**University of Central Punjab**

**Faculty of Information Technology**



**BSCS**

**PROGRAM (S) TO BE**

**EVALUATED**

1. **Course Description**

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| **Course Code** | GE102 (Theory) | | | |
| **Course Title** | **Basic Electronics** | | | |
| **Credit Hours** | 3 (2 + 1) | | | |
| **Prerequisites by Course(s) and Topics** | N/A | | | |
| **Assessment Instruments with Weights** (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | Quiz 20%,  Assignment 15%  Midterm 25%  Final 40% | | | |
| **Semester** | Fall 2024 | | | |
| **Course Instructor** |  | | | |
| **Course Coordinator** | Irfan Anjum (irfan.anjum@ucp.edu.pk) | | | |
| **Office Hours** | Will be decided | | | |
| **Plagiarism Policy** | All the Groups involved will be awarded Zero in first instance. Repeat of the same offense will result in (F) grade. Marks will be uploaded on portal and can be contested within a week or would be considered final. | | | |
| **Current Catalog Description** | In this course, students will embark on a foundational exploration of electricity and electronics principles. This comprehensive journey begins with core concepts, providing students with a solid grasp of electrical components, units. They will delve into the fundamentals of current, voltage, resistance, energy, and power in electric circuits, enabling them to build a strong foundational knowledge. The course covers series and parallel resistances, elucidating the effects of current and voltage in these configurations. Furthermore, students will be introduced to Kirchhoff's voltage and current laws, empowering them to analyze intricate circuits effectively. This course also delves into sinusoidal waveforms, encompassing half-wave and full-wave rectification techniques, as well as special-purpose diodes and their applications, both in half-wave and full-wave rectification scenarios. Finally, students will gain insight into Bipolar Junction Transistors (BJT) and their modes of operation, paving the way for a comprehensive understanding of electronic devices and circuits. 'Basic Electronics' serves as a crucial foundation for further exploration in the realms of electronics and electrical engineering, equipping students with vital knowledge. | | | |
| **Textbook** | Principles of Electric circuits by Thomas. L. Floyd 10th edition | | | |
| **Reference Material** | Electronic devices by Thomas. L. Floyd 10th edition | | | |
| **Course Goals** | This course aims to provide students with a comprehensive understanding of electricity and electronics, beginning with an introduction to essential concepts such as electrical components, units of measurement, and measuring instruments. Students will delve into the core principles of current, voltage, resistance, energy, and power in electric circuits, equipping them with the fundamental knowledge required for further exploration in the field. Through detailed exploration of series and parallel resistances, students will learn to analyze and interpret the effects of resistor configurations on current and voltage. Kirchhoff's voltage and current laws will be thoroughly explained, enabling students to apply these laws confidently in solving complex electrical circuit problems, including voltage and current division. Additionally, students will gain insight into sinusoidal waveforms, half-wave, and full-wave rectification techniques, essential in the study of alternating current (AC) circuits. Special purpose diodes and their practical applications will be explored, alongside an introduction to Bipolar Junction Transistors (BJTs) and their various modes of operation. By the end of this course, students will have acquired a solid foundation in the fundamentals of electricity and electronics, preparing them for further studies and practical applications in the field. | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction) | * Attached | | | |
| **Programming Assignments Done in the Course** | No | | | |
|  |  | | | |
| **Class Time Spent on** (in credit hours)  **Oral and Written Communications** | **Theory** | **Problem Analysis** | **Solution Design** | **Social and Ethical Issues** |
| 1 | 0.5 | 0.5 | 0 |

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| **CLO#** | **Course Learning Outcome (CLO)** | **Taxonomy** | **PLO** |
| **CLO 1** | Students will be able to **apply** circuit theory concepts, including Ohm's Law, Kirchhoff’s Laws, and equivalent resistance techniques, to solve series and parallel resistive circuits. | **C3** | **PLO 2** |
| **CLO 2** | Students will be able to **apply** the concepts of solid-state devices, including diodes and BJTs, to solve circuits involving these devices. | **C3** | **PLO 2** |
| **CLO 3** | Students will be able to **understand** and summarize the outputs of digital circuits designed with BJTs and PN junction diodes. | **C2** | **PLO 2** |

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| **Week #** | **Topics Covered** | **Performance Evaluation Tool & Books** | **CLO#** |
| **1** | **Basic Concepts**  Introduction to Basic Electronics, Importance and Applications in CS  Basic atomic model, Conductors, Insulators, Semiconductors. Energy Bands and band gap. | Book 1  Ch # 2 | **1** |
| **2** | **Basic Concepts**  Electric Charge, Voltage, Current, | Book 1  Ch # 2 | **1** |
| **3** | **Basic Concepts**  Resistance, resistance colour coding (4 and 5 colour bands) | Assignment 1 (CLO1) | **1** |
| Book 1  Ch # 2 & Ch # 3 |
| **4** | **Basic Circuit Theory**  Ohm’s Law.  Power and Energy. | Quiz 1 (CLO1) | **1** |
| Book 1  Ch # 4 |
| **5** | **Basic Circuit Theory**  Resistors in Series, Current in Series Circuit, Voltage in series. Voltage Divider, Power in Series Circuit.  Verification of Kirchhoff’s Voltage Law. | Book 1  Ch # 5 | **1** |
| **6** | **Basic Circuit Theory**  Resistors in Parallel, current divider (current in parallel), current sources in parallel  Power in Parallel Circuits,  Verification of Kirchhoff’s Current Law. | Assignment 2 (CLO 1) | **1** |
| Book 1  Ch # 5 |
| **7** | **Basic Circuit Theory**  Identification of series-parallel relationships, and Analysis of Series-Parallel resistive circuits. | Quiz 2 (CLO 1) | **1** |
| Book 1  Ch # 6 and  Ch # 7 |
| **8** | **Revision** | | |
| **9** | **Mid Terms** | | |
| **10** | **Solid State Physics and Devices**  Introduction of PN junction Diode, N-type and P-type doping. Biasing of Diode, Ideal Diode and Practical Diode. |  | **2** |
| **11** | **Solid State Physics and Devices**  Introduction to alternation current and voltage  Half-Wave Rectification.  Full-Wave Rectification- Bridge Network, | Book 2  Ch # 2 Book 1  Ch # 11  (Provided Notes) | **2** |
| **12** | **Solid State Physics and Devices**  Bipolar Junction Transistor (BJT) structure, basic operation, configurations (CE), modes of operation (Active, Saturation, Cutoff) | Assignment 3 (CLO 2) | **2** |
| Book 2  Ch # 3 |
| **13** | **Solid State Physics and Devices**  Circuit Analysis of CE Configuration. BJT as a switch | Quiz 3 (CLO 2) | **2** |
| Book 2  Ch # 4 |
| **14** | **Solid State Physics and Devices**  Transistors series formation, Transistors parallel formation,  Logic Gates using transistors | Assignment 4 (CLO 3) | **3** |
| Book 2  Ch # 4 |
| **15** | **Solid State Physics and Devices**  Special Purpose Diodes- Zener Diode & LED  Voltage regulation using Zener diode | Quiz 4 (CLO 3) | **2** |
| Provided Notes |
| **16** | **Revision** | | |