Department of Physics, IIT Kanpur

PHY692 (Measurement Techniques), 2025-26 Semester IInd

Instructor In-charge

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Schedule

Lectures: Mon, Wed, 9 AM-10 AM

Laboratory: Tue, Thu, 2 PM-5 PM

Objectives

The aim of this course is to discuss basic concepts of experimental measurements and introduction of experimental and data analysis techniques used in various domains of experimental research.

Prerequisites

Knowledge of linear algebra, calculus, differential equations, Fourier analysis, Optics, Electronics, Quantum mechanics and Solid state physics at the undergraduate level. Basic computer skills are assumed. Programming knowledge will be a bonus. Permission from the instructor will be required to undertake this course as an elective.

Lecture Contents

1. Introduction: Programming Review, Mathematical Background
2. Errors in measurements
3. Numerical techniques, data analysis
4. Electronics and Instrumentation
5. Measuring electrical signals, radiation and light
6. Vacuum technology
7. Experiment Case Studies

Tentative List of Experiments

1.	Op-Amp applications	7.	Chaos – electronic circuits
2.	Arduino applications	8.	Michelson interferometer
3.	Four-probe method	9.	4*f* *i*maging
4.	Noise in electronic measurements	10.	Gamma ray spectroscopy
5.	PID controller	11.	Thin film deposition
6.	Lock-in amplifier	12.	Tandetron Lab Visit

Grading

Evaluation	Weightage (%)
Laboratory Reports	30
Mid-Semester Examination (Theory)	20
End-Semester Examination (Theory)	20
End-Semester Examination (Laboratory)	30
Total	**100**

Academic Misconduct Policy

Any plagiarism or copying in laboratory reports, deliberate data fabrication or falsification, or cheating in examinations to any extent whatsoever, if found, will be punished by awarding a F grade in the course. In addition, the student will not be allowed to drop the course, and findings will be reported to the relevant authorities in the Institute for disciplinary action.

Lab Policy

Details of the experiments and lab teams and partners, together with the schedule will be provided during the first lab session. Students will be allowed to proceed to the next experiment only upon submission of the report for the previously completed experiment. Reports should be submitted on the hello.iitk portal according to the format discussed in the class. A minimum of seven experiments need to be performed by each student, of which Experiments 9 and 10 (thin film deposition and Tandetron lab visit) are compulsory.