| Department | General Studies | Major | Engineers and Scientis | | | | sts | |
|--------------------|-----------------|---|------------------------|---|---|-----|-----|---|
| Course Name | Physics I | Course Code | PHYS 361 | | | | | |
| Prerequisites | DUVC 201 | Major Course Code Credit Hours CRH | | 3 | | CTH | | 4 |
| | PHYS 301 | | L | 2 | Р | 2 | Т | 0 |

Course Description :

An engineer might design the product itself, or just figure out a way to build it. But either way, success is impossible without an understanding of the physics behind each of them. This course enables students to gain theoretical and practical background in physics. This course contains two parts:

Part 1: **Mechanic**: Introduction (Vectors ,system coordinates, kinematic quantities), Motion in two and three Dimensions with Applications to Projectile motion, Circular and Helical motions, Newton's Laws of Motion and Applications, Work and Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Moment of force, Torque, Moment of inertia, Angular acceleration, Rotation of rigid object about a fix axis.

Part 2: **Electricity and Magnetism**: Coulomb's law, Electric fields, Gauss' Law, Electric potential, Potential energy, Capacitance and Dielectric, Currents and Resistance, Electrical Energy and Power, Direct current circuits, Kirchhoff's rules, Magnetic fields, Motion of charged particle in a magnetic field, Sources of the magnetic field, Ampere's law, Faraday's law of induction, Self-inductance, energy in a magnetic field, Mutual inductance, Alternating current circuits, the RLC series circuit, power in an A.C. circuit, resonance in RLC circuit.

A series of experiments is designed to give the student an expertise in measurements and interpretation of physical phenomenon.

General Objective: This course aims at teaching the future engineer the principle skills on various areas of physics. Students should become proficient in the topics of mechanic, electricity and magnetism. Students should be able to connect the concepts presented to the uses in engineering applications.

| Deta | Detailed Objectives: | | | | |
|------|--|--|--|--|--|
| Т | rainee will be able to: | | | | |
| 1- | Understand the basic notions and principles of the applied physics | | | | |
| 2- | Analyze physical systems | | | | |
| 3- | Formulate approach for solving physics problems (Mechanical and Electromagnetic) | | | | |
| 4- | Establish competence in complex problem solving | | | | |
| 5- | To make the connection between the technical problem and the adequate physical principle | | | | |

| Detailed of Theoretical Contents | | | | |
|----------------------------------|--|---|--|---|
| Hours | | | Contents | Assessment Tools |
| 2 | Coordina Cartesia Cylindri Spherica displace dot and a | nte Sy n Coo cal Coo al Coo ment, cross | Oral, Quizzes, | |
| | Textbook | 1 | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC, ISBN 978-0-470-46908-8. Ninth edition | Jearl Walker. John |
| | | 2 | Physics for Scientists and Engineers (6th edition) - R. A. S | erway& Jewett |
| 4 | 2. Kinemati Space ar Definition particle. Curvature The Rotadisplace Rotation Kinemati Relation acceleration Application Kinetic I Example | ics of nd Tim ons: P re rad: ationa ment, with tic Equ betw tion m tions f Energ es and | Material Point for Rotational Motion the referential. osition, Velocity, Acceleration and trajectory of a fus I Variables (angular position, angular angular velocity, angular acceleration). Constant Angular Acceleration uations for Constant Angular Acceleration een the Linear and Angular Variables for constant notion. for Curvilinear Motion: Circular, Helical. y of Rotation Herblems | Oral, Quizzes, Homework 1 |
| | Textbook | 1 | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC,ISBN 978-0-470-46908-8. Ninth edition Physics for Scientists and Engineers (6th edition)- R. A. Sc | Jearl Walker. John on erway & Jewett |
| 4 | 3. Center of The center Newton² Linear M The Line Collision Conserv Moment Inelastic | of Ma ter of 's Sec Aomen ear Ma n and ation tum ar Colli | ss and Linear Momentum mass ond Law for a System of Particles ntum omentum of a System of particles Impulse of Linear Momentum of Kinetic Energy in Collisions sions in One Dimension | Oral, Quizzes, Homework 2 First Exam (Units: 1,2,3) |

| | | | Detailed of Theoretical Contents | | |
|-------|--|---|---|--|-----|
| Hours | | | Contents | Assessment To | ols |
| | Elastic CCollisionExample | Collisi ns in 7 es an o | ons in One Dimension Two Dimensions d Problems | | |
| | Textbook | 1 | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC, ISBN 978-0-470-46908-8. Ninth edition | Jearl Walker. John on | |
| | | 2 | Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| 7 | 2 Physics for Scientists and Engineers (6th edition)- R. A. Serway & Jewett 4. Rotational Motion of a Rigid Body Inertia Example of Calculating the Rotational Inertia for rigid body Parallel-Axis Theorem Torque: τ = r .F.sin θ Newton's Second Law for Rotation Work and Rotational Kinetic Energy Rolling, Torque, and Angular Momentum Rolling as Translation and Rotation Combined The Kinetic Energy of Rolling The Forces of Rolling Torque in the cross product form : τ = r × F Angular Momentum Newton's Second Law in Angular Form The Angular Momentum of a System of Particles The Angular Momentum of a Rigid Body Rotating About a fixed axis Conservation of Angular Momentum | | | Oral, Quizzes, Homework 3 | |
| | Textbook | 1 | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC,ISBN 978-0-470-46908-8. Ninth edition Physics for Scientists and Engineers (6th edition) - R. A. So | Jearl Walker. John on erway & Jewett | |
| 6 | 5. Circu Pre-requisite DC sou Current Voltage Kirchho | it in H es: rce divide divide ff's la | Permanent, Transient and Sinusoidal Forced Regimes: er er ws. | | |

| Detailed of Theoretical Contents | | | | |
|----------------------------------|---|---|---|--|
| Hours | | Contents | Assessment Tools | |
| Hours | Here we begin Transient regin RC charging an $\tau_c = RC$. RL Circuit resp $\tau_L = L/R$. Transient regim Differential equ solution(harmon Alternating Ci Storage and dar Sinusoidal AC a Resistors in an rms current and Capacitors in an The capacitive re Inductors in an The inductive re Oscillations in a solution). The impedance The voltage am Power in an AC Resonance in a The transformer Analogy betwee | Assessment Tools Oral, Quizzes, Homework 4 Second Exam (units: 4, 5) | | |
| | I I Z I | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC,ISBN 978-0-470-46908-8. Ninth edition Physics for Scientists and Engineers (6th edition) - R. A. Sc | Jearl Walker. John on erway& Jewett | |
| 5 | 6. Electric fields a Coulomb's law. The electric field Electric field lin Electric field du Symmetry eleman Superposition point Electric field du | and electric potential lds. ne. ue to a point charge nents of a distribution of charge principle ue to an electric dipole ue to a line of charge ue to charge disk rric field. | Oral, Quizzes, Homework 5 | |

| Detailed of Theoretical Contents | | | | | |
|----------------------------------|---|---|---|---|-------|
| Hours | | | Contents | Assessment Too | ols |
| | Gauss's theorem Electric potential. Calculating the potential from the electric field. Potential due to a point charge and electrical dipole. Calculating the field from the potential. Examples and Problems | | | | |
| | Textbook | 1 | Fundamentals of physics, David Halliday, Robert Resnick, Wiley and Son, INC, ISBN 978-0-470-46908-8. Ninth edition | Jearl Walker. John | |
| | | 2 | Physics for Scientists and Engineers (6th edition) - R. A. S | erway& Jewett | |
| 4 | 4 7. The magnetic field Magnetic field and magnetic field lines. Biot-Savart law Symmetry elements of a distribution of current. Ampere's theorem: magnetic field due to a long straight wire, a circular conductor, a solenoid, Hall Effect. Discovering of the electron and measuring e/m The magnetic force. Magnetic fluxacross a circular turn. Electromagnetic induction and Faraday's law. Electromotive force. Examples and Problems | | | Oral, Quizzes, Homework 6 Final Exam (All ur | nits) |
| | Image: Provide the state of the state o | | | | |

| Detailed of Practical Contents | | | | |
|--------------------------------|--|--|---|--|
| Hours | | Contents | Assessment Tools | |
| 4 | 1. I s | Equilibrium condition of a rigid body subjected to a et of forces | Lab Exp. Report | |
| | | Physics for Scientists and Engineers (6th edition)- R. A. S | erway& Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 2. Equilibrium condition of arigid body able to rotate around a fixed axis | | | |
| | – – – – | 1 Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 3. N | Aeasurement of acceleration due to gravity (g) by a ompound pendulum | Lab Exp. Report | |
| | | 1 Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 4. 7 | Transient regimes: RC circuits. | Lab Exp. Report | |
| | | 1 Physics for Scientists and Engineers (6th edition) - R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 5. 7 | Transient regimes: RL circuits. | Lab Exp. Report | |
| | F (1) | 1Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 6. 7 | Transient regimes: RLC circuits. | Lab Exp. Report | |
| | | 1Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 7. S | inusoidal driven oscillator and resonance intensity nd frequency: RLC circuit | Lab Exp. Report | |
| | | 1Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | Textbook | 2 Booklet of practical works realized in the department | | |
| 4 | 8. S i | tudy of the deflection of electron in a magnetic field nto a circular orbit | Lab Exp. Report + Final Practical Exam | |
| | Torth 1- | 1Physics for Scientists and Engineers (6th edition)- R. A. S | erway & Jewett | |
| | I EXIDOOK | 2 Booklet of practical works realized in the department | | |

| Textbooks | Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker. John Wiley and Son, INC,ISBN 978-0-470-46908-8. Ninth edition | |
|-----------|---|--|
| | Physics for Scientists and Engineers (6th edition)- R. A. Serway & Jewett | |
| | Foundations of Physics for Technology Colleges and Universities Freshmen, Dr. Marwan Al Fahhad, Third edition2012 | |

List of Detailed Equipment for Laboratory, Workshop or Lab

| No. | Laboratory name / workshop | Capacity of training | Human Resources with Certificate |
|-----|----------------------------|-------------------------|-------------------------------------|
| 1- | Physics Lab | 20 Students | 1 Laboratory technician |

| Workshop / Lab of Physics | | | | |
|---------------------------|---|----------|--|--|
| No. | Product's Name | Quantity | | |
| 1- | Force table | 10 | | |
| 2- | Two arm, straight lever, angular lever, single arm lever | 10 | | |
| 3- | Retort stand, pendulum bob, thread, meter rule, stop watch | 10 | | |
| 4- | Variable resistor + Standard resistor values, variable inductance, variable capacitor + Standard capacitor values | 10 | | |
| 5- | Digital oscilloscope | 10 | | |
| 6- | Function generator | 10 | | |
| 7- | Bar and Horseshoe magnet, Flat coil, solenoid, Transformer | 10 | | |