

Faculty	Ingegneria
Bachelor	Mechanical Engineering (Genova)
Year/Semester	3/I

Course Title	Measurement and instrumentation
ID Course Code	66228
Course Credits (CFU)	6
Scientific-Disciplinary Sector	ING-IND/12
Course Type	mono-disciplinary course
Lecturer-in-charge	Francesco CRENNÀ

Learning Outcomes:

Operative comprehension of the foundations of measurement, including elements of probability and statistics, static and dynamic analysis of measuring systems, evaluation of uncertainty, calibration, components selection, signal conditioning, measurement of mechanical and thermal quantities.

Course Organisation Details

Elements of probability and statistics: probability, random variables, variance and covariance, linear regression.

Evaluation of measurement uncertainty, calibration, dynamic measurement.

Sensors: seismic, elastic, strain gages, thermo-resistances, thermocouples, capacitive, inductive.

Signal conditioning: potentiometer and bridge circuits, demodulators, amplifiers, filter, interference reduction and grounding.

Voltmeters, A/D converters, current-to-voltage converters.

Metrological infrastructures. Length, temperature, force and vibration measurement.

Laboratory practice in strain and force measurement.

Assessment	hours
Lectures	44.0
Practice	0.0
Laboratory	10.0
Integrative activities	0.0

References

P. Bentley, *Principles of measurement systems*, Longman, 2005;

E. O. Doebelin, *Strumenti e metodi di misura*, McGraw-Hill, 2004;

W. Dally, *et alii*, *Instrumentation for engineering measurement*, Wiley, 1993;

A. Papoulis, *Probabilità, variabili aleatorie e processi stocastici*, Boringhieri, Torino, 1985;

Technical written standards: *Guide to the expression of uncertainty in measurement (GUM)*, in Italian UNI CEI ENV 13005, ISO 10012, ISO 17025.

Organization and examinations

Written test and oral examination, including discussion of two reports on lab activities.

Pre-requisites

None.