

Semester	AUG 2022
Open to semester	5,7,11,13,21
Course code	PH3153/PH6144
Course title	Methods of Experimental Physics
Credits	3 /4
Course Coordinator & participating faculty (if any)	Shivprasad Patil
Nature of Course	Lectures
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	This course is meant for students interested in experimental physics. It aims to introduce a broad range of experimental techniques and critical experimental concepts routinely used in modern research laboratories.
Course contents (details of topics /sections with no. of lectures for each)	<p>Section #1 Uncertainties in measurements (2)(Random and systematic errors, and their analysis), 3) Statistical significance of data (6 lectures)</p> <p>Section # 2 Electronic measurements & Signal Processing (Basics of Electrical Wiring/Circuits, Use of Basic Measuring devices, Nature of electronic noise, Filters, Phase Sensitive Detection) Types of cable and signal transmission (8 lectures)</p> <p>Section # 3 Section # 3-Vacuum Technology: Introduction to gas flow regimes; vacuum pumps, pressure gauges, and their operation, types of pumps and their principles (6 lectures)</p> <p>Section # 4 Control Systems theory and feedback control systems used in Physics including temperature controls. (4 lectures)</p> <p>Section # 5 Cryogenic Techniques Low temperature Physics (3 lectures)</p> <p>Section # 6 Optical Techniques (3 lectures) Generation & measurement of light, Polarization Control, Interferometry (4 lectures)</p> <p>section # 7 Spectroscopic Techniques (6 lectures)</p>

	<p>Optical Spectroscopy. Correlation spectroscopy, scanned probe spectroscopic techniques section # 8 Some Important experimental techniques: an overview. (4 lectures)</p>
<p>Evaluation /assessment</p>	<p>End-Sem Examination-40% Mid-Sem Examination-30% Others-30 % continuous through quiz and assessment. PhD students will have more assessment since it is four credit course for them %</p>
<p>Suggested readings (with full list of authors, publisher, year, edn etc.)</p>	<p>1)Art of Experimental Physics by Daryl W. Preston, Wiley 2)Introduction To Error Analysis: The Study of Uncertainties in Physical Measurements by John R. Taylor. 3)The Art of Electronics by Paul Horowitz and Winfield Hill. Also see Student Manual for the Art of Electronics by Thomas C. Hayes and Paul Horowitz. 4)Methods of Experimental Physics By M. I. Pergament, CRC Press. 5)Statistical Methods in Experimental Physics By Frederick James, World Scientific. 6)A Laboratory Course in Experimental Physics by W J Loudon. 7)Data Reduction & Error Analysis for the Physical Sciences, P. R. Bevington & D. K. Robinson, McGraw Hill. 8)Experimental Physics: Modern Methods by R. A. Dunlap, Oxford University Press. 9)Experimental Techniques In Condensed Matter Physics At Low Temperatures by R. C. Richardson & E. N. Smith, Westview Press. 10)Measurement, Instrumentation and Experimental Design in Physics & Engineering, M. Sayer & A. Mansingh, Prentice Hall of India. Also read pedagogical Journal Papers on experimental physics from American Journal of Physics, Physics Education, Reviews of Scientific Instruments, Physics Today etc for project.</p>