Course Synopses (This course is offered as part of the BSc Programme)

Semester and Level	Semester 1– Level 05					
Course Code	PHU5303					
Course Title	Data Acquisition and Signal processing					
Credit value	03					
Core/Optional	Core for B.Sc. Honours Degree in Physics/ Optional for B.Sc. General Degree					
Prerequisites	PHU4301					
Hourly breakdown	**Theory**		**Practical**	**Independent/Group Learning**	**Assessment**	**Total**
	50 hrs (2×25 Sessions)	**12 hrs** (4×3 DS)	**0 hrs**	**86 hrs** [Independent/Group Learning (75 hrs) 3 x 25 sessions + Online and recommended readings (11 hrs)	**02 hrs** (2 CAT x 1hrs)	**150 hrs**
Course Aim/s.	[1] Get the aptitude to use the knowledge in fundamental concepts in Data Acquisition system that can be applied in many different ways to understand in electronics field. [2] Master a broad set of knowledge concerning the fundamentals in physical parameters					
PLOs addressed by course	Students should be able to: **PLO-01** **Knowledge:** Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the BSc degree. **PLO-02** **Problem Analysis**: Identify problems and apply knowledge acquired, and analyze such problems using qualitative and/or quantitative practical approaches in scientific methodology to provide valid conclusions. **PLO-03** **Information and Communication Technology Literate**: Effectively use ICT skills for numerical and statistical analysis keeping up to date with knowledge and skills. **PLO-04** **Individual and Team Work**: Function effectively as an individual, and as a team member, sharing work and experiences, leading and managing assigned tasks to completion on time. **PLO-05** **Communication**: Communicate effectively to present information, ideas and concepts to the scientific community as well as to the wider society whilst being able to comprehend, write effective reports and design documentation. **PLO-06** **Lifelong Learning**: Foresee new trends and recognize their impact, and have the knowledge and ability to engage in independent and lifelong learning to meet future change and challenges. **PLO-07** **Project Management and Leadership**: Demonstrate scientific and management leadership to address situations in diverse and multi-disciplinary environments in day to day life. **PLO-08** **Vision for Life:** Identify where one wants to be and develop long term goals maintaining the ability to conduct scientific investigations and proceed to undertake research studies at higher levels.					
Course Learning Outcomes (CLO)	Students following this course should be able to: **CLO-01** Comprehend the basic concepts and principles in basic electromagnetism and appreciate how they are applied in in our day-to-day life. (PLO-01 and PLO-06) **CLO-02** Develop competency in acquiring new knowledge on electromagnetism and applying it in a variety of situations. (PLO-01 and PLO-08) **CLO-03** Apply basic mathematical tools commonly used in physics, including differential and integral calculus, vector calculus, ordinary differential equations, and linear algebra. (PLO-02) **CLO-04** Develop the ability to clearly express their thinking in both oral and written form, and efficiently acquire new information from many sources. (PLO-03, PLO-05 and PLO-08) **CLO-05** Convert a physical situation articulated in English/Sinhala/Tamil language to a mathematical formulation and then analyse it quantitatively. (PLO-02 and PLO-03) **CLO-06** 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. (PLO-02 and POL3) **CLO-07** Develop critical thinking, analytical skills, report witting skills and skills needed in a laboratory. (PLO-01, PL0-05 and PLO-07) **CLO-08** Students should be able to handle the basic laboratory equipment and understand the standard methods of conducting physics experiments. (PLO-01 and PLO-04) **CLO-09** Use basic laboratory data analysis techniques, including error and statistical analysis, and develop skills in reporting and interpreting data graphically.(PLO-02 and PLO-04) **CLO-10** Communicate the concepts, principles and the results of their laboratory experiments using effective scientific writing and oral communication skills.(PLO-05 and PLO-08)	
Content (Main topics, sub topics)	Introduction to data acquisition systems ; displacement, force and weight sensors ; optical sensors and radiation detectors ; more radiation detectors ;controlling external devices ; analysis of operation amplifiers circuits ; deviations of Op - amps from idial behaviour ; clipping clamping and filter circuits ; delay lines ; computers, Schmidt triggers and discrimators ; noise ; multiple time average and phase sensitive ditection ; spectrum analysis ; interfacing analogue and digital worlds ; digital to analogue circuits; analogue to digital conversition circuits ; introduction to microprocessors preliminary concepts ; components of a microprocessor ; memory ; programming's microprocessor ; motorola MC 6809 processor ; designing with MC 6809; microprocessor support chips ; introduction to IBM PC ; interfacing to IBM PC; interrupts in IBM PC; ISA Bus, standard interfaces.	
Teaching and Learning methods	• Independent/Group learning: Course material in print (25 Sessions), Online components, Recommended readings • Non-compulsory contact sessions: 4 Day schools • Continuous assessments: 2 NBT + Practical Assessment	
Assessment strategy	Overall CA Mark (OCAM):40%	Final Assessment: 60%
	2 NBTs (1 hour × 2) . OCAM = (60% of Best NBT + 40% of other NBT) EL Criterion – CAM ≥ 35%	Theory paper (2 hours) 4 to be answered out of 6 essay type questions. Final Examination Marks: 100%
Recommended Readings:	(1) Fraden, J. (2000). Handbook of Modern Sensors (Physics, Design, and Applications), 2nd Edition, Springer-Verlog. (2) .Clayton, G. and Winder, S. (2003). Operational Amplifiers, 5th Edition, Newnes Publications. (3) Millman, J. and Grabel, A. (1987). Microelectronics, 2nd Edition, McGraw-Hill Book Company	

PM–Practical Marks, NB –No Book Test, FEM–Final Exam Marks, OCAM–Overall Continuous Assessment Marks