APPLIED PHYSICS WITH LAB

College-Prep Physics Through Engineering Applications

COURSE INFORMATION	INSTRUCTOR
Grade Level: 10th - 12th **Credits:** 1.0 Lab Science **Duration:** 32 weeks (Full Year) **Schedule:** TBA **Prerequisites:** Algebra I (C+), Geometry, Physical Science	**Michael Puckett, M.Ed.** michael@trceducation.com 615-796-4632 TennesseeRoboticsCenter.com

SMART CREDENTIAL: Electrical Foundations — Carnegie Mellon Robotics Academy micro-certification

CLASS STRUCTURE (2.5 Hours)

INSTRUCTION	LUNCH/DEVOTION	HANDS-ON LAB
11:30 AM - 12:30 PM	12:30 - 1:00 PM	1:00 - 2:00 PM
60 minutes	30 minutes	60 minutes

Students should bring a peanut-free packed lunch. The devotion time focuses on character development and the 'Dare Mighty Things' mission mindset.

COURSE DESCRIPTION

This rigorous physics course prepares students for college-level STEM programs through hands-on engineering applications. Building on Physical Science foundations, students master kinematics, dynamics, energy, momentum, rotational motion, waves, and electromagnetism—with every concept applied to real robotic and mechanical systems. Mathematical problem-solving emphasizes algebraic and introductory calculus-based approaches.

REQUIRED TEXTBOOKS

Primary: *Conceptual Physics* by Paul Hewitt, 13th Edition (Pearson)

ISBN: 978-0135847978

Supplemental: *Physics: Principles with Applications* by Giancoli, 7th Edition

ISBN: 978-0321625922

TIME COMMITMENT

In-class instruction and lab time	2.5 hours/week
Textbook reading (chapters assigned weekly)	1-2 hours/week
Problem sets & lab reports	2-3 hours/week
TOTAL WEEKLY COMMITMENT	**6-8 hours/week**

COURSE UNITS (32 Weeks)

Unit	Topic	Weeks
1	**Physics & Measurement** SI units, dimensional analysis, vectors, significant figures, error analysis	1-4
2	**Kinematics** 1D & 2D motion, projectile motion, relative velocity, kinematic equations	5-8
3	**Dynamics (Newton's Laws)** Force diagrams, friction, tension, normal force, inclined planes, systems	9-12
4	**Energy, Work & Power** Work-energy theorem, conservation of energy, power, efficiency, springs	13-16

5	**Momentum & Rotation** Impulse, collisions, conservation of momentum, torque, angular motion	17-20
6	**Waves, Sound & Light** Wave mechanics, interference, Doppler effect, optics, sensors	21-24
7	**Electricity & Circuits ★ SMART** Electric fields, Ohm's Law, Kirchhoff's Laws, RC circuits, power	25-28
8	**Magnetism & Electromagnetism ★ SMART** Magnetic fields, motors, generators, electromagnetic induction	29-32

★ SMART = Unit aligned to CMU SMART certification competencies

GRADING

Reading Quizzes	10%
Lab Reports	25%
Problem Sets	20%
Unit Assessments	25%
Final Exam	20%

Grading Scale:

A: 90-100% | B: 80-89% | C: 70-79% | D: 60-69% | F: Below 60%

REQUIRED MATERIALS

- *Conceptual Physics* and *Physics: Principles with Applications* textbooks
- Scientific calculator with trig functions (TI-84 recommended)
- Graph paper notebook
- Composition notebook for lab notes
- Closed-toe shoes required on lab days

PATHWAY

Physical Science → **Applied Physics** → Engineering II → Robotics Engineering

Applied Physics provides the theoretical foundation for advanced engineering courses. Students completing this course are well-prepared for Engineering II (electrical systems), Robotics Engineering (control systems), AP Physics, or college-level physics and engineering programs.