Course Synopses:

<table>
<tr><td>Course Code</td><td colspan="2">PHU 4301</td><td>Level</td><td colspan="3">4</td></tr>
<tr><td>Course Title</td><td colspan="6">Electronics</td></tr>
<tr><td>Credit value</td><td colspan="6">03</td></tr>
<tr><td>Core/Optional</td><td colspan="6">Optional</td></tr>
<tr><td>Prerequisites</td><td colspan="6">PHU 4303</td></tr>
<tr><td>Hourly breakdown</td><td colspan="2">Theory</td><td>Practical hours</td><td>Independent Learning</td><td>Assessments</td><td>Total hrs</td></tr>
<tr><td></td><td>22 Sessions X 2 = 44 hrs</td><td>4 DS x 3 hrs = 12 hrs</td><td>Lab /field 9x3 = 27 hrs</td><td>▪ 22 Sessions (x 3) = 66 hrs
▪ Online learning resources= 05 hrs</td><td>Continuous Assessments (1 hr) x 2 = 2 hrs</td><td>156</td></tr>
<tr><td>Course Aim/s.</td><td colspan="6">Provide knowledge and skill required to design an implement an electronic circuit to solve a given problem and to analyse an existing circuit.</td></tr>
<tr><td>PLOs addressed by course</td><td colspan="6">PLO1: Knowledge - Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the BSc degree.
PLO2 Practical Knowledge and Application - Acquire competency in practical skills and the necessary knowledge to appropriately use these skills.
PLO3: Communication - Communicate reliably, efficiently and effectively to present information, ideas and concepts to the scientific community as well as to the wider society.
PLO4: Individual Work, Team Work and Leadership - Function effectively as an individual, and as a team member, sharing work and experiences, leading and managing assigned tasks to completion on time, demonstrating leadership to address situations in diverse and multi-disciplinary environments in day to day life.
PLO5: Creativity and Problem Solving - Identify problems and argue out and analyze such problems using qualitative and/or quantitative practical approaches in scientific methodology to provide valid conclusions.
PLO6: Adaptability and Flexibility - Develop appropriate strategies to adapt to changing environments.
PLO7: Information and Communication Technology Literate: Effectively use ICT skills for numerical and statistical analysis keeping up to date with knowledge and skills.
PLO9: Lifelong Learning: Foresee new trends and recognize their impact, and update knowledge and develop new skills to meet future changes and challenges</td></tr>
<tr><td>Course Learning Outcomes (CLO)</td><td colspan="6">At the completion of this course student will be able to:

CLO1 Explain and apply fundamental principles in semiconductors, analogue electronics and digital electronics (PLO 1, PLO 2)
CLO 2 Analyze a problem logically and come up with a suitable electronic circuit to solve it. (PLO 3, PLO 5 PLO 6, PLO9)
CLO 3 Develop skill to use electronics laboratory equipment's and implement circuits (PLO 2, PLO 4)
CLO 4 Ability to learn new concepts and technologies in electronic via internet or other mediums (PLO 3, PLO 7, PLO 9)
CLO 5 Ability to works as an individual and as a group in laboratory sessions. (PLO 3, PLO 4, PLO 5, PLO 6)</td></tr>
<tr><td>Content (Main topics, sub topics)</td><td colspan="6">Basic Concepts, Modern applications , Electrical vs electronics, Organization of the book, Performance table, Current, Conduction mechanism of current, Voltage, Current voltage sources, Series and parallel, Ohms law, Kirchhoff's law, (Norton + Thevinings), Types of conductors, Atomic level description Energy bands, Doping , N type, P type, PN junction, depletion region, Forward and reverse bias, Characteristic curve, Ideal vs real diode, Analog Electronics, Diode calculations, Diode applications,, Zenner diode structure, applications and calculations, LEDs, photo diodes, tunnel diodes, varactors, BJT vs FET, BJT structure, Notations, Configurations, Behavior, Characteristic curves, Calculations of Ib, IC, VCE, Load line, Transistor biasing , Q point and amplifier classes, Push pull amplifier, Transistor as a switch, Structure and characteristics, Calculations and applications of FETs, Structure and applications, Parameters, Ideal vs real, Golden rules, inverting , non-inverting, negative and positive feedback, Calculations of amplifications, Filters, Peak detectors, Math operators, g , h parameter modeling, Digital Electronics, Analogue vs digital, Gates, Boolean algebra, K maps, truth tables, Adders, multiplexers, Design a circuit, Flip flops, Counters, Registers, Design a circuit, Importance and applications, Resolution and sampling frequency, ADC circuits, DAC circuits, Practical problems to solve (Dark detector , Sun tracker, Binary clock, etc.), laboratory sessions, Component identification, Instrument usage (Oscilloscope, signal generator..etc.), Soldering skills, Diode characteristics and applications, transistor characteristics and applications, Op-amps, Combinational and Sequential circuits, Design and test a circuit.</td></tr>
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<tr><td>Teaching Learning methods (TL)</td><td colspan="2">

Self-Learning/Independent learning of Self-study

Instructional Material (IL)
Online Activities (OL)

Compulsory contact sessions

Practical Sessions (PR)
Reports (RE);

Non-compulsory contact sessions

Day Schools (DS)

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<tr><td rowspan="3">Assessment strategy</td><td>Overall Continuous Assessment Mark (OCAM): 40%</td><td>Final Assessment: 60%</td></tr>
<tr><td>Details: 36 % of Best CA + 24 % of the second best (1 hr each) + 40% PM</td><td>Final Evaluation
Theory: 100 (2 hrs) %</td></tr>
<tr><td colspan="2">Overall mark = 40 % OCAM +6 0 % Final Examination</td></tr>
<tr><td>Recommended Readings:</td><td colspan="2">[1] Paul Horowitz and Winfield Hill, Art of Electronics, (3rd Edition or Later) Cambridge University Press
[2] Paul Scherz, Practical Electronics for Inventors by, McGraw-Hill Publications</td></tr>
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