Montgomery County Community College
PHY 115
Technical Physics
4-3-3

COURSE DESCRIPTION:
This course is a one-semester, algebra-based overview of topics in introductory physics designed for students in the life sciences. Topics include basic principles of motion, mechanics, statics, work and energy, fluid mechanics, sound and waves, thermal physics, electricity, magnetism, light, and optics. The weekly laboratory is designed to reinforce material introduced in lecture.

REQUISITES:
Previous Course Requirements
MAT 011 Beginning Algebra OR MAT 011B Beginning Algebra with Review of Arithmetic with a minimum grade of C.

Concurrent Course Requirements
None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Recognize basic physical quantities and the units associated with them.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
2. Explain how various physical quantities are related to each other.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Use the scientific method as applied to problems in classical physics.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
4. Solve practical problems in a rigorous and orderly manner using basic physical principles.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
5. Recognize the basic physical principles behind the operation of current technologies.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
6. Analyze independently devised and performed experiments to test hypotheses.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
7. Form tentative interpretations and conclusions to practical problems using experimental evidence.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
8. Identify reasonable sources of experimental error.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
9. Communicate experimental results through appropriately written lab reports.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
10. Interpret the graphical representation of various physical quantities.	Lecture Small Group Discussions Laboratory Experiments Demonstrations Videos Daily Reading and Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

1. Kinematics
2. Vectors
3. Force and Friction
4. Work and Energy
5. Conservation of Energy
6. Linear momentum
7. Rotational Motion
8. Newton’s Law of Gravitation and Kepler’s Laws
9. Circular Motion
10. Static Equilibrium
11. Fluid Mechanics
12. Thermodynamics
13. Waves and Sound

14. Electric Charge and Electric Fields
15. Electric Potential
16. Capacitance
17. Current and Resistance
18. DC Circuits
19. Magnetism and Magnetic Fields
20. Faraday's Law of Electromagnetic Induction
21. AC Circuits
22. Electromagnetic Waves and the Nature of Light
23. Mirrors and Lenses
24. Interference and Diffraction of Light

SEQUENCE OF EXPERIMENTS:
1. Acceleration Due to Gravity
2. Vector Addition
3. Newton's 2nd Law
4. Friction
5. Work-Energy Theorem
6. 1-Dimensional Collisions
7. Centripetal Force
8. Statics
9. Thermal Expansion
10. Standing Waves and Resonance
11. Mapping Electric Fields
12. The Oscilloscope
13. Basic DC Circuits
14. Electromagnetic Induction
15. Optics – Mirrors and Lenses

LEARNING MATERIALS:
Textbook: Giancoli. (2013) *Physics: Principles with Applications* (7th ed.) Pearson.
PHY115 Laboratory Manual
Scientific calculator (logarithms, exponential, powers, roots, etc.)

Learning Resources:
Physics Computer Lab (Science Center 216)
Tutorial Services (College Hall)

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by: Thomas French, Assistant Professor of Physics Date: 10/15/2015

VPAA/Provost Compliance Verification:

Dr. Victoria Bastecki-Perez Date: 3/31/2016

Revised by: Kelli Spangler, Assistant Professor of Physics Date: 11/20/2017

VPAA/Provost or designee Compliance Verification: Date: 11/20/2017

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.