher recommendation; meets District CST Incentive Plan.

*Course work of transfer students will be evaluated for equivalency.

Date Matched Against State Framework, Model Curriculum Standards, and State Curriculum Guides:

Board Approved: July 11, 2005

REVIEW CYCLE:

REQUIRED TEXTBOOK: *Contemporary College Physics*, 2001, 3rd Edition, Jones & Childers, McGraw-Hill or *Physics: Principles with Applications*, 6th Edition, Giancoli, Pearson/Prentice Hall, 2004

INSTRUCTIONAL MATERIALS

BASIC TEXT(S):

Contemporary College Physics, 2001, 3rd Edition, Jones & Childers
McGraw-Hill

SUPPLEMENTARY TEXT(S):

The Blue Planet: An Introduction to Earth System Science Second Edition;
John Wiley & Sons

SUMMARY OF MAJOR UNITS OF INSTRUCTION

Advanced Placement Physics – Course B

UNITS

I. Mechanics

II. Heat, Kinetic Theory, and Thermodynamics

III. Electricity and Magnetism

IV. Waves and Optics

V. Modern Physics

VI. Mathematics Used in Physics

EXPECTATIONS FOR STUDENT LEARNING

I. The student, through lab reports and written assignments, will demonstrate knowledge of the following:

A. Kinematics including:

.1 the analysis of motion in one dimension including but not limited to the use of vector analysis and the use of the terms displacement, velocity and acceleration.
.2 the analysis of motion in two dimensions including but not limited to the use of vector analysis and the terms displacement, velocity, and acceleration.

B. Newton's laws of motion including:

.1 First Law (static motion)
.2 Second Law (single particle dynamics)
.3 Third Law (systems of bodies)

C. Work, energy, and power including:

.1 Work and work-energy theorem
.2 Conservation of forces and potential energy
.3 Conservation of energy
.4 Definition of power

D. Systems of Particles and linear momentum including:

.1 Center of Mass
.2 Impulse and momentum
.3 Conservation of linear momentum

E. Rotation including:

.1 Torque and rotational
.2 Rotational kinematics
.3 Moment of inertia
.4 Rotational dynamics
.5 Angular momentum and its conservation

F. Oscillations and gravitation including:

.1 Simple harmonic motion (dynamics and energy relationships)
.2 Mass on a spring
.3 Pendulum and other oscillations

.4 Newton's law of gravity
.5 Orbits of planets and satellites including circular and general case orbits

II. The student will demonstrate a knowledge of heat, kinetic theory, and thermodynamics through the use of laboratory experiments and written reports including:

A. Temperature and Heat including:

.1 the mechanical equivalent of heat
.2 specific and latent heats including calorimetry
.3 heat transfer and thermal expansion

B. Kinetic theory and thermodynamics including:

.1 the kinetic theory of ideal gases
.2 the ideal gas law
.3 the First Law of Thermodynamics
.4 the Second Law of Thermodynamics

III. The student will demonstrate a knowledge of electricity and magnetism through the use of laboratory experiments and written reports including:

A. Electrostatics including:

.1 charge, field, and potential
.2 Coulomb's law and field and potential of point charges
.3 fields and potentials of other charge distributions
.4 Gauss's law

B. Conductors, capacitors, dielectrics including:

.1 electrostatics with conductors
.2 capacitors including both parallel plate and spherical/cylindrical types
.3 dielectrics

C. Electric circuits including:

.1 current, resistance, and power
.2 steady-state direct current circuits with batteries and resistors
.3 capacitors in circuits

D. Magnetostatics including:

.1 forces on moving charges in magnetic fields

.2 forces on current-carrying wires in magnetic fields
.3 fields of long current-carrying wires
.4 Biot-Savart and Ampere's law

E. Electromagnetism including:

.1 electromagnetic induction with the use of Faraday's and Lenz's laws
.2 inductance with the use of LR and LC circuits
.3 Maxwell's equations

IV. The student will demonstrate a knowledge of waves and optics through the use of laboratory experiments and written reports including:

A. Wave motion of both sound and physical optics including:

.1 the properties of traveling waves
.2 the properties of standing waves
.3 the Doppler effect
.4 superposition
.5 interference and diffraction
.6 dispersion of light and the electromagnetic spectrum

B. Geometric optics including:

.1 reflection and refraction
.2 mirrors
.3 lenses

V. The student will demonstrate a knowledge of atomic physics, nuclear physics, and special relativity through the use of laboratory experiments and written reports including:

A. Atomic physics and quantum effects including:

.1 alpha particle scattering and the Rutherford model
.2 photons and the photoelectric effect
.3 Bohr model and energy levels
.4 wave-particle duality

B. Nuclear physics including:

.1 radioactivity and half-life
.2 nuclear reactions including conservation of mass number and charge

C. Special relativity including:

.1 the postulates of special relativity
.2 space and time effects
.3 mass and energy effects

VI. The student will demonstrate a knowledge of mathematical concepts appropriate to physics including the identification of vectors and scalars, vector resolution, graphical representation of laboratory data, and the graphs of functions.

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TEXTBOOK ADOPTION

NAME OF BOOK:	Physics: Principles with Applications, 6th Edition or Contemporary College Physics, 3rd Edition	
AUTHOR(S):	Giancoli	Jones & Childers
PUBLISHER:	Pearson/Prentice Hall	McGraw Hill
COPYRIGHT DATE:	2004	2001
ISBN #:	0131846612	0072335297
PRICE:	$91.97	(out of print 2005)
DEPARTMENT:	Science	
CLASS:	Advanced Placement Physics	

GENERAL DESCRIPTION:
College level physics book.

ASSURANCE OF SOCIAL APPROPRIATENESS: The selection committee has determined that the materials comply with the State of California Standards for Evaluation of Instructional Materials with Respect to Social Content.

APPROVED BY:

Selection Committee:
Dan Harris, Steve Dickson, Carol Schutt, Brian Heese

Curriculum Area Chairperson

Linda Erickson
Director, Curriculum & Staff Development, 7-12