# The Superior University, Lahore

## Faculty of Computer Science & Information Technology

### Course Outline

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| Course Information | Course Title | **APPLIED PHYSICS** | | |
| | Course ID | CS3101 | Course Type | Supporting Course |
| | Credit hours | 3 | Hours per week (C-L) | 3 |
| | Programs | BSCS | Preferred Semester | 1ST |
| | Date | 06/21/2022 | Version | 2.0 |
| Offered Course Information | Program(s) | BS (CS) | Semester Session | FALL 2024 |
| | Instructor(s) | MUHAMMAD NOMAN ARSHAD | TA / Lab Engineer | Not Applicable |
| | QCH | MUHAMMAD NOMAN ARSHAD | Telephone No. / Ext. | 0332-4621859 |
| | Email | shahzad.nemat@superior.edu.pk | Class Hours | 3 hours/week |
| | Office / Room No. | OFFICE # 07 | Office Hours | 8:00 AM to 4:00 PM |

**Course Description**

**Applied Physics** is a preparatory course for undergraduate students of computer science, software engineering and information technology. It covers fundamental concepts of circuit theory of electronics through Project Based Learning (PBL) scheme. The course prepares the students tomeaningfully understand follow-up courses e.g., Digital Logic Design, Computer Architecture. The course will also help students develop their entrepreneurial and final year projects involving niftysolutions forsociety.

**Course Objectives (CO)**

*The objective of this course is to enable students to;*

| No. | Objective |
|---|---|
| CO1. | To demonstrate students with a clear and logical hands-on experience of basic concepts and principles fundamental to electronics and devices. |
| CO2. | To analyze skills to conceptualize, hypothesize and materialize the Projects |

**Course Learning Outcomes (CLO)**

*At the end of this course students will be able to;*

| No. | Outcome | Domain | Taxonomy Level | PLO # |
|---|---|---|---|---|
| CLO1. | To demonstrate knowledge of circuit theory, Electronics and their link with computational sciences. | Cognitive | C2 | 1 |
| CLO2. | To analyze theskillsto designelectrical circuitsfundamental to computer hardware. | Cognitive | C4 | 3 |
| CLO3. | To apply to acquired knowledge to develop electronic circuits using active and passive circuit components e.g., power supply, logic gates, arduino etc | Cognitive | C3 | 3 |

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| Lecture type | Presentation, demonstration |
| Prerequisites | Digital Logical Design and Computer Architecture, IoT, Wireless Sensor Networks (Data Acquisition) |
| Follow up Courses | |

**Textbook**

| Title | Edition | Authors | Publisher | Year | ISBN |
|---|---|---|---|---|---|
| Electronic Device | 9th | Thomas L. Floyd | Pearson | 2012 | ISBN: 13: 978-0-13-254986-8 |

**Reference Books**

| | | | | | |
|---|---|---|---|---|---|
| Digital Fundamentals | 11th | Floyd | Pearson Pvt Limited | 2006 | 0-13-197255-3 |

**Assessment Criteria (100%)**

| Assessment | Weight | Used to attain CLO | Assessment | Weight | Used to attain CLO |
|---|---|---|---|---|---|
| Assignment | 10% | CLO1,2,3 | Quiz | 10% | CLO1,2,3 |
| Lab | 0% | - | Project / Presentation | 20% | CLO-3 |
| Attendance | 0% | - | Participation | 0% | - |
| Mid Term | 20% | CLO1,2 | Final | 40% | CLO1,2 |

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| | Other 1 | 0% | | Other 2 | 0% | - |
| Methods of Evaluation | Quizzes, Problem solving Assignments, project and written examinations | | | | | |
| Notes | Textbook | | | | | |

| Week No. | Topic | | Lecture Contents | Relation with CLO |
|---|---|---|---|---|
| W1. | Introduction | L1<br>L2 | – Demonstrate Breaking the ice: Course introduction and rationale<br>– Demonstrate Role of Physics in computer science | CLO1 |
| W2. | Circuit theory: Basic laws and applications | L3<br>L4 | – Demonstrate and analyze Ohm's law<br>– Demonstrate and analyze Concept of AC and DC<br>– Demonstrate and analyze series resistors and voltage division<br>– Demonstrate and analyze Parallel resistors and current division | CLO1,CLO2 |
| W3. | Circuit theory: Basic laws and applications | L5<br>L6 | – Demonstrate and Apply Kirchhoff's current law (KCL) With numerical<br>– Demonstrate and Apply Kirchhoff's current law (KCL) With numerical | CLO3, CLO1 |
| W4. | Circuit theory: Basic laws and applications | L7<br>L8 | – Demonstrate and make plan of Kirchhoff's voltage law (KVL)<br>– Demonstrate and make plan of Kirchhoff's voltage law (KVL) | CLO4, CLO1 |
| W5. | Basic Electronics | L9<br>L10 | – Demonstrate and analyze Introduction to Electronics, Energy band Theory,<br>– Demonstrate and analyze Intrinsic and Extrinsic Semiconductors | CLO1, CLO2 |
| W6. | Electronics: P-N junction diode | L11<br>L12 | – Demonstrate P-N junction operation, Ions formation Mechanism of barrier layer.<br>– Demonstrate Intrinsic and Extrinsic Semiconductors | CLO1 |
| W7. | Electronics: P-N junction diode | L13<br>L14 | – Demonstrate and analyze P-N junction<br>– Demonstrate and analyze Forward biasing and reverse biasing of diode, Explanation of movement of electrons during both processes.<br>– Demonstrate and analyze V-I characteristics curve in detail | CLO1,CLO2 |
| W8. | Electronics: Special Purpose Diodes | L15<br>L16 | – Demonstrate and analyze Photo diode, LED, and its usage in circuitry<br>– Demonstrate and analyze Laser diode and its usage in circuitry | CLO1 ,CLO2 |
| W9. | Mid Term Week | – Mid TERM WEEK | | |
| W10. | Transistor: Introduction and basic structure | L19<br>L20 | – Demonstrate ,analyze and make a plan of Historical perspective, Moore's law and current technological Trends<br>Bipolar junction transistor (BJT) Structure, Common base,<br>– Common Emitter, Common Collector | CLO1,CLO2,CLO3 |
| W11. | Transistor: | L21 | | |

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| | operation and characteristics | L22 | – Demonstrate and make plan of BJT Operation, BJT characteristics and Parameters equations derivations<br>– Base Current<br>– Emitter Current<br>– Collector Current<br>– Voltage between base and emitter<br>– Voltage between Collector Emitter<br>– Voltage between emitter collector | CLO1, CLO3 |
| W12. | Transistor: Bias Circuits | L23<br>L24 | Demonstrate DC operating point of Common emitter<br>– emitter configuration<br>– Voltage divider bias | CLO1 |
| W13. | Transistor: applications | L25<br>L26 | – Demonstrate and analyze Transistor as a switch<br>– Demonstrate and analyze Transistor as an amplifier | CLO1, CLO2 |
| W14. | Introduction to Digital Logic and Design and Number System<br><br>(Book: Digital Fundamentals: Floyd) | L27<br>L28 | – Introduction of Course<br>– Discuss Module with students<br>– Demonstrate and analyze Basic Introduction to Digital Logic and Design<br>– Demonstrate and analyze Difference between Digital Logic and Design and analogue signals/Devices<br>– Demonstrate and analyze ADC and DAC use in Digital Logic and Design<br>Introduction to Digital Signal<br>– Demonstrate and analyze Digital Signal parameters (frequency, amplitude, time, time period, time high, time low, Duty Cycle, falling edge, rising edge<br>– Demonstrate and analyze Introduction to Digital Pulse<br>– Introduction to Digital wave<br>– Timing diagram<br>– Introduction to serial transfer and parallel<br>– Transfer of data. | CLO1, CLO2 |
| W15. | Logic Gates (Book: Digital Fundamentals: Floyd) | L29<br>L30 | – Demonstrate and analyze and make plan to execute AND, OR, NOT, NAND, NOR, EXCLUSIVE OR, EXCLUSIVE NOR gates. | CLO1, CLO2, CLO3 |
| W16. | | – Projects Exhibition Plan | | CLO4 |
| W17. | Final Term Exam | | – Final exam Evaluation | |