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Politecnico di Torino

Academic Year 2009/10 (first time established in A.Y.1999/00)

01LQQDR, 01LQQAX, 01LQQJA

Multidisciplinary project I

1st degree and Bachelor-level of the Bologna process in Mechanical Engineering - Vercelli (I FACOLTA' DI INGEGNERIA)
1st degree and Bachelor-level of the Bologna process in Civil Engineering - Vercelli (I FACOLTA' DI INGEGNERIA)
1st degree and Bachelor-level of the Bologna process in Electronic And Computer Engineering - Vercelli (III FACOLTA' DI INGEGNERIA)

Teacher	Status	SSD	Les	Ex	Lab	Years Stability
Cicero Giancarlo	RU	FIS/03	30	0	0	0

SSD	CFU	Activities	Area context
FIS/01	3	A - Di base	Fisica e chimica

Objectives of the course

The purpose of this laboratory course is to perform hands-on experiments in fundamentals physics in order to increase knowledge and understanding of the principles and methods involved in physical quantity measurements, to analyse measured data, to compare them to theory, and to communicate the results in written and oral form. In addition, this laboratory provides a practical foundation for some arguments covered in mechanics, electromagnetism and probability and statistics, as well as encouraging collaborative learning among students. The experiments are designed to enhance traditional laboratory skills, and to reinforce topics covered in both lectures and readings.

Expected skills

The supplied methodologies will allow the student to deal with problems of physical quantity measurements by developing methodologies to analyse data and to make correct estimations of the expected values and errors in the measured physical quantities. In addition a knowledge of the equipments that are used in measuring will be acquired.

Prerequisites

It is necessary to know and to be able to apply base mathematics as derivatives, differential and integral calculus.

Syllabus

Metrology: Fundamental quantity and System of Units ' mean, theoretical and empirical variance and standard deviation for continuous and discrete physics quantity ' histograms ' normal distribution ' chi-square distribution and method ' covariance ' error propagation ' measurements, estimations of precision and reliability of the results ' linear regression and least squares estimates ' description of the laboratory experiments.

Laboratories and/or exercises

There will be a three week lectures to present theory, describe the experiments, and discuss results. Experiments are performed in groups of 3-4 students spending one morning or afternoon in the lab under supervision of the TA. One laboratory reports are due. The reports are in the format of a Physical Report. Data could be analysed taking into account error propagation and can be shared as the reports.

Bibliography

Kimothi Shri Krishna The uncertainty of measurement: Physical and chemical metrology impact and analysis.
ASQ Quality Press, Milwaukee (USA)
Douglas C. Montgomery, George C. Runger:
Applied Statistic and Probability for Engineers
Editor: John Wiley & Sons Inc.
Gatti Paolo: Probability theory and mathematical statistics for engineers.
Editor: Spon Press, London

Revisions / Exam

The exam consists of the report estimation, TA evaluation and oral presentation followed by some questions. Final grades will be determined according to the following weighting scheme:
70% Laboratory write-ups
15% Oral Final
15% TA Evaluation

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