

Instructor:	Prof. Abdennaceur Karoui
Course Meeting time:	MW 1:00-3:30 p.m.
Location:	114 Roberts Science Hall
Office Location:	120 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)
TAHours:	On Wednesday, by arrangement.
Text (required):	Serway, Physics for Scientist and Engineers Sixth Ed. Saunders College Publishing,
Course Prerequisites:	The prerequisite for this course is General Physics II (PHY 202).

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 do the following:

1. To know and understand basic physical processes and phenomena.
2. To be able to solve simple physics problem by applying both theoretical and experimental techniques.
3. To acquire skills needed to read physics literature and to work with tables and physical quantities.
4. To be able to 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.

Suggested References:

D. Halliday and R. Resnick, Fundamentals of Physics, John Wiley & Sons, Inc., 1991

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 for the absent. Late work will only be accepted up to one week after the assignment is due.

Calendar:

PART - I: LIGHT AND OPTICS

Chapter 1 The Nature of Light and toe Laws of Geometric

The Nature of Light	Aug. 21
Measurements of the Speed of Light	
The Ray Approximation in Geometric Optics Reflection	
Fermat's Principle	Aug. 23
Huygens's Principle	
Refraction	Aug. 28
Total Internal Reflection	
Dispersion and Prisms	Sep. 11
Gauss Approximation, Lenses	

Chapter 2: Image Formation

Images Formed by Flat Mirrors	Sep. 18
Images Formed by Spherical Mirrors	
Images Formed by Refraction	
Thin Lenses	Sep. 25
Lens Aberrations	
The Camera and The Eye	
The Simple Magnifier	Oct. 4
The Compound Microscope	
The Telescope	

Chapter 3: Interference of Light Waves

Interferences	Oct. 9
Young's Double-Slit Experiment	
Intensity Distribution of the Double-Slit Interference Pattern	
Phasor Addition of Waves	Oct.16
Change of Phase Due to Reflection	
Interference in Thin Films	
The Michelson Interferometer	

Chapter 4: Diffraction Patterns and Polarization

Diffraction Patterns and Polarization	Oct.23
Introduction to Diffraction Patterns	
Diffraction Patterns from Narrow Slits	
Resolution of Single-Slit and Circular Apertures	Oct.30
The Diffraction Grating	
Diffraction of X-Rays by Crystals	
Polarization of Light Waves	

PART - II: MODERN PHYSICS

Chapter 1: Relativity

The Principle of Galilean Relativity	Nov.06
The Michelson—Morley Experiment	
Einstein's Principle of Relativity	
Consequences of the Special Theory of Relativity	Nov.13
The Lorentz Transformation Equations	
The Lorentz Velocity Transformation Equations	
Relativistic Linear Momentum and the Relativistic Form of Newton's Laws	Nov.20
Relativistic Energy	
Mass and Energy	
The General Theory of Relativity	

Chapter 2: Physics of Nanoscience and Nanotechnology

Experimental Observations That led to Quantum Mechanics	Nov.27
Introduction to Quantum Mechanics	
Case Studies: Potential Well, Periodic Potential, Particle in a 3D Box	
Examples of Computer Simulation of Crystals and Molecules by Quantum Mechanics Calculations	Nov.29
Basis of Molecular Dynamics Calculations and Examples	

Calendar of the Homework and Exams

WebTests (once a week)	Will Start on 8/28/06
Pb Solving (once a week)	Will Start on 8/28/06
Quiz 1	8/30/06
Homework 1	9/13/06
Quiz 2	9/20/06
Homework 2	9/27/06
Mid-Term	10/2/06
Quiz 3	10/11/06
Homework 3	10/25/06
Quiz 4	11/8/06
Homework 4	11/15/06
Presentation	11/20/06
Final Exam	12/4/06