Course Specifications

Program(s) on which this course is given:	Electronics & Electrical Communications Engineering
Major or Minor element of programs:	Major
Department offering the program:	Electronics & Electrical Communications Engineering
Department offering the course:	Mathematics and Engineering Physics
Academic year / Level:	First
Date of original/modified specification approval:	2003/
Semester of course offering:	First

A- Basic Information

1.a. Title:	Physics (2)			**1.b. Code:**	PHY 117A			
2. Units/Credit hours per week:	2.a. Lectures	4	2.b. Tutorial	1	2.c. Practical	1	2.d. Total	6

B- Professional Information

1. Overall Aims of the Course:

In this course, the student should learn the basics of physical optics. He gets sufficient knowledge about waves, oscillations and nature of light. The student study reflection, refraction, interference, diffraction, polarization of light.

2. Intended Learning Outcomes of Course (ILOs):

a) Knowledge and Understanding (1.1)

1. Define wave intensity and Poynting vector
2. Discuss the Doppler effect in sound and in light
3. State Maxwell's Equations
4. State Fresnel equations
5. Define coherence
6. Explain Young's experiment for wave front splitting interference
7. Explain diffraction grating and its diffraction pattern
8. State the laws of the rotation of plane of polarization
9. Discuss the function of the polarimeter

b) Intellectual Skills (3.1)

1. Calculate speed, acceleration and energy of simple harmonic motion.
2. Calculate wave intensity, absorption of wave an wave function equation.
3. Calculate the energy density, Poynting vector and irradiance of EMW.
4. Calculate the reflection and transmission coefficients, reflectance and transmittance for TM and TE modes
5. Compare between external and internal reflections of light beam.
6. Differentiate between phase difference and optical path difference
7. Compare between thin films and wedge shaped films.
8. Compare between the diffraction and interference patterns for double slit setup
9. Compare between different methods of polarization of light waves.
10. Calculate the intensity of emerged light beam from the polarimeter for different angles of rotations

c) Professional and Practical Skills (2.6)

1. Apply principle of superposition for multiple SHM, algebraically and graphically.
2. Measure the curvature of the convex lens using Newton's Rings
3. Measure the width of narrow slit using single and double slit diffraction.
4. Measure the wavelength of the line spectrum of a light source using a diffraction grating

	5. Determine the specific rotation of a sugar solution using the Polarimeter 6. Sketch the diffraction pattern for single and double slit setup.
	d) General and Transferable Skills (4.7)
	1. Participate in team work. 2. Present and defend his point in oral exam

3. Contents

Topic	Total hours	Lectures	Tutorial/ Practical
Nature of Light Oscillations and waves: Geometrical optics, Oscillations, Simple Harmonic Motion, Spring Mass System, Principle of superposition Waves: one dimensional wave function, wave equation, harmonic traveling wave, Huygens' principle, wave intensity, absorption of waves, three dimensional plane wave, Superposition of waves, Doppler effect in sound and EMW	18	12	6
Electromagnetic nature of Light Maxwell equations, electromagnetic waves, plane wave solution, energy density and pointing vector, irradiance of plan harmonic wave	6	4	2
Reflection and Refraction Fersnel equation, external and internal reflections, change of phase, reflectance and transmittance	12	8	4
Interference Effect of refraction, phase difference and optical path difference, interference of radio waves, coherence, interference of light waves, wave front splitting interference , amplitude splitting interference, Newton's rings, thin films, wedge shaped film,	18	12	6
Diffraction Single slit diffraction pattern, resolving power of a single slit, double slit diffraction pattern, diffraction grating	12	8	4

Polarization of light waves Natural light waves, Method of polarization of light waves, Mauls Law, polarization by reflection, polarization by double refraction, Nicole prism, polarization by scattering, optically active material rotation of plane of polarization	12	8	4

4. Teaching and Learning Methods	Lectures (Y)	Practical Training/ Laboratory (Y)	Seminar/Workshop (N)
	Class Activity (Y)	Case Study (Y)	Projects (N)
	E-learning (N)	Assignments /Homework (Y)	Other:

5. Student Assessment Methods

5.a. Method	**To assess (with reference to the ILOs)**
• Experimental Labs	c1, c2, c3, c4, c5, c6, d1, d2
• Midterm	a1 – a9, b1 – b10.
• Final	a1 – a9, b1 – b10.
5.b. Assessment Schedule	**Week**
Assessment 1: Regular Experimental Assignments	each week.
Assessment 2: Mid-term Exam	10
Assessment 3: Oral and experimental Exam	13
Assessment 4: Final Exam	15
5.c. Weighting of Assessments	
Experimental Work	16.67%
Midterm	16.67%
Final	66.67%
Total	100 %

6. List of References

6.a. Course Notes: Lecturer notes (in English).

6.b. Essential Books (Text Books)

- "Physical Optics," Engineering Physics Dept., Cairo University, Egypt, 2007.
- "Experimental Physics Lab for First Year," Engineering Physics Dept., Cairo University, Egypt, 2007.
- "Solved Problems on Physical Optics for Engineering Students", Engineering Physics Dept., Cairo University, Egypt, 2007.

6.c. Recommended Books: N/A

6.d. Periodicals, Web Sites, … etc: http://www.physicsdaily.com/physics/

7. Facilities Required for Teaching and Learning

- Data Show and white board
- Well equipped labs with sufficient number of calibrated experiments with respect to number of students

Course Coordinator:	Dr. Nadia Hussien
Head of Department:	Prof. Dr. Ahmad Alaa Aboulsoud
Date:	