MONROVIA UNIFIED SCHOOL DISTRICT

Course Description

[redacted]

1. Course Title
Advanced Placement (AP) Physics 1

2. Transcript Title / Abbreviation

3. Transcript Course Code / Number

4. School
Monrovia High School

5. District
Monrovia Unified School District

6. City
Monrovia, CA

7. School / District Web Site
www.monroviaschools.net

8. School Contact

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Title/Position: Director, Secondary Educational Services

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9. Subject Area

- History/Social Science
- English
- Mathematics
- X Laboratory Science
- Language other than English
- Visual & Performing Arts (for 2003)
- X College Prep Elective
- Career Technical Education (CTE)

10. Grade Level(s)
10-12

11. Seeking "Honors" Distinction?
Yes X No

12. Unit Value

- 0.5 (half year or semester equivalent)
- X 1.0 (one year equivalent)
- 2.0 (two year equivalent)
- Other: _____

13. Date of School Board Approval

14. Was this course previously approved by UC? Yes X No If so, year removed from list?
Under what course title?

15. Is this course modeled after an UC-approved course from another school? Yes No
If so, which school(s)? _____

16. Pre-Requisites
Physics or Physics Honors (recommended); Integrated Math I (required)

17. Co-Requisites
Integrated Math II

18. Brief Course Description –

The AP Physics 1 course is conducted using inquiry-based instructional strategies that focus on experimentation to develop students' conceptual understanding of physics principles. The students begin studying a topic by making observations and discovering patterns of natural phenomena. The next steps involve developing, testing, and applying models. Throughout the course, the students construct and use multiple representations of physical processes, solve multi-step problems, design investigations, and reflect on knowledge construction through self-assessment rubrics. In most labs, the students use probeware technology in data acquisition. In the classroom, they use graphing calculators and digital devices for interactive simulations, Physlet-based exercises, collaborative activities, and formative assessments.

19. Course Goals and/or Major Student Outcomes

The AP Physics 1 course devotes over 25% of the time to hands-on laboratory investigations. The laboratory component of the course allows the students to demonstrate the seven science practices through a variety of investigations in all of the foundational principles. The students use guided–inquiry (GI) or open–inquiry (OI) in the design of their laboratory investigations. Some labs focus on investigating a physical phenomenon without having expectations of its outcomes. In other experiments, the student has an expectation of its outcome based on concepts constructed from prior experiences. In application experiments, the students use acquired physics principles to address practical problems. Students also investigate topic-related questions that are formulated through student designed/selected procedures. All investigations are reported in a laboratory journal. Students are expected to record their observations, data, and data analyses. Data analyses include identification of the sources and effects of experimental uncertainty, calculations, results and conclusions, and suggestions for further refinement of the experiment as appropriate.

20. Course Objectives

This course framework provides a clear and detailed description of the course requirements necessary for student success. The framework specifies what students must know, be able to do, and understand, with a focus on six big ideas that encompass core principles, theories, and processes of physics. The framework also encourages instruction that prepares students to make connections across domains through a broader way of thinking about the physical world. The course framework includes two essential components:

- SCIENCE PRACTICES The science practices are central to the study and practice of physics. Students should develop and apply the described practices on a regular basis over the span of the course.
- COURSE CONTENT The course content is organized into commonly taught units of study that provide a suggested sequence for the course and detail required content and conceptual understandings that colleges and universities typically expect students to master to qualify for college credit and/or placement. This content is grounded in big ideas, which are cross-cutting concepts that build conceptual understanding and spiral throughout the course.

The big ideas serve as the foundation of the course and allow students to create meaningful connections among concepts. They are often abstract concepts or themes that become threads that run throughout the course. Revisiting the big ideas and applying them in a variety of contexts allows students to develop deeper conceptual understanding. Below are the big ideas of the course and a brief description of each.

- BIG IDEA 1: SYSTEMS (SYS) Objects and systems have properties such as mass and charge. Systems may have internal structure.
- BIG IDEA 2: FIELDS (FLD) Fields existing in space can be used to explain interactions.
- BIG IDEA 3: FORCE INTERACTIONS (INT) The interactions of an object with other objects can be described by forces.
- BIG IDEA 4: CHANGE (CHA) Interactions between systems can result in changes in those systems.
- BIG IDEA 5: CONSERVATION (CON) Changes that occur as a result of interactions are constrained by conservation laws.

21. Course Outline

UNIT 1. KINEMATICS
• Kinematics in one-dimension: constant velocity and uniform accelerated motion
• Vectors: vector components and resultant
• Kinematics in two-dimensions: projectile motion

UNIT 2. DYNAMICS
• Forces, types, and representation (FBD)
• Newton’s First Law
• Newton’s Third Law
• Newton’s Second Law

• Applications of Newton's Second Law
• Friction
• Interacting objects: ropes and pulleys

UNIT 3. CIRCULAR MOTION AND GRAVITATION
• Uniform circular motion
• Dynamics of uniform circular motion
• Universal Law of Gravitation

UNIT 4. ENERGY
• Work
• Power
• Kinetic energy
• Potential energy: gravitational and elastic
• Conservation of energy

UNIT 5. MOMENTUM
• Impulse
• Momentum
• Conservation of momentum
• Elastic and inelastic collisions

UNIT 6. SIMPLE HARMONIC MOTION
• Linear restoring forces and simple harmonic motion
• Simple harmonic motion graphs
• Simple pendulum
• Mass-spring systems

UNIT 7. ROTATIONAL MOTION
• Torque
• Center of mass
• Rotational kinematics
• Rotational dynamics and rotational inertia
• Rotational energy
• Angular momentum
• Conservation of angular momentum

UNIT 8. MECHANICAL WAVES
• Traveling waves
• Wave characteristics
• Sound
• Superposition
• Standing waves on a string
• Standing sound waves

UNIT 9. ELECTROSTATICS
• Electric charge and conservation of charge
• Electric force: Coulomb's Law

UNIT 10. DC CIRCUITS
• Electric resistance
• Ohm's Law
• DC circuits
• Series and parallel connections
• Kirchhoff's Laws

22. Texts & Supplemental Instructional Materials

College Physics for the AP Physics 1 & 2 Courses, Third Edition
By Gay Stweart, Roger A. Freeman, Todd Ruskell, Phillip Kestern
Published by Bedford, Freeman, & Worth

23. Key Assignments

See # 21

24. Instructional Methods and/or Strategies

Students will have the opportunity to practice what they have learned through structured laboratory experiments, guided inquiry, in class practice problems, and group projects. Students will be able to work individually, in pairs, and in groups to explore the concepts seen in class. The class will incorporate direct teaching, whole class discussion, partner work, and collaborative groups.

25. Assessment Methods and/or Tools

Students will be assessed using individual written tests, partner laboratory reports, group projects, and weekly classwork.

[redacted]

Please refer to instructions

26. Indicate how this honors course is different from the standard course.

[redacted]

Please refer to instructions

27. Context for Course (optional)

28. History of Course Development (optional)