Syllabus
GENERAL PHYSICS I, PHY 221 – 01

Fall 2006

Instructor:	Prof. Abdennaceur Karoui
Course Meeting time:	MW 1:00-3:30 p.m.
Location:	320 Roberts Science Hall
Office Location:	309 Roberts Science Hall
e-mail:	akaroui@shawu.edu
Phone:	919-719 1998 (5998 on campus)
Office Hours:	Mon. 4:00pm-5:00pm Additionally when possible, Wed. 4:00pm-5:00pm (Availability will be announced in this website, each week)
TA Hours:	On Wednesday, by arrangement**.**
Text (required):	Serway, Physics for Scientist and Engineers Sixth Ed. Saunders College Publishing,
Course Prerequisites:	Calculus I , Calculus II

General Description:

Calculus-based Physics course, taken by physics, mathematics, computer science and engineering majors, light, optics, light interference, diffraction, and introduction to modern physics.

Course Objectives:

After completing this course students should be able to:

1. know and understand basic physical processes and phenomena.
2. solve simple physics problem by applying both theoretical and experimental techniques.
3. acquire skills needed to read physics literature and to work with tables and physical quantities.
4. understand and to use physical laws governing real process and to describe them mathematically.

Course Format:

This course integrates lectures, laboratory, exercises (Web Assignment), Problem Sessions (in-class with the TA). Note that there will be only one grade given for this course.

Additional materials:

Scientific calculator, drawing instruments (ruler, protractor, and compass), and student version of MATHCAD software (publisher: Mathsoft Engineering & Education, Inc.)

Problem Solving Session, Laboratory reports, Homework, Group Project, Presentation, and Evaluation.

- Each week, there will be either one Problem Solving or one Laboratory. The corresponding report will be due one week after it has been assigned unless otherwise posted. Credit will be given for both the attendance and the corresponding report.

- The combined grade for the Labs will be 11.4% of the total grade.

- The combined grade for the Problem Solving will be 11.4% of the total grade.

- One Group Project will be made by each group of two students. They will present their work at the end of the semester of the group project. Together (presentation and work quality) will count for 10% of the grade.

- **Bonus:** Points will be added to a student's grade for contribution in the classroom. Attendance affects the amount of bonus points.

- The combined grade for the Quizzes will be 11.4% of the total grade.

- Homework will be assigned every week and will be due the one week after it has been assigned unless otherwise posted. Homework will count for 17.1% of the total grade

- There will be four quizzes given based on groups of chapters (i.e. Chs. 1- 4). The final will be cumulative, which amounts to about 11.4% of the grade.

- Mid-term and Final Exam will count for 20% of the grade.

Summary of the Evaluation:

	% of final grade
Laboratory Reports:	11.4
Problem Solving (with TA):	14.3
Web Assignment:	11.4
Group Project:	7.1
Presentation:	2.9
Bonus:	4.3
Homework:	17.1
Quizzes:	11.4
Exams (mid-term and Final):	20.0
Total:	100

Lateness:

Any work turned in late will only count for half credit. A student, who is absent on the due date of the assignment may turn in the assignment by the next class only if the student has a valid excuse.
Late work will only be accepted no later than one week after the assignment is due.

GENERAL PHYSICS I , PHY 221-01

PART 1: MECHANICS

Chapter 1 Physics and Measurement

Standards of Length, Mass, and Time
Matter and Model Building
Density and Atomic Mass
Dimensional Analysis, Units, and Conversion of Units
Estimates and Order-of-Magnitude Calculations
Significant Figures , Significant Digits

Chapter 2 Motion in One Dimension

Position, Velocity, and Speed
Instantaneous Velocity and Speed
Acceleration
Motion Diagrams
One-Dimensional Motion with Constant Acceleration
Freely Falling Objects
Kinematic Equations Derived from Calculus
General Problem-Solving Strategy

Chapter 3: Vectors

Coordinate Systems
Vector and Scalar Quantities
Some Properties of Vectors
Components of a Vector and Unit Vectors

Chapter4: Motion in Two Dimensions

The Position, Velocity, and Acceleration Vectors
Two-Dimensional Motion with Constant Acceleration
Projectile Motion
Uniform Circular Motion
Tangential and Radial Acceleration
Relative Velocity and Relative Acceleration

Chapter 5: The Law of Motion

The Laws at Motion
The Concept of Force
Newton?s First Law and Inertial Frames
Mass
Newton?s Second Law
The Gravitational Force and Weight
Newton?s Third Law
Some Applications of Newton?s Laws
Forces of Friction

Chapter 6: Circular Motion and Other Applications of Newton?s Laws

Newton?s Second Law Applied to Uniform Circular Motion
Nonuniform Circular Motion
Motion in Accelerated Frames
Motion in the Presence of Resistive Forces
Numerical Modeling in Particle Dynamics

Chapter 7: Energy and Energy Transfer

Systems and Environments
Work Done by a Constant Force
The Scalar Product of Two Vectors
Work Done by a Varying Force
Kinetic Energy and the Work?Kinetic Energy Theorem
The Nonisolated System?Conservation of Energy
Situations Involving Kinetic Friction
Power
Energy and the Automobile

Chapter 8: Potential Energy

Potential Energy of a System
The Isolated System?Conservation of Mechanical Energy
Conservative and Non-conservative Forces
Changes in Mechanical Energy for Non-conservative Forces
Relationship Between Conservative Forces Potential Energy
Energy Diagrams and Equilibrium of a System

Chapter 9: Linear Momentum and Collisions

Linear Momentum and Its Conservation
Impulse and Momentum
Collisions in One Dimension
Two-Dimensional Collisions
The Center of Mass
Motion of a System of Particles
Rocket Propulsion

Chapter 10: Rotation of a Rigid Object About a Fixed Axis

Angular Position, Velocity, and Acceleration
Rotational Kinematics: Rotational Motion with Constant Angular Acceleration
Angular and Linear Quantities
Rotational Kinetic Energy
Calculation of Moments of Inertia
Torque
Relationship Between Torque and Angular Acceleration
Work, Power, and Energy in Rotational Motion
Rolling Motion of a Rigid Object

Chapter 11: Angular Momentum

The Vector Product and Torque
Angular Momentum
Angular Momentum of a Rotating Rigid Object
Conservation of Angular Momentum
The Motion of Gyroscopes and Tops
Angular Momentum as a Fundamental Quantity

Chapter 12: Static Equilibrium and Elasticity

The Conditions for Equilibrium
More on the Center of Gravity
Examples of Rigid Objects in Static Equilibrium
Elastic Properties of Solids

Chapter 13: Universal Gravitation

Newton?s Law of Universal Gravitation
Measuring the Gravitational Constant
Free-Fall Acceleration and the Gravitational Force
Kepler?s Laws and the Motion of Planets
The Gravitational Field
Gravitational Potential Energy
Energy Considerations in Planetary and Satellite Motion

Chapter 14: Fluid Mechanics

Pressure
Variation of Pressure with Depth
Pressure Measurements
Buoyant Forces and Archimedes?s Principle
Fluid Dynamics
Bernoulli?s Equation
Other Applications of Fluid Dynamics

PART - II: OSCILLATIONS AND MECHANICAL WAVES

Chapter 1: Oscillatory Motion

Motion of an Object Attached to a Spring
Mathematical Representation of Simple Harmonic Motion
Energy of the Simple Harmonic Oscillator
Comparing Simple Harmonic Motion with Uniform Circular Motion
The Pendulum
Damped Oscillations
Forced Oscillations

Chapter 2: Wave Motion

Propagation of a Disturbance
Sinusoidal Waves
The Speed of Waves on Strings
Reflection and Transmission
Rate of Energy Transfer by Sinusoidal Waves on Strings
The Linear Wave Equation

Chapter 3: Sound Waves

Speed of Sound Waves
Periodic Sound Waves
Intensity of Periodic Sound Waves
The Doppler Effect
Digital Sound Recording
Motion Picture Sound

Chapter 4: Superposition and Standing Waves

Supplement A: Hands-on MATHCAD

Supplement B

Supplement C: Mathematics Review