COURSE OUTLINE

PHYS 133 – UNIVERSITY PHYSICS III

Prepared By: Dr. Lawretta Ononye
A. **TITLE**: UNIVERSITY PHYSICS III

B. **COURSE NUMBER**: PHYS 133

C. **CREDIT HOURS**: 3

D. **WRITING INTENSIVE COURSE**: NO

E. **COURSE LENGTH**: 15 weeks

F. **SEMESTER(S) OFFERED**: Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY**: 3 hours per week

H. **CATALOG DESCRIPTION**: This is the third semester of an introductory college physics course which uses basic calculus in developing some of the fundamental concepts of classical physics. Topics covered are rotation of rigid objects, static equilibrium of extended bodies, simple harmonic motion, gravitation, fluid mechanics, the law of thermodynamics and kinetic theory of gases.

I. **PRE-REQUISITES/CO-REQUISITES**:
   a. Pre-requisite(s): Physics 131 and MATH 161 or permission of instructor
   b. Co-requisite(s): PHYS 137

J. **GOALS (STUDENT LEARNING OUTCOMES)**: By the end of this course, the student will be able to:

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<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Demonstrate an understanding of the fundamental concepts of rotational mechanics.</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>b. Apply Newton's laws, the principles of conservation of angular momentum and energy to analyze and predict the rotational motion of simple mechanical systems.</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>d. Demonstrate an understanding of the elastic properties of solid and interpret stress-strain curve.</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>h. Illustrate an understanding of the fundamental concepts of fluid mechanics and thermodynamics.</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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L. **REFERENCES:** None

M. **EQUIPMENT:** Technology enhanced classroom

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:**
   - Exams
   - Quizzes
   - Homework
   - Participation
   - Class project/presentation

P. **DETAILED COURSE OUTLINE:**

I. Rotation of a Rigid Object About a Fixed Axis
   A. Rotational Kinematics
   B. Relationships between angular and linear quantities
   C. Rotational energy
   D. Moment of inertia
   E. Torque
   F. Relationship between torque and angular acceleration
   G. Work, power and energy in rotational motion

II. Rolling Motion, Angular Momentum and Torque
   A. Rolling motion of a rigid body
   B. The vector product and torque
   C. Angular momentum of a particle and conservation of angular momentum

III. Static Equilibrium and Elasticity
   A. The conditions of equilibrium of a rigid object
   B. The center of gravity
   C. Elastic properties of solids

IV. Oscillatory Motion
   A. Simple harmonic motion
   B. Energy of a simple harmonic oscillator
   C. The pendulum

V. Wave Motion
   A. Types of waves
   B. Propagation of waves
   C. Sound waves

VI. The Law of Gravity
   A. Newton’s Law of Universal Gravitation
   B. Weight and gravitational force
   C. Kepler’s Laws
VII. Fluid Mechanics
   A. Pressure and its variation with depth
   B. Buoyant forces and Archimedes’ principle
   C. Fluid dynamics
   D. Streamlines and the equation of continuity
   E. Bernoulli’s equation and its applications

VIII. Thermodynamics
   A. Temperature and the Zeroth Law of Thermodynamics
   B. Thermometers and Temperature Scales
   C. Thermal Expansion of Solids and Liquids
   D. Kinetic theory of gases: Macroscopic Description of an Ideal Gas
   E. Heat transfer
   F. First Law of Thermodynamics
   G. Second Law of Thermodynamics

Q. **LABORATORY OUTLINE:** NA