

VIRGINIA STATE UNIVERSITY
School of Engineering, Science and Technology
Department of Physics
COURSE SYLLABUS: SPRING SEMESTER, 2004
PHYSICS 302 Conceptual Physics (Lecture) 3 hrs credit

INSTRUCTOR: Carey E. Stronach, Ph.D., Professor of Physics

OFFICE: 104S Hunter-McDaniel Building

OFFICE HOURS: Monday: 11:00 am - 12:00 n & 3:30 - 5:00 pm;
Tuesday: 10:00 - 11:00 am; Wednesday: 10:00 - 11:00 am;
Thursday: 11:00 am - 12:00 n and 3:00 - 4:00pm;
Friday: 10:00 - 11:00 am & 3:00 - 4:00 pm.

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COURSE DESCRIPTION: PHYS 302, Conceptual Physics, is the study of the basic concepts of physics including motion, energy, rotation, gravity, heat and thermodynamics, wave motion, sound, electric charges and currents, electric and magnetic fields, electromagnetic waves including light, relativity, quantum physics, atomic and molecular structure, nuclear forces, and elementary particles. Emphasis is placed on how these concepts relate to everyday phenomena. This course is designed for students not majoring in science or mathematics.

PREREQUISITES: College Algebra and Trigonometry, or the equivalent.

COURSE TEXTBOOK: The Physics of Everyday Phenomena, Fourth Edition, by W. Thomas Griffith, 2004, The McGraw-Hill Companies, Inc., ISBN 0-07-121465-8.

CLASS MEETING PLACE AND TIMES: 106S Hunter-McDaniel Building, 8:00 - 8:50 am T, 8:00 - 9:20 Th.

NECESSARY SUPPLIES: Calculator, French curve (including straightedge and protractor) and graph paper.

COURSE REQUIREMENTS

General academic regulations are described in the University Catalog and in the Student Handbook. Some relevant policies from the Catalog are included at the end of this syllabus.

Students to whom the *Americans with Disabilities Act* applies should consult with the instructor about special course arrangements.

Course requirements will include the following:

A. Quizzes

Five quizzes will be given during the semester. The best **three** will be counted. There will be **no make-ups for missed quizzes**. Collectively the three quizzes that are counted will constitute **100%** of the semester grade (each counted quiz constitutes 33.3%). The *tentative* quiz dates and the sections in the text to which they relate are given below:

Quiz #1: Chapters 1 - 4; January 30, 2004

Quiz #2: Chapters 5 - 8; February 13, 2004

Quiz #3: Chapters 9 - 12; March 5, 2004

Quiz #4: Chapters 13 - 16; April 9, 2004

Quiz #5: Chapters 17 - 21; April 28(?), 2004

B. Final Examination

The final examination period will be used for quiz #5, which will include review material in addition to Chapters 17 - 21.

GRADING STANDARDS

The course grade will be based on the following items, which are discussed above:

Quizzes (five, with the best three counted) ----- 100%

The standard University grading scale will be employed:

A:	90 - 100
B:	80 - 89
C:	70 - 79
D:	60 - 69
F:	0 - 59

REFERENCE BOOKS:

The following text may be useful:

Conceptual Physics, by Paul G. Hewitt, Addison-Wesley Publishing Co.

The instructor recommends the following study guide:

The Physics Toolbox, by Hubbard & Katz, Brooks-Cole.

COURSE OUTLINE - PHYSICS 302

I. The nature of physics

- a. The scientific method
- b. Sub-fields of physics
- c. Measurement
- d. The metric system

II. Motion

- a. Length, time and mass
- b. Speed and velocity
- c. Acceleration

III. Falling objects

- a. Gravitational acceleration
- b. Projectile motion

IV. Newton's laws of motion

- a. First & second laws of motion
- b. Third law of motion

V. Central force motion

- a. Circular motion
- b. Planetary motion
- c. Newton's law of gravity

VI. Energy

- a. Work
- b. Kinetic energy
- c. Potential energy
- d. Conservation of energy
- e. Simple harmonic motion

VII. Momentum

- a. Momentum and impulse
- b. Conservation of momentum
- c. Elastic and inelastic collisions

VIII. Rotational Motion

- a. Rotational displacement, velocity and acceleration
- b. Torque, center of gravity and angular momentum
- c. Newton's second law of rotational motion
- d. Conservation of angular momentum

IX. Fluids

- a. Pressure
- b. Archimedes' principle
- c. Bernoulli's principle

X. Temperature and heat

- a. Temperature scales
- b. Heat and specific heat
- c. Phase changes
- d. The first law of thermodynamics
- e. The second law of thermodynamics
- f. Entropy

XI. Electromagnetism

- a. Electric charge, Coulomb' s law and electric fields
- b. Electric circuits and Ohm' s law
- c. Alternating current
- d. Magnets
- e. Magnetic effects of electric currents
- f. Electromagnetic induction, generators and transformers

XII. Waves

- a. Properties of waves
- b. Physics of music
- c. Electromagnetic waves
- d. Optics

XIII. Atoms

- a. The periodic table
- b. Quantum physics
- c. Structure of atoms
- d. Atomic nuclei
- e. Radioactivity, nuclear reactions, fission and fusion

XIV. Relativity

- a. Relative motion and the speed of light
- b. What' s relative and what' s invariant
- c. Mass and energy
- d. The principle of equivalence
- e. Curvature of space and time; black holes

XV. Frontiers of physics

- a. Elementary particles
- b. The fundamental forces
- c. Cosmology
- d. Microelectronics and computers
- e. Superconductors

The purposes of this course are (1) to provide the student with a basic knowledge of the fundamental concepts in physics, (2) to develop in the student an analytic approach to problem solving, both in science and "everyday life", and (5) to develop in the student an appreciation of the role of science in our current society, and in the past, and what it is likely to be in the future.