

SHIV NADAR UNIVERSITY

GRADUATE COURSE

I. COURSE TITLE: Experimental Techniques for Engineers

II. COURSE CODE: CED633

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ BATCH/WEEK (L:T:P): 3:0:0

V. COURSE TYPE (Core/Elective): Core

VI. PREREQUISITE/S (IF ANY): Engineering Mechanics and Strength of materials

VII. SCHOOL/ DEPARTMENT: Civil Engineering

VIII. COURSE CONTENT & SYLLABUS:

IX. COURSE OBJECTIVE

- To understand modern engineering experimentation including experiment design, system calibration, data acquisition, analysis and presentation.
- To develop and apply an understanding of statistical methods to select the best experimental approach to satisfy given requirements of accuracy.
- To understand how to quantify error and uncertainty in physical measurements.
- To understand how to apply statistical methods to the analysis and presentation of experimental results.
- To understand modern data acquisition concepts and requirements.

X. LEARNING OUTCOME

- Draw a concept map for a generalized measurement system that identifies the most important concepts.
- Apply basic statistical methods to design experiments, to analyze, and to present the results of experiments.
- Identify and describe the elements making up computer-based data acquisition systems, including alternative configurations and technologies.
- Design a data acquisition system for a given application by analyzing and specifying requirements, selecting appropriate commercial hardware, and writing a computer program to acquire, analyze, and present the desired data.

XI. COURSE DETAILS

Module-1

Introduction and basic concepts (calibration standards, dimensions and units, the generalized measurement systems), Dynamic response and measurements, experiment planning

Module-2

Analysis of experimental data, Experimental error and error analysis, uncertainty analysis, Statistical analysis of Experimental data, Probability distributions, parameter estimation, Graphical data analysis.

Module-3

Measurement system for electrical signals, displacement, dimensional measurements, flow and pressure measurements, force and strain measurements, Vibration measurement and sensing devices etc.

Module-4

Data Acquisition and Processing-General data acquisition system, Signal conditioning and Noise filter, data transmission, Data Storage and display.

Module-5

Design of Experiments- Types of experiment, Experimental design factor and protocol

XII. EVALUATION SCHEME:

- Midterm Exam 30 %
- Quizzes 10 %
- Presentation 20 %
- Final Examination 40 %

XIII. TEXT BOOKS

- Holman J. P., Experimental methods for engineers, 7th ed., The McGraw-Hill Companies, New York, © 2007.
- Dunn, P. F. (2005) Measurement and Data Analysis for Engineering and Science, McGraw-Hill, New York, NY. ISBN: 0-07-282538-3
- Doebelin, E.O. (2004) Measurement Systems: Application and Design, 5th ed., McGraw-Hill, New York, NY. ISBN: 0-07-243886-X