# Applied Physics

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| **Course title** | **Course code** |
| Applied Physics | MTH112 |

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| **Course Catalog Description** |
| The purpose of this course is to give an understanding about Measurement, Vectors, Motion along a straight line. Force and motion. Kinetic energy and work. Potential energy and conservation of energy. Center of mass and linear momentum. Gravitation. Oscillations. Waves. First and second law of thermodynamics. Electric charge. Electric field. Gauss's law. Electric potential. Capacitance. Current and resistance. Circuits. Magnetic fields. Magnetic fields due to currents. |

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| **Course detail** | |
| Credit Hours | 03 |
| Core | BS(CS) & BS(SE) |
| Elective |  |
| Pre Requisite |  |

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| **Course offering Detail** | | | | |
| Lecture Hall | No of lecture per week | Duration of lecture | Lecture day | Semester |
|  | 1 | 02 Hours |  |  |

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| **Instructor Detail** | |
| Name | Engr. M. Mujtaba Ihsan |
| Office | Room no 13, First floor, EE department |
| Email | mujtaba.ihsan@inu.edu.pk |
| Counseling hours |  |
| Course assistant |  |

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| **Recommended Books** | | | |
| **Text Book** | | | |
| Title | Edition | Web link | Others/tutorial |
| Halliday, Resnick and Walker, "Fundamental of Physics", 10th Edition | 2015 |  |  |
| **Reference Books** | | | |
| 1. Hugh. D. Young, Roger A. Freedman, A. Lewis Ford, “University Physics with Modern Physics”, 13th Edition. | Latest |  |  |

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| **Lecture No:** | **Contents** |
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| 1 | Measurement  The International system of Units  Changing Units  Significant figures and Decimal places  Vectors  Vectors and Scalars  Components of Vectors |
| 2 | Motion Along a Straight Line  Position and Displacement  Average Velocity and Average Speed  Acceleration  Force and Motion  The Drag force and Terminal Speed  Uniform Circular Motion |
| 3 | Introduction of Energy, Kinetic Energy and Potential Energy  Work and Kinetic Energy  Work Done by the Gravitational Force  Work and Potential Energy |
| 4-5 | Oscillation  Simple Harmonic Motion  The force Law for Simple Harmonic Motion  An Angular Simple Harmonic Motion  Damped Simple Harmonic Motion  Gravitation  Newton’s Law of Gravitation  Gravitation Near Earth surface  Gravitation Potential Energy |
| 6 | Waves  Transverse and Longitudinal Waves  Wavelength and Frequency  Speed of Travelling Wave |
| 7 | Temperature and Heat  The Law of Thermodynamics  Absorption of Heat by Solids and Liquids  The First Law of Thermodynamics  The Second Law of Thermodynamics |
| 8 | Electric Charge and Electric Field  Coulomb’s Law  Electric Field and Electric Field Lines  Gauss Law  Electric Flux  A charged isolated conductor  Applying Gauss’ law Cylindrical Symmetry |
| 9 | Electric Potential  Equipotential surfaces and the Electric Field  Potential due to a charged particle |
| 10 | Capacitance  Calculating the Capacitance  Capacitance in Parallel and in Series  Energy stored in an electric Field  Capacitance with a Dielectric |
| 11 | Current and Resistance  Electric Current  Current Density  Resistance and Resistivity  Ohms Law  Power, Semiconductor, Super Conductor |
| 12 | Circuits  Single Loop Circuit  Multi loop Circuit  The Ammeter and the Voltmeter |
| 13 | Magnetic Field  Magnetic fields and Closed Field : the real effect |
| 14 | A circulating charge particle  Magnetic force of current carrying wire  Torque on a current loop  Ampere’s law  A current carrying coil as magmatic dipole  RL Circuits |
| 15 | Induction and Inductance  Induced Electric Fields  Self-Induction |
| 16 | Energy Stored in Magnetic Field  Energy Density of magnetic Field  Mutual Induction  RC Circuits |