Programme: M. Sc. (Physics)
Course Code: PHGO-119 **Title of the Course:** General Physics Practical
Number of Credits: 4
Effective from AY: 2021-22

Prerequisites for the course:	Nil	
Objective:	This course provides laboratory training in performing experiments that verify important physical laws and using modern and novel techniques of measurements.	
Content:	Short Lecture Course on – Theory of errors, Treatment of Errors of observation, linear least squares fitting and Data analysis. The experiments on the following topics (any 12) are to be performed with emphasis on the estimation and calculation of errors. 1. Types of Statistical Distributions 2. Analysis of Sodium Spectrum – Quantum defect and Effective quantum number 3. Michelson Interferometer/Fabry-Perot Interferometer 4. Diffraction experiments using laser– single slit, double slit, grating 5. Polarization experiments using laser –linearly and elliptically polarized light 6. Statistical Distribution of radioactive decay 7. Verification of Inverse Square Law using GM counter 8. Linear Absorption Coefficient of Aluminium using GM counter 9. Verification of Debye Relaxation Law and measurement of thermal relaxation of serial light bulb 10. Thermal diffusivity of Brass 11. Thermometry – measurement of thermoemf of Iron-Copper (Fe-Cu) thermocouple as a function of temperature and verification of law of intermediate metals 12. Calibration of Lock-in Amplifier 13. Measurement of mutual inductance of a coil using lock-in amplifier 14. Measurement of low resistance using lock-in amplifier 15. X-ray Emission – characteristics lines of a W target 16. Experiments using Strain Gauge 17. Ultrasonic Interferometer 18. Nonlinear dynamics – Feigenbaum circuit 19. Nonlinear dynamics – Chua's circuit 20. Verification of Percolation phenomena 21. Measurement of electrical resistance of Ni wire to verify para to ferromagnetic phase transition 22. Measurement of electrical resistance of NiTi based shape memory alloy 23. Measurement of Young's modulus of Brass by Flexural vibrations	12 hours 72 hours

Pedagogy:	Lectures and Laboratory Experiments.	
References/Readings	1. P. R. Bevington and D. K. Robinson, Data Reduction and Error Analysis for the Physical Sciences, McGraw Hill (Indian Edition) 2015. 2. R. Srinivasan, K. R. Priolkar and T. G. Ramesh, A Manual on Experiments in Physics, Indian Academy of Sciences, 2018.	
Learning Outcomes	1. Employ proper techniques when making scientific measurements 2. Demonstrate the ability to use selected pieces of measuring devices including the multimeter, oscilloscope, and AC and DC power supplies 3. Demonstrate the ability to use the computer as a data analysis tool 4. Demonstrate the ability to maintain a laboratory notebook 5. Apply the appropriate physics to the physical situation presented 6. Quantitatively analyze experimental data 7. Estimate and translate errors and report quantities up to last significant digit 8. Formulate and report scientific conclusions based on data analysis 9. Prepare lab reports in standard scientific format	