Florida Agricultural and Mechanical University
Professional Education Unit
Tallahassee, Florida 32307

COURSE SYLLABUS

<table>
<thead>
<tr>
<th>Course Number:</th>
<th>PHY 2048.001</th>
<th>Course Title: GENERAL PHYSICS I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite(s):</td>
<td>MAC 2311</td>
<td></td>
</tr>
<tr>
<td>Course Credit:</td>
<td>4</td>
<td>Course Hours: 9:05AM-9:55AM</td>
</tr>
<tr>
<td>College:</td>
<td>ART AND SCIENCE</td>
<td>Required Text(s): FUNDAMENTAL OF PHYSICS, 7th Edition</td>
</tr>
<tr>
<td>Department:</td>
<td>PHYSICS</td>
<td>By David Holliday/Robert Resnick/Jearl Walker</td>
</tr>
<tr>
<td>Faculty Name:</td>
<td>Williams, Ronald L.</td>
<td>Publisher: John Wiley and Sons, Inc.</td>
</tr>
<tr>
<td>Supplies:</td>
<td></td>
<td>Term and Year: Spring 2010</td>
</tr>
<tr>
<td>Office Location:</td>
<td>JONES HALL  205</td>
<td>Place and Time: BLPC 00310</td>
</tr>
<tr>
<td>Office Hours</td>
<td></td>
<td>Telephone: (850) 599-8383</td>
</tr>
<tr>
<td>Monday</td>
<td>1PM-2PM</td>
<td>e-mail: <a href="mailto:Ronald.williams@famu.edu">Ronald.williams@famu.edu</a></td>
</tr>
<tr>
<td>Tuesday</td>
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<td>Wednesday</td>
<td>1PM-2PM</td>
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<td>Thursday</td>
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<td>Friday</td>
<td>1PM-2PM</td>
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<td>Saturday</td>
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Course Description

The course is designed to enable the student to learn introductory physics with calculus for secondary physics education, chemistry, engineering, mathematics, physics, and biology major. A laboratory and recitation are required.

Course Purpose

The course is to help students and prospective teachers to:

A. Develop the use of computer-base strategies to illustrate and solve physics problems.
   Present of physics applications orally and in writing.
B. Extract information from physics text through analytic reading.
C. Calculate and interpret the results of various physics problems.
D. Solve real world engineering problems using physics principles.
E. Develop models of physical problems.
F. Collaborate effectively with team members.
G. Solve problems through skilled time management.
H. Recognize and apply basic principles in the main area of physics

F=Florida Educator Accomplished Practices Standards (FEAPS)
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)
(K)=Knowledge (S)=Skill (D)=Disposition
**State and National Professional Standards for Training**

In response to Florida’s demand for accountability from their public schools, the 1997 State Legislature created the Florida System of School Improvement and Accountability, which is designed to improve student performance. The Physics Department, in response to this initiative, strives to make a positive impact by ensuring that it produces high quality professional specialists in physics education who are committed to improving student performance and who will assist students in meeting the Florida Sunshine State Standards. The Physics Department Physics Education program endeavors to provide a quality program through the implementation of an integrated curriculum based on the guidelines and competencies aligned with the Florida Sunshine State Standards, Florida Accomplished Practices, Florida Adopted Subject Area Competencies, and those guidelines and standards from other learned societies and professional organizations.

The Conceptual Framework in the Professional Education Unit at Florida A&M University’s College of Education is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of many activities and themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the unit strives to produce. Figure 1 provides a diagram of the Exemplary Professional Conceptual Framework:

The Unit’s Conceptual Framework is consistent with and complements the College of Education and the University’s Mission statements. The shared vision of the Professional Education Unit is to prepare exemplary professionals who are able to go into the educational institutions of Florida, the nation and the world armed with knowledge, skills, and dispositions that will facilitate learning for students, support interactions and partnerships with community stakeholders, and engender on-going professional development for themselves and others. The conceptual framework provides direction for programs, courses, teaching, candidate performance, scholarship, service, and Unit accountability.

The Physics Education Program at Florida A&M University is committed to training professionals who have expertise in the depth and diversity of both in physics and education.

**Conceptual Framework**

The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework.

**CRITICAL THINKING**

**CF4**
Through this focal area, the FAMU professional education candidate will:

| CF: 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 4 | I: 4 |

**PROFESSIONALISM**

**CF 5**
Through this focal area, the FAMU professional education candidate will:

| CF: 5.1 (K) | Know the content | F: 8 | I: 1 |

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National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

Standard 1: Subject Matter: The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

1.10 Knowledge
1.12 The teacher understands how students' conceptual frameworks and their misconceptions for an area of knowledge can influence their learning.

1.13 The teacher can relate his/her disciplinary knowledge to other subject areas.

Standard 4: Instructional Strategies: The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

4.10 Knowledge
4.11 The teacher understands the cognitive processes associated with various kinds of learning (e.g. critical and creative thinking, problem structuring and problem solving, invention, memorization and recall) and how these processes can be stimulated.

4.12 The teacher understands the principles and techniques, along with advantages and limitations, associated with various instructional strategies (e.g. cooperative learning, direct instruction, discovery learning, whole group discussion, independent study, interdisciplinary instruction).

4.13 The teacher knows how to enhance learning through the use of a wide variety of materials as well as human and technological resources (e.g. computers, audio-visual technologies, videotapes and discs, local experts, primary documents and artifacts, texts, reference books, literature, and other print resources).

Standard 8: Assessment: The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

8.10 Knowledge
8.11 The teacher understands the characteristics, uses, advantages, and limitations of different types of assessments (e.g. criterion-referenced and norm-referenced instruments, traditional standardized and performance-based tests, observation systems, and assessments of student work) for evaluating how students learn, what they know and are able to do, and what kinds of experiences and technology will support their further growth and development.

8.12 The teacher knows how to select, construct, and use assessment strategies, technology and instruments appropriate to the learning outcomes being evaluated and to other diagnostic purposes.

8.13 The teacher understands measurement theory and assessment-related issues, such as validity, reliability, bias, and scoring concerns.

Florida Educator Accomplished Practices (FEAP)

- Uses appropriate techniques and strategies, which promote and enhance critical, creative, and evaluative thinking capabilities of students. CRITICAL THINKING
- Demonstrates knowledge and understanding of the subject matter. SUBJECT MATTER KNOWLEDGE

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**Competencies and Skills required for Teacher Certification in Florida (FTCE)**

1. **Knowledge of Nature of Scientific Investigation and Instruction In Physics**
   1.1 Identify the characteristics and processes of scientific inquiry.
   1.4 Relate the historical development of the major concepts, models, and investigations in physics to current knowledge (e.g., force and motion, conservation principles, fields, quantum theory).
   1.5 Distinguish between scientific theories and laws in terms of their specific roles and functions.

2. **Knowledge of the Mathematics of Physics**
   2.1 Determine the validity of a formula based on dimensional analysis.
   2.2 Combine vectors using graphic and trigonometric methods.
   2.3 Determine the dot product and cross product of two vectors.
   2.4 Convert between units of a given quantity (e.g., length, area, volume, mass, time, temperature).
   2.5 Identify prefixes in the metric system and standard units of measure (e.g., newtons, meters, kilowatt-hours, teslas, electron volts, calories, horsepower).
   2.6 Estimate the order of magnitude of a physical quantity.
   2.7 Interpret the slope of a graph or area under the curve in relation to physical concepts.
   2.8 Apply the concepts of accuracy, precision, uncertainty, and significant figures to measurements and calculations.

4. **Knowledge of mechanics**
   4.1 Analyze the motion of an object moving in one dimension, given a graph (e.g., displacement versus time, velocity versus time, acceleration versus time).
   4.2 Determine distance traveled, displacement, speed, velocity, acceleration, or time of travel for objects moving in one dimension.
   4.3 Determine distance traveled, displacement, speed, velocity, acceleration, or time of travel for objects moving in two dimensions (e.g., projectile motion).
   4.4 Apply Newton's laws of motion to problems involving linear motion of a body.
   4.5 Apply Newton's laws of motion to problems involving circular motion of a body.
   4.6 Identify action-reaction pairs of forces between two bodies.
   4.7 Apply conservation of momentum to problems in one or two dimensions.
   4.8 Analyze problems using the impulse-momentum theorem.
   4.9 Analyze problems using Newton's universal law of gravitation (e.g., orbital motion).
   4.10 Analyze problems involving static or kinetic frictional forces.
   4.11 Apply conservation of mechanical energy.
   4.12 Use Newton's second law to analyze problems involving two connected masses (e.g., Atwood machine, Atwood machine on inclined plane, blocks, massless pulley).
   4.13 Analyze problems involving torque (e.g., equilibrium, rotational dynamics).
   4.14 Apply conservation of angular momentum and conservation of energy to problems involving rotational motion.
   4.15 Analyze problems involving work done on mechanical systems (e.g., power, work-energy theorem).
   4.16 Analyze problems involving the relationships between depth, density of fluid, and pressure.
   4.17 Analyze problems involving the buoyant force on a submerged or floating object (i.e., Archimedes' principle).
   4.18 Analyze problems involving moving fluids (e.g., mass conservation, Bernoulli's principle).
   4.19 Analyze problems involving center of mass.
   4.20 Use free-body diagrams to analyze static or dynamic problems in two or three dimensions.
   4.21 Analyze characteristics and examples of simple harmonic motion (e.g., oscillating springs, vibrating strings, pendula).

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5. Knowledge of waves and optics

5.1 Identify characteristics of waves (e.g., velocity, frequency, amplitude, wavelength, period, pitch, intensity, phase, nodes, antinodes, transverse waveforms, longitudinal waveforms).
5.2 Analyze the motion of particles in a medium in the presence of transverse and longitudinal waves.
5.3 Identify factors that affect wave propagation and wave speed.
5.4 Analyze problems involving the superposition, or interference, of waves (e.g., beats, standing waves, interference patterns).
5.5 Analyze problems involving standing waves (e.g., open or closed tube, vibrating string).
5.6 Analyze the Doppler effect due to the motion of a source or receiver.
5.7 Analyze waves, using either graphical or mathematical representations.
5.8 Analyze reflection and refraction problems using the law of reflection and Snell's law).
5.9 Interpret the relationships between wavelength, frequency, and speed of light.
5.10 Analyze the effects of linear polarizing filters on the polarization and intensity of light.
5.11 Analyze the geometric optics of thin lenses and mirrors.
5.12 Analyze patterns produced by diffraction and interference of light (e.g., single-slit, double-slit, diffraction gratings).
5.13 Identify the use and characteristics of various optical instruments (e.g., eye, spectroscope, camera, telescope, microscope, corrective lenses).
5.14 Apply the relationship between intensity and distance from a point source (i.e., inverse-square law).
5.15 Compare qualitative features of the ranges of the electromagnetic spectrum.

National Science Teachers Association Standards (NSTA)

1. Understand and can successfully convey to students the major concepts, principles, theories, laws and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association. (NSTA 1.0a)
2. Use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and needs of students. (NSTA 8.0a)
3. Reflect constantly upon their teaching and indentify ways and means through which they may grow professionally (NSTA 10.0b)

Professional Organization/Learned Society Standards

National Society of Science Teachers Association; American Association of Physics Teachers
Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills
American Physics Society (APS)
National Society of Black Physicists (NSBP)

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**Academic Learning Compact**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>NSTA For Teachers of Physics</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
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</thead>
<tbody>
<tr>
<td>Homework: Selected physics and mathematics problem from the textbook and additional instructor addendums. Each homework assignment will address course content and is aimed at development problem solving skills..</td>
<td>Students will 1. Demonstrate knowledge of the lecture material, and 2. Develop and enhance the skill of analytical analysis and problem solving</td>
<td>1.10, 4.10, 8.10</td>
<td>1C.5a: 1.0, 2.0, 3.0, 4.0, 8.0</td>
<td>4.1: 4.a,4.b; 8.1:8.a,8b.</td>
<td>1.1;1.4;1.5; 2.1 – 2.8; 4.1 -4.21; 5.1 – 5.15</td>
<td>CF 5.1(K), CF 4.5(S)</td>
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<tr>
<td>Exams: Three tests will cover the material of Chapters 1 - 12. Test 4 (Final) covers the material of Chapters 13 - 16.</td>
<td>Students will demonstrate knowledge (Chapters 1-16) and problem solving skill attaining a grade of 70% or higher.</td>
<td>1.10, 4.10, 8.10</td>
<td>1C.5a: 1.0, 2.0, 3.0, 4.0, 8.0</td>
<td>4.1: 4.a,4.b; 8.1:8.a,8b.</td>
<td>1.1;1.4;1.5; 2.1 – 2.8; 4.1 -4.21; 5.1 – 5.15</td>
<td>CF 5.1(K), CF 4.5(S)</td>
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**Course Artifacts**

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<tr>
<th>Standards</th>
<th>Name of the Artifact 1</th>
<th>Name of the Artifact 2</th>
<th>Name of the Artifact 3</th>
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<tbody>
<tr>
<td>PEU CF</td>
<td>Homework (10 problems) on Measurements; Motion Along a Straight line; Vectors; Motion in Two and Three Dimensions</td>
<td>Homework (10 problems) on Rolling Torque and Angular Momentum</td>
<td>Homework (10 problems) on Gravitation, Fluids</td>
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<td>FEAP</td>
<td>4.1: 4.a, 4.b; 8.1:8.a,8b.</td>
<td>4.1: 4.a,4.b; 8.1:8.a,8b.</td>
<td>4.1: 4.a,4.b; 8.1:8.a,8b.</td>
</tr>
<tr>
<td>INTACS</td>
<td>1.10, 4.10, 8.10</td>
<td>1.10, 4.10, 8.10</td>
<td>1.10, 4.10, 8.10</td>
</tr>
<tr>
<td>NSTA For Teachers in Physics</td>
<td>1C.5a: 1.0, 2.0, 3.0, 4.0</td>
<td>1C.5a: 3.0, 4.0, 8.0</td>
<td>1C.5a: 1.0, 2.0, 3.0, 4.0</td>
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<tr>
<td>FTCE SAE</td>
<td>2.1 – 2.8; 4.1- 4.5;</td>
<td>4.5; 4.13; 4.14</td>
<td>4.9; 4.11;4.16-4.18</td>
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**Topical Outline**

- **Week 1** Measurements
- **Week 2** Motion Along a Straight line

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Teaching Methods

Experiences to be provided in this course may include reading assignments in the textbook. During lecture physics theory and concepts will be explain with sample problems to reinforce the understanding of subject. Given the nature of the subject it is to student responsibility to attend class. Solving problems is vital part of learning physics, at the end of each chapter, problems will be assigned. It will be web-base, using the University of Texas web-base. [https://hw.utexas.edu](https://hw.utexas.edu). The unique access code or class name for this course is 51228. All assignments will be due at midnight on the due date. A week after the assignments is given. Absolute no late assignments will be accepted.

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Methods of Evaluations

The purpose of evaluating is to accurately reflect the extent to which the student has mastered the course content. Accordingly a variety of indicators will be used that included four tests ( drop one test in case student run into emergencies, or drop one the lowest test ), class attendance, more significant is mental presence, web-base Homework, class participation.

Homework Assignments: Problems from each section of the text will assigned each class. Unless otherwise stated they will be due one week after being assigned. Each homework assignment will address course content and is aimed at increasing your problem solving skills.

Class Participation and Student Led Discussions: Participation in class will be monitored and counts towards each student's grade.

Course Examinations/ Final Examination: There will be four in-class Tests and a Final Exams. These tests and the final exam will be given to assess your content knowledge on major concepts, principles, and physical laws. The final exam will be cumulative.

4 TEST (each of 20 points, the lowest score will be dropped) ------------------------------- 60 points
TEST #1:
CHAPTER # 1 Measurements
CHAPTER # 2 Motion Along a Straight line
CHAPTER # 3 Vectors
CHAPTER # 4 Motion in Two and Three Dimensions
TEST # 2:
CHAPTER # 5 Force and Motion-I
CHAPTER # 6 Force and Motion –II
CHAPTER # 7 Kinetic Energy and Work
CHAPTER # 8 Potential Energy and Conservation of Energy
TEST # 3:
CHAPTER #9 Center Mass and Linear Momentum
CHAPTER #10 Rotation
CHAPTER #11 Rolling Torque and Angular Momentum
CHAPTER #12 Equilibrium and Elasticity
TEST # 4:
CHAPTER #13 Gravitation, Fluids
CHAPTER #14 Oscillations
CHAPTER #15 Waves-I
CHAPTER #16 Waves-II

- 10 Homework (1 points each) ------------------------------- 10 points
Homework # 1:
CHAPTER # 1.2 Measurements; Motion Along a Straight line
CHAPTER # 3.4 Vectors; Motion in Two and Three Dimensions
Homework # 2:
CHAPTER # 5.6 Force and Motion-I; Force and Motion –II
CHAPTER # 7.8 Kinetic Energy and Work; Potential Energy and Conservation of Energy
Homework # 3: CHAPTER #9 Center Mass and Linear Momentum
Homework # 4: CHAPTER #10 Rotations
Homework # 5: CHAPTER #11 Rolling Torque and Angular Momentum

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Homework # 6: CHAPTER # 12 Equilibrium and Elasticity
Homework # 7: CHAPTER # 13 Gravitation, Fluids
Homework # 8: CHAPTER # 14 Oscillations
Homework # 9: CHAPTER # 15 Waves-I
Homework # 10: CHAPTER # 16 Waves-II

Final Exam (30 points) ---------------------------------- 30 points

Total ------------------------------------------- 100 points

**Grading**

100 - 90 = A  
98 - 80 = B  
79 – 70 = C  
69 – 60 = D  
< 59 = F

**Course Policies**

**Attendance:** You are responsible for determining if you want to attend to class or not. Given the nature of the subject it is to your benefit to attend the class. Should you find it necessary to be absent from class, you are responsible for determining what was covered in class while you were out.

**Withdrawal from Class without Penalty of “F”**

To withdrawal from class, you must fill out and return in to the records office a drop form on or prior the midterm date listed on the front of the syllabus. If you stop coming to class without going to the proper withdrawal procedure will result in the assignment of a grade of “F” for the semester.

**Assignment Of An Incomplete “I”**

An “I” will be assigned only to students, who fail to complete the course due to illness, injury or other non-academic emergency. Only those students who were doing satisfactory work will be eligible for the “I” grade. An “I” must be satisfactorily removed during the following academic quarter or the symbol “I” will be changed to “F” by the Records office. In unusual circumstances, an instructor may extend an incomplete beyond the one-quarter deadline – not to exceed a total of three consecutive calendar quarters. In order to remove an “I”, student will not be permitted to re-register for the course.

Please contact me if you should have extended illness or some other unavoidable non-academic emergencies.

**Academic Dishonesty:**

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Cheating may consist of stealing someone else’s answer on an exam to using notes of a “crib” sheet during exam. Should cheating be detected you will receive a zero on the given exam. Plagiarism may consist by presenting the work of others as your own work. Same as cheating, it will be penalized with a zero on the assignment.

**ADA Compliance** To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

**Reference**

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