Montgomery County Community College
PHY 152
Principles of Physics II
(Calculus-based)
4-3-3

COURSE DESCRIPTION:
This calculus-based course, designed for physical science majors, presents in depth an experimental and analytical study of mechanical oscillators, simple harmonic motion, waves, acoustics, resonance, electrostatics, electric fields, DC and AC circuits, magnetism, electromagnetic induction, electromagnetic waves, including the laws of Coulomb, Faraday, Gauss, Ampere, and Kirchhoff. The course will also cover the nature of light, and geometrical and physical optics, as applied to reflection, refraction, polarization, interference, and diffraction. This course is subject to a course fee. Refer to http://mc3.edu/adm-fin-aid/paying/tuition/course-fees for current rates.

REQUISITES:
Previous Course Requirements
- PHY 151 Principles of Physics I
- MAT 189 Calculus With a Review of Functions II or MAT 190 Calculus and Analytic Geometry I

Previous or Concurrent Course Requirements
- MAT 201 Calculus and Analytic Geometry II

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 AV/Multimedia Materials Daily Reading 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 AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Describe and use the scientific method as applied to problems in classical physics.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
4. Use basic physical principles to solve practical problems.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
5. Solve physics-related problems in a rigorous and orderly manner.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
6. Recognize the basic physical principles behind the operation of current technologies.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
7. Devise, perform, and analyze properly controlled experiments to test hypotheses.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
8. Use experimental evidence to form tentative interpretations and conclusions.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
9. Assign meaningful measurement uncertainties and identify reasonable sources of experimental error.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
10. Communicate experimental results through written lab reports.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
11. Use basic laboratory equipment in a safe and appropriate manner.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading Problem-Solving Assignments	Homework/Quiz Laboratory Report Section Examinations Final Exam
12. Interpret the graphical representation of various physical quantities.	Lecture Small Group Discussions Laboratory Experiments Demonstrations AV/Multimedia Materials Daily Reading 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. Simple Harmonic Motion
2. Waves and Harmonic Waves
3. Sound
4. Standing Waves
5. Electric Charge and Electric Fields
6. Gauss' Law
7. Electric Potential
8. Capacitance
9. Current and Resistance
10. DC Circuits
11. RC Circuits
12. Magnetism and Magnetic Fields
13. Charged Particles in Magnetic Fields
14. Ampere's Law
15. Faraday's Law of Electromagnetic Induction
16. Inductance
17. AC Circuits
18. Electromagnetic Waves and the Nature of Light
19. Mirrors and Lenses
20. Compound Optical Systems
21. Interference of Light
22. Diffraction of Light

SEQUENCE OF EXPERIMENTS:

1. Simple Harmonic Motion
2. Standing Waves and Resonance
3. Mapping Electric Fields
4. The Oscilloscope
5. Basic DC Circuits
6. RC Time Constant
7. Charged Particles in Magnetic Fields
8. Electromagnetic Induction
9. AC Circuits
10. Optics I – Mirrors and Lenses11. Optics II – Compound Optical Systems
12. Interference of Light
13. Diffraction of Light
14. Atomic Spectra

LEARNING MATERIALS:

Textbook:

Serway & Jewett. (2010). *Physics for Scientists and Engineers* (8th ed.). Thomson Publishing.

PHY152 Laboratory Manual

Physics Computer Lab (Science Center 217)

Tutorial Services

Scientific calculator (logarithms, exponential, powers, roots, etc.)

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: 4/11/2006
Revised by:	Thomas French, Assistant Professor of Physics	Date: 2/12/2009
VPAA/Provost Compliance Verification:	Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by:	Xingshu Zhu, Assistant Professor of Physics	Date: 2/7/2013
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.	Date: 4/14/2013
Revised by:	Debbie Dalrymple	Date: 6/27/2016
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.	Date: 6/27/2016

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.