Course Synopsis

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<tr><td>Course Code</td><td colspan="2">PHU3300</td><td>Level</td><td colspan="2">3</td></tr>
<tr><td>Course Title</td><td colspan="5">General and Thermal Physics</td></tr>
<tr><td>Credit value</td><td colspan="5">3</td></tr>
<tr><td>Core/Optional</td><td colspan="5">Core</td></tr>
<tr><td>Prerequisites</td><td colspan="5">Pass in the relevant science subject at the G.C.E.(A.L.) Examination or equivalent</td></tr>
<tr><td rowspan="2">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>Sessions X 2 = 20 x 2hrs =40 hrs</td><td>DS hrs = 4 x 3 hrs = 12 hrs</td><td>Lab hrs = 4 days x 6 hrs = 24 hrs</td><td>▪ Sessions (20 x 3hrs) = 60 hrs (Online /Audio-visual materials and other learning resources)
▪ Lab (10 x 0.5) = 5 hrs
▪ Group Learning = 5 hrs</td><td>▪ Continuous Assessments (CA) = 2 hrs
▪ Practical assessments (PA) = 2 hrs</td><td>150 hrs</td></tr>
<tr><td>Course Aim/s.</td><td colspan="5">Students who follow this course should be able to master a broad set of knowledge concerning the fundamentals in basic physics (Mechanics, Properties of Matter, Heat and Thermodynamics) and get the aptitude to use the knowledge that can be applied in many different ways to understand and predict what nature does.</td></tr>
<tr><td>PLOs addressed by course</td><td colspan="5">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.
PLO8: Vision for Life: Identify where one wants to be and develop long term goals maintaining competency to conduct scientific investigations and proceed to undertake further studies.
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="5">Students following this course should be able to:
CLO1: Comprehend the basic concepts and principles in Mechanics, Properties of matter and Thermal physics, and appreciate how they are applied in science in our day-to-day life. (PLO1, PLO6)
CLO2: Develop competency in acquiring new knowledge and applying it in a variety of situations.(PLO1,PLO8,PLO9)
CLO3: Apply basic mathematical tools commonly used in physics, including differential and integral calculus, vector calculus, ordinary differential equations, and linear algebra. (PLO5)
CLO4: Develop the ability to clearly express their thinking in both oral and written form, and efficiently acquire new information from many sources. (PLO3, PLO5, PLO8)
CLO5: Convert a physical situation articulated in English/Sinhala/Tamil language to a mathematical formulation and then analyse it quantitatively. (PLO5, PLO7)
CLO6: Solve problems competently by identifying the essential parts of a problem and formulating a strategy for solving the problem. Estimate the numerical solution to a problem. Apply appropriate techniques to arrive at a solution, test the correctness of the solution, and interpret the results. (PLO5, PLO6, POL7, PLO9)
CLO7: Develop critical thinking, analytical skills, report witting skills and skills needed in a laboratory. (PLO2, PL03, PLO4, PLO-07, PLO9)
CLO8: Students should be able to handle the basic laboratory equipment and understand the standard methods of conducting physics experiments. (PLO2, PLO6, PLO9)
CLO9: Use basic laboratory data analysis techniques, including error and statistical analysis, and develop skills in reporting and interpreting data graphically.(PLO2, PLO4, PLO9)
CLO10: Communicate the concepts, principles and the results of their laboratory experiments using effective scientific writing and oral communication skills.(PLO3, PLO8)</td></tr>
<tr><td>Content (Main topics, sub topics)</td><td colspan="5">Mechanics: Vectors and scalars, motion in one, two and three dimensions; Newton's laws of motion and Centre of mass; Work, power, conservative forces, conservation of energy, mass and energy; Impulse and momentum; collisions; conservation of linear momentum; Angular motion and conservation of angular momentum; the compound pendulum; Kepler's laws, Newton's law of gravitation, gravitational fields and gravitational potential; Principles of rocket and satellite motion. Properties of Matter: Elasticity: Theory and Concepts; The bending of beams: columns and supports; Fluid statics; Fluid flow; Bernoulli's theorem and its applications; The viscosity of liquids and Stoke's law; Surface Tension: nature and definition of surface tension; surface energy; angle of contact; pressure difference across a curved interface. Thermal Physics: Free and forced expansion of a gas; Joule-Thomson process; behaviour of a real gas; The kinetic theory of gases; Real gasses; Vander Walls' equation of state for a real gas; critical constants of gases; Thermodynamics; Specific Heat Capacities of Gases; Specific Heat Capacities of Gases: Classical Theory; Thermometry: International Scale of Temperature; Primary and Secondary Standard Fixed Points; Platinum Resistance Thermometer; Thermocouple. Practical: Compound pendulum, Kater's compound pendulum, Searle's apparatus, cantilever, bending moments, rigidity modulus, capillary rise, Jaeger's Method, viscosity of an oil by 'falling sphere method', Poiseuille's Method, Moment of Inertia, specific heat capacities of gases, modulus of rigidity.</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)
Reference Work (RE)

Compulsory contact sessions

Practical Sessions (PR)
Laboratory Training (LT)
Assessments (AS) and Feedback – MCQs (MCQ);Structured Essay (SEQ); Presentations (PS); Viva voce (VV); Reports (RE);

Non-compulsory contact sessions

Day Schools (DS)

Group Learning (GL)

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<tr><td rowspan="2">Assessment strategy</td><td>Overall Continuous Assessment Mark (OCAM): 40 %</td><td>Final Assessment: 60 %</td></tr>
<tr><td>Details: Continuous Assessment (CA):
36% of Best NBT + 24% of other NBT % (2 hrs)
Practical Assessment (PA) : (2 hrs)
40% of PM%
(Should obtain minimum of 40% in practical assessment to sit for the final examination)</td><td>Final Evaluation
Theory: 100 % (2 hrs)</td></tr>
<tr><td>Recommended Readings:</td><td colspan="2">[1] Serway and Jewett, (2013) Physics for Scientists and Engineers with Modern Physics (9th ed.) Cengage Learning.
[2] Hugh D. Young, Roger A. Freedman (2011) Young and Freedman, University Physics (13th ed.) Pearson.
[3] David Halliday, Robert Resnick, Jearl Walker (2013) Fundamentals of Physics (10th ed.) Wiley.</td></tr>
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