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| Applied Physics | | | |
| Course Code: | PHY-102 | **Semester:** | 1st |
| Credit Hours: | 3 (2+1) | **Prerequisite Codes:** |  |
| Instructor: | **Dr. M. Imran Malik** | **Class:** | BEE-11ABC |
| Office: | 051-90852357 | **Telephone:** | \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* |
| Lecture Days: | Tuesday and Friday | **E-mail:** | imran.malik@seecs.edu.pk |
| Class Room: |  | **Consulting Hours:** |  |
| Lab Engineer: |  | **Lab Engineer Email:** |  |
| Knowledge Group: | Applied Physics | **Updates on LMS:** | Before every lecture |

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| Course Description: | |
|  | The course comprises the topics of Physics, which are directly related to Engineering and Technology. These include Motion, Friction, Moment of inertia, Oscillations, waves and propagation, Electric Charge & Coulomb’s Law, Electric Field, Electric Potential, Capacitors & Dielectric, Magnetic fields. |

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| Course Objectives: | |
|  | The course aims to give students both a theoretical and a practical foundation for engineering courses, like; Engineering Mechanics, Electromagnetic Field Theory, Systems and Signals, Control Systems, Transmission Lines and Antennas& Microwave Devices. The course gives the students a sound knowledge of Physics with its applications to problems of practical nature. After studying this course the students will be able to apply Physics as a strong tool to understand and develop the problems which they come across in Engineering/Technology. |

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| Course Learning Outcomes (CLOs): | |  |  |
| At the end of the course the students will be able to: | | **PLO** | **BT Level\*** |
|  | 1. Understand and apply the concepts of mechanics and its applications | 1 | C-2,C-3 |
|  | 1. Understand and apply the concepts of Electro & Magneto-statics and their applications | 1 | C2, C-3 |
|  | 1. Validate theoretical concepts through relevant Lab experiments | 2 | P-4 |
|  | \* BT= Bloom’s Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain |  |  |

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| Mapping of CLOs to Program Learning Outcomes |
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| Mapping of CLOs to Assessment Modules and Weightages (In accordance with NUST statutes) |
| To be filled in at the end of the course.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Assessments/CLOs** | **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | | Assignments: (Home and Class Group Assignments) | √ | √ |  |  |  | | Midterm | √ |  |  |  |  | | Labs |  |  | √ |  |  | | End Semester Exam | √ | √ | √ |  |  | | Total : 100 % |  |  |  |  |  | |

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| Books: | |
| Text Book: | 1. Physics for Scientists & Engineers by Serway Jewett (6th Edition) |
| Reference Books: | 1. Physics By Halliday, Resnick & Walker (7th Edition) 2. University Physics by Sears & Zemansky (12th Edition) |

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| Topics to be Covered: | | | |  | | |
| 1. Newton’s laws, Work and Energy | | | |  | | |
| 1. Friction, Rotation, Moment of Inertia | | | |  | | |
| 1. Oscillations and Waves | | | |  | | |
| 1. Charge, Coulomb’s law and Electric field | | | |  | | |
| 1. Gauss’ law | | | |  | | |
| 1. Electric potential | | | |  | | |
| 1. Electric current and Magnetic field | | | |  | | |
| 1. Ampere’s law | | | |  | | |
| 1. Faraday’s law | | | |  | | |
| Lecture Breakdown: | | | | | | | |
|  | **Week No.** | | **Topics** | | **Sections** | **Remarks** | |
|  | 1 | Lecture 1: Applications of Newton’s Laws  Lecture 2: Work and Energy | | |  |  | |
|  | 2 | Lecture 3: Tension, Normal and Frictional forces  Lecture 4: Dynamics of uniform circular motion, Kinematics of rotational motion, related problem solving  Lab 01 | | |  |  | |
|  | 3 | Lecture 5: Simple harmonic motion  Lecture 6: SHM and energy  Lab 02 | | |  |  | |
|  | 4 | Lecture 7: Damped and forced oscillations  Lecture 8: Oscillations and wave propagation  Lab 03 | | |  |  | |
|  | 5 | Lecture 9: Energy and power carried by waves  Lecture 10: Reflection, interference and diffraction  Lab 04 | | |  |  | |
|  | **6** | **OHT-1** | | | | | |
|  | 7 | Lecture 11: Charge and Coulomb’s law  Lecture 12: Electric field and superposition principle  Lab 05 | | |  |  | |
|  | 8 | Lecture 13: Electric dipoles  Lecture 14: Electric flux  Lab 06 | | |  |  | |
|  | 9 | Lecture 15: Gauss’ law and different symmetries  Lecture 16: Contd.  Lab 07 | | |  |  | |
|  | 10 | Lecture 17: Electric potential (point charges and dipole)  Lecture 18: Electric potential from electric field and vice versa  Lab 08 | | |  |  | |
|  | 11 | Lecture 19: Conductors and equipotential surfaces  Lecture 20: Electric Current, Current density, Drift Velocity  Lab 09 | | |  |  | |
|  | **12** | **OHT-2** | | | | | |
|  | 13 | Lecture 21: Resistance and Resistivity, Ohm’ Law (Microscopic and Macroscopic)  Lecture 22: Magnetic force on a moving charges  Lab 10 | | |  |  | |
|  | 14 | Lecture 23: Magnetic force on a current carrying wires  Lecture 24:Torque on current loop and magnetic dipoles  Lab 11 | | |  |  | |
|  | 15 | Lecture 25: Ampere’s law and magnetic field due to long wires  Lecture 26: Magnetic field due to solenoid and toroid  Lab 12 | | |  |  | |
|  | 16 | Lecture 27: Faradays Law of induction, Lenz’s law  Lecture 28: Motional EMF, Generators and Motors, Induced Electric field | | |  |  | |
|  | 17 | Lecture 29: Capacitance, Energy Stored in an Electrical Field  Lecture 30: Inductance, Energy Stored in magnetic field | | |  |  | |
|  | 18 | Week 18: ESE | | |  |  | |

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| Lab Experiments: | |
| Lab 01: | [Introduction to La](#_Toc332971714)b |
| Lab 02: | Understanding Errors |
| Lab 03: | Mini-launcher (Exp. 1,2,3) |
| Lab04: | Mini-launcher (Exp. 4,6) |
| Lab 05: | PAScar with Mass (Exp. 1,2,3) |
| Lab 06: | PAScar with Mass (Exp. 4,6) |
| Lab 07: | Compound Pendulum |
| Lab 08: | Heat Engine/Gas Laws (Exp.1,2,3) |
| Lab 09: | Ripple Tank |
| Lab 10: | Faraday’s Law |
| Lab 11: | DC Electronics |
| Lab 12: | DC Electronics |

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| Tools / Software Requirement: | |
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| Grading Policy: | |
| Quiz Policy: | The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor’s discretion. |
| Assignment Policy: | In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No ‘best-of’ policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams. |
| Lab Conduct: | The labs will be conducted for three hours every week. A lab handout will be given in advance for study and analysis The lab handouts will also be placed on LMS. The students are to submit their results by giving a lab report at the end of lab for evaluation. One lab report per group will be required. However, students will also be evaluated by oral viva during the lab. |
| Plagiarism: | SEECS maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people’s work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECS plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action. |

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