

Faculty of Engineering & Technology

Physics 3

Information :

Course Code : PHY 231

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Department of Structural Engineering & Construction Management

Instructor Information :

| Title | Name | Office hours |
|--------------------|--------------------------------|--------------|
| Lecturer | AHMED MOHAMED ALI ASHOUR AHMED | 21 |
| Assistant Lecturer | SHEROUK SOBHI ABDELSALAM FOUDA | 4 |

Area Of Study :

The objective of this third physics course for the engineering students is to develop their ability to understand Optics and Modern physics topics in comparative view between classical and quantum physics and to analyze and logically solve problems of engineering applications based on these topics. On successful completion of these courses the engineering student will be able to:

1. Know and understand all old classical physics that is applied up to today.
2. Learn Optics as a single topic.
3. Learn Modern physics as a single topic.
4. Solve problems about these two topics.
5. Understand the comparative view between classical and quantum physics.

Description :

Special theory of relativity, Quantization and Max Planck principle, Black body radiation, The photoelectric effect, Wave particle duality and De Broglie Hypothesis, matter waves, Electron microscopes, Uncertainty principle and Heisenberg principle, Wave function for a confined particle, Schrodinger wave differential equation in one dimension, Particle in an infinite potential well, X-rays spectroscopy, Nuclear physics and radiation safety.

Course outcomes :

a. Knowledge and Understanding: :

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| 1 - | The differences between classical and modern physics. |
| 2 - | The types of waves. |
| 3 - | The mechanical waves. |
| 4 - | The sound waves. |
| 5 - | The electromagnetic waves and physical optics. |
| 6 - | The old modern quantum theory. |
| 7 - | The wave mechanics and its modern applications. |

b. Intellectual Skills: :

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| 1 - | Deal with physical problems. |
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| 2 - | Think logically and creatively. |
| c. Professional and Practical Skills : | |
| 1 - | Gaining skills in identifying and using the different physical parameters related to this course, and perform experiments related to these topics. |
| 2 - | Gaining skills in constructing the physical laws and be able to solve the physical problems. |
| d. General and Transferable Skills : | |
| 1 - | Work effectively in team. |
| 2 - | Develop skills related to creations thinking, problem solving , oral and written presentation, and team work. |

| Course Topic And Contents : | | | |
|---|---------------------|----------------|-----------------------------|
| Topic | No. of hours | Lecture | Tutorial / Practical |
| Mechanical Waves | 10 | 6 | 2 |
| Sound Waves | 10 | 6 | 2 |
| Waves Interference | 7 | 3 | 2 |
| Diffraction of waves | 7 | 3 | 2 |
| Max-Planck Assumptions | 6 | 2 | 2 |
| Einstein Photoelectron Theory | 6 | 2 | 2 |
| Bohr Theory for Hydrogen-Like Atom | 6 | 2 | 2 |
| De Broglie , and Heisenberg Assumptions | 7 | 3 | 2 |
| The infinite Potential Well | 10 | 6 | 2 |
| The finite Potential Well | 6 | 2 | 2 |
| The Tunneling Effect | 6 | 2 | 2 |
| Applications on Quantum Mechanics | 12 | 4 | 4 |
| Revision | 6 | 2 | 2 |

| Course Assessment : | | | |
|------------------------------|--------------------------|----------------|--------------------|
| Methods of assessment | Relative weight % | Week No | Assess What |
| Final Exam | 40.00 | 16 | |
| Lab | 20.00 | 1 | |
| Mid-Term Exam 1 | 15.00 | 6 | |
| Mid-Term Exam 2 | 15.00 | 11 | |
| Semester Work | 10.00 | 1 | |

| Course Notes : |
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| handout and notes |

Recommended books :

- 1 College physics - Giambattista and Richardson, Mac gramtill, 3rd edition, 2010.
- 2 Physics for scientists and engineers - Serway, Thomson Brookes/Cok., 8th edition, 2011.