



National University of Sciences and Technology

Course Description

Course Title	Course Code	Credit Hours
Advanced Measurements and Instrumentation	ME-915	3 – 0

Text Books

- Measurement and Instrumentation: Theory and Application by Alan Morris and Reza Langari

Reference Books:

- Fundamentals of Signals and Systems Using the Web and MATLAB by Edward Kamen and Bonnie Heck
- Sensors and Signal Conditioning, 2nd Edition by Ramon Pallas-Areny and John G. Webster
- Engineering Vibration Analysis with Application to Control Systems by C. Beards

Course Objective:

This course is designed to provide a comprehensive understanding of advanced measurement techniques and instrumentation in mechanical engineering

Course Outline:

- Introduction to Advanced Measurements and Instrumentation, Overview of measurement systems, Types of measurement sensors, Types of instrumentation systems, Measurement uncertainties
- Fundamentals of Signal Processing, Analog and digital signals, Fourier analysis and transforms, Time and frequency domain analysis, Filtering techniques
- Data Acquisition and Instrumentation, Types of data acquisition systems, Signal conditioning techniques, Sampling and quantization, A/D conversion techniques
- Sensors and Actuators, Introduction to sensors, Types of sensors and their applications, Actuators and their applications, Calibration techniques
- Measurement Systems and Technique, Overview of measurement systems, Strain gauges and their applications, Pressure sensors and their applications, Temperature sensors and their applications, Flow sensors and their applications
- Advanced Measurement Techniques, Optical measurement techniques, Acoustic measurement techniques, Vibration measurement techniques, Laser Doppler velocimetry
- Data Analysis and Interpretation, Overview of data analysis techniques, Statistical analysis techniques, Time-frequency analysis techniques, Machine learning techniques for data analysis

ASSESSMENTS

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester Exam	40-50%