ISNS-3371-Phenomena of Nature
Spring 2007

This course is a multidisciplinary study of nature expressly designed for those who have chosen not to major in the natural sciences or engineering. Laboratory experiments are performed in almost every class demonstrating relevant principles of physics. The course covers many concepts that will explain how the world works and provides the students with an appreciation for the intricacies of the natural world.

The students will gain an understanding of the nature of the universe and many of the underlying principles that govern its existence. The course will cover many important concepts from physics and chemistry and will use some simple mathematics throughout the course.

INSTRUCTOR:

- **Dr. Phillip C. Anderson 972-883-2875 — Room FO2.708D**
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TEACHING ASSISTANT:

- **Jeff Peden 972-883-2867 — Room FO1.426**
  email: loganpeden@sbcglobal.net

OFFICE HOURS:

- **Dr. Anderson: Tuesday/Thursday 10:00 – 11:00 PM and by appointment**
- **Mr. Peden: Wednesday 2:00 – 3:00 PM and by appointment**

TEXT:

- **Conceptual Physical Science by: Hewitt, Suchocki, Hewitt**
- **Slides will be available on the web at: www.utdallas.edu/~pca015000**

GRADING:

- **Exams (3), 2 Exams @ 25% each = 50%**
  February 8th and March 15th
  Final Exam = 30%
  April 24th @ 8:00 AM
- **Quizzes = 10%**
  Short quizzes may be given during any class period
- **Homework = 10%**

ATTENDANCE is important since exams and quizzes are based on material covered in class.

- **A seating chart will be made on the second day of class.**
- **If your grade is on the borderline between two letters, your attendance will be used to determine whether to raise or lower your grade**

SYLLABUS - Spring 2007

1. Introduction -

- Exploration of Nature, Science –
  A Way of Knowing
- Fundamental quantities
- Measurement units
- Scales of distances

2. The Newtonian Universe

- Vectors, Scalars
- Motion - distance, velocity, acceleration
- Force - static, net
- Mass, momentum, impulse
- Newton's Laws of Motion
- Gravity -force, acceleration, weight, weightlessness

3. Energy and Matter

- Matter - States of Matter
- Energy, Work
- Law of Conservation of Energy
- Forms of Energy
- Transformation of energy
- Power
- Heat, Temperature
- Transfer of heat - Conduction, Convection,
  Radiation, Change of state of matter
- Gases - gas laws, Boyle, Charles, General
- First Law of Thermodynamics
- Diffusion of gases
- Archimedes' Principle
- Bernoulli Effect

4. Exploring the Universe

Wave Motion

- Waves, Properties of Waves

- Standing Waves,
- Resonance, Interference, Beats

Sound

- Pitch vs. Frequency,
- Loudness vs. Intensity
- Timbre vs. Harmonics

Light

- Electromagnetic Spectrum - Color
- Refraction, Reflection
- Polarization
- Doppler Effect
- Lenses and Mirrors, Optical Instruments
- Scattering - Blue Sky - Red Sunsets
- Rainbows
- Atmospheric Pollution

Radiation

- Black Body, Planck's Law
- Wien's and Stefan's Laws

5. Electricity and Magnetism

- Electrostatics
- Fields and Potential, Energy and Power
- Electrical units: Volt, Ampere, Ohm
- Circuits - Series and Parallel
- Magnetism
- Electric Currents and Magnetic Fields
- Motors, Generators, Transformers
- Power Distribution

6. The Material World

- Particles of Matter – Atoms, Atomic Structure
- Atomic Spectra – Hydrogen Atom
- What is Inside the Atom?
- The Nucleus – Geochronology, Stability,
- Radioactivity,
- Fission, Fusion

- Energy of the Future

SPRING 2007 — HOMEWORK PROJECT

Select an article from the newspaper or a news magazine dealing with **science** and its relationship with society, that is, with the environment, weather, global warming, space exploration, health, dna, genetic engineering, etc.

Articles dealing with purely social issues will not be accepted.

Write a report on the article. The report must contain:

1. Title of the article.
2. Name of publication (Dallas Morning News, New York Times, Time, Newsweek. Reports from the internet are acceptable.)
3. Date of publication.
4. A paragraph of two or three sentences on the main theme of the article and how it relates to a current science issue.
5. Your name and assigned seat number in the upper right hand corner.

Attach a copy of the article to the report. Please **staple** the article to the report before coming to class. We do not have a stapler in class.

Reports are due every Tuesday starting on January with the last one due on April 19.

Late reports will not be accepted. A report is considered **late** if not handed in by the end of class (10:45 am) on the date due.