**INSTITUTION** National University of Computer & Emerging Sciences, Islamabad

BS-CS ,Fall 2019

**PROGRAM (S) TO BE**

**EVALUATED**

**Course Description**

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| **Course Code** | EE117 | | | |
| **Course Title** | Applied Physics | | | |
| **Credit Hours** | 3 | | | |
| **Prerequisites by Course(s) and Topics** | None | | | |
| **Assessment Instruments with Weights** (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | 100% Theory and problem solvingAssessment instruments of Theory part:Midterm Exam 1 30%Quizzes 5 10%Homeworks/ Assignments 5 10%Final Exam 1 50% | | | |
| **Course Coordinator** | Dr. Mehwish Hassan | | | |
| **URL (if any)** |  | | | |
| **Current Catalog Description** | This course is covering the basic concept of Newtonian Mechanics, waves , electrostatics and semiconductor physics which will help students to understand the advance courses of computer sciences. | | | |
| **Textbook** (or **Laboratory Manual** for Laboratory Courses) | **Fundamental of Physics(Extended )10th Edition**, Halliday /Resnick/Walker | | | |
| **Reference Material** | **Physics for computer science students**, Narciso Garcia, Arthur Damask | | | |
| **Course Description and Learning Outcomes** | **A. Course Learning Outcomes (CLOs)**  **CLO:1** Obtain knowledge of scalars and vectors quantities along with operation of basic operators on it to help them in computer graphics.  **CLO 2:** Explain kinematics and kinetics in 1 D &2d along with applications of Newton’s laws which will help them in game programming.  **CLO 3:** Develop basic understanding of oscillations and analyze different types of waves graphically &mathematically.  **CLO 4**: Obtain understanding of basic concepts of electromagnetism.  **CLO 5:** Develop understanding of basic concepts of semiconductor physics to help them in advance course of digital logic design.   |  |  | | --- | --- | | **B. Program Learning Outcomes** | | | For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cell blank if the enablement is little or non-existent. | | | |  |  | | --- | --- | | 1. Academic Education: | To prepare graduates as computing professionals | |  | | |  |  | | --- | --- | | 2. Knowledge for Solving Computing Problems: | Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the  abstraction and conceptualization of computing models from defined problems and requirements. | | ✔ | | |  |  | | --- | --- | | 3. Problem Analysis: | Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines. | |  | | |  |  | | --- | --- | | 4. Design/ Development of Solutions: | Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. | |  | | |  |  | | --- | --- | | 5. Modern Tool Usage: | Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations. | |  | | |  |  | | --- | --- | | 6. Individual and Team Work: | Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings. | |  | | |  |  | | --- | --- | | 7. Communication: | Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions. | |  |  | |  | | |  |  | | --- | --- | | 8. Computing Professionalism and Society: | Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice. | |  | | |  |  | | --- | --- | | 9. Ethics: | Understand and commit to professional ethics, responsibilities, and norms of professional computing practice. | |  | | |  |  | | --- | --- | | 10. Life-long Learning: | Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional. | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C. Mapping of CLOs on PLOs**  (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes) | | | | | | | | | | | | |  | | **PLOs** | | | | | | | | | | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | | **CLOs** | 1 |  | ✔ |  |  |  |  |  |  |  |  | | 2 |  | ✔ |  |  |  |  |  |  |  |  | | 3 |  | ✔ |  |  |  |  |  |  |  |  | | 4 |  | ✔ |  |  |  |  |  |  |  |  | |  | 5 |  | ✔ |  |  |  |  |  |  |  |  | | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction and one-hour lectures) | |  |  | | --- | --- | | Graphical and Mathematical realization of vectors and its components, | 3 Lectures | | Vector operations, curl and divergence | 3 Lectures | | Linear Motion, free falling bodies | 3 Lecture | | Motion in 2D/3D , Projectile motion, Uniform circular motion &relative emotion | 3Lectures | | * Newton laws, contact forces , basic concept of force, mass , weight, | 3Lectures | | * Application of Newton’s laws | 3 Lectures | | * Oscillations(simple, harmonic, damped and forced), waves and its types | 4 Lectures | | Principle of superposition, standing waves, Analogue and digital signalsFundamental of electrostatics, field and forces,3 Lectures | 3 Lectures | | * Current and current density, voltage and resistance, ohm’s law | 4 Lectures | | Capacitor &Resistor and Kirchhoff’s law , | 3Lectures | | Electric circuits, circuit element, DC | 3 Lectures | | Semiconductor physics | 4Lectures | | Transistors, logic gates | 3Lectures | |  |  | | | | |
| **Laboratory Projects/Experiments Done in the Course** | No lab for this course | | | |
| **Programming Assignments Done in the Course** | No | | | |
| **Class Time Spent on** (in credit hours, Hrs/Min) | **Theory** | **Problem Analysis** | **Solution Design** | **Social and Ethical Issues** |
| 60 min. | 30min |  | . |
| **Oral and Written Communications** | Every student is required to do problems given in class. | | | |

## Tentative course outline and lecture plan

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| **Number of Lectures** | **Topics** | **Chapters** |
| 6 | Vector algebra | **3** |
| 12 | Linear motion , motion in 2D/3D, Newton’s law | **2,4,5,6** |
| 7 | Waves and oscillations | **16,17** |
| 13 | Electrostatic basic concepts | **21,22,25,26,27** |
| 7 | Semiconductor physics | **41** |

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| **COURSE CONTENTS (Lab/ Practical):** | | | |
| **Weeks** | **Contents/Topics** | **\*\*Courseware Events** (MM/ IT Lab/Case Study/ Assignment/ Presentation etc.) | **Comments (if any)** |
| ***Week-01*** | Graphical and Mathematical realization of vectors and its components, unit vectors, vector operations(addition, subtraction/dot product) |  |  |
| ***Week-02*** | Curl /divergence on vectors, problem solving | Assignment 1 |  |
| ***Week-03*** | Linear motion (speed, distance, velocity , acceleration), free falling bodies, problem solving | Quiz 1 |  |
| ***Week-04*** | Motion in 2D/3D , projectile motion, problem solving, uniform circular motion, relative motion | Quiz 2 |  |
| ***Week-05*** | Newton’s three laws, types of forces and related concepts, weight, mass, tension, spring force, friction, drag force, collision |  |  |
| ***Week-06*** | Applications of Newton’s law | Assignment 2 |  |
| ***Week-07*** | Oscillations(simple harmonic, damped, forced), Waves(frequency, amplitude, phase, wavelength)types of waves, Mathematical representation of wave |  |  |
| ***Week-08*** | Principle of superposition of waves, interference of waves, standing waves, Analogue and digital signal | Quiz 3 |  |
| ***Week-09*** | Graphical representation of composite waves, analogue and digital signals, Frequency and amplitude and phase modulation |  |  |
| ***Week-10*** | Electric charge, Coulomb’s law and application, electric field, field due to point charges and dipole. | Assignment 3 |  |
| ***Week-11*** | Current, current density, voltage, resistance, Ohm’s law | **Quiz 4** |  |
| ***Week -12*** | Capacitors, Resistors in series and in parallel, Kirchhoff’ law |  |  |
| ***Week 13*** | Electric circuits(single/Multi loop), Circuit elements, Polarity, Direct current circuits | Assignment 5 |  |
| ***Week-14*** | Semiconductor physics , band theory, pn junctions, diodes | **Quiz 5** |  |
| ***Week-15*** | Transistors, logic gates |  |  |