



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2020/2021
MASTER'S DEGREE (MSC)	MECHANICAL ENGINEERING
SUBJECT	MECHANIC VARIABLES ACQUISITION AND PROCESSING SYSTEMS
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20933-Attività formative affini o integrative
CODE	10076
SCIENTIFIC SECTOR(S)	ING-IND/12
HEAD PROFESSOR(S)	D'ACQUISTO LEONARDO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	D'ACQUISTO LEONARDO Thursday 08:30 10:00 Edificio 8 - stanza docente

PREREQUISITES	General concepts of mechanical and thermal measurements . Basic principles of electrotechnology (resistive, inductive and capacitive circuits).
LEARNING OUTCOMES	Knowledge and understanding The course aims at providing the student the following knowledge and skills: knowledge of the basics of computer programming language; the knowledge of the theoretical , methodological and operational aspects of processing signals coming from sensors and transducers of mechanical and thermal quantities with particular reference to applications in the industrial field; an awareness of the broad multidisciplinary context of engineering, in particular the links between sensorics, information technology and industrial engineering . Applying knowledge and understanding The course aims at providing the student the following knowledge and skills: ability to use knowledge of mathematics, physics and classical mechanics to understand, quantify and describe the information content associated to measurement signals also in the presence of missing data or of a partial description of the measurement object; the ability to formulate and solve problems in new and emerging areas of engineering, suggesting specific solutions for the approach to unconventional measurement problems . Making judgments The course aims at developing the students 'skills' and interpretative decision regarding the choice of computational techniques, the simplification of problems, analysis of experimental data aimed at the mechanical design and control of industrial processes. Enable communication The course aims to develop the students' ability to communicate and express competently and with language property the engineering problems of measurement systems in the mechanical language. Learning Capacity This course will contribute to develop the skills of the student to complete, also through home study, his preparation on the different topics.
ASSESSMENT METHODS	Oral exam Evaluation criteria for the oral examination The oral test consists of an interview, in order to check that you have skills and knowledge disciplinary provided by the course; the evaluation is expressed in thirtieths. The questions, both open both semi-structured to test the results of learning provided for, will tend to occur: a) the knowledge captured; b) the processing capacity, c) have adequate display capacity on the course contents. The final evaluation will be formulated according the following graduation of knowledge of the student. Excellent 30-30 and praise, very good knowledge of the topics, excellent properties of language, good analytical ability, the student is able to apply knowledge to effectively solve data acquisition and processing problems proposed 26-29 Very Good, Good command of the topics, full of language, the student is able to apply knowledge to solve data acquisition and processing problems proposed 24-25 good, basic understanding of the main topics, discrete properties of language, with limited ability to independently apply the knowledge to the solution of the proposed problems Satisfactory 21-23, has not fully mastered the main teaching subjects but it has the knowledge, satisfactory property language, poor ability to independently apply the knowledge acquired Sufficient 18-20, Minimum basic understanding of the major teaching and technical language issues, very little or no ability to independently apply the knowledge acquired Insufficient, it does not have an acceptable knowledge of the contents of the topics covered in the teaching
EDUCATIONAL OBJECTIVES	Objectives of the course The student, at the end of the course, will have the acquired understanding skills, knowledge and methodologies to effectively address measurement problems of mechanical and thermal quantities, even applying the design of data acquisition systems and development of mechanical and thermal measurements by the use of PC and dedicated software realized on the basis of commercial software packages. He will be able to formulate and solve problems in new and emerging areas of engineering, providing tailored approach solutions to unconventional measurement problems , showing

	decision-making skills to select the proper computational techniques, to simplify problems, to setup the analysis of experimental data requested for the mechanical design and control of industrial processes.
TEACHING METHODS	Frontal lessons, Laboratory experiences
SUGGESTED BIBLIOGRAPHY	1. MODERN INSTRUMENTATION FOR SCIENTISTS AND ENGINEERS, Blackburn, James A., 2001, XV, 319 p., 190 illus., Hardcover, ISBN: 978-0-387-95056-3. 2. LABVIEW PROGRAMMING, DATA ACQUISITION AND ANALYSIS, Prentice Hall, J.Y. Beyon, New, York, 2001 3. Materiale didattico delle lezioni fornito dal docente

SYLLABUS

Hrs	Frontal teaching
24	Basics of signal theory and analitical techniques of numerical signal processing
20	Data acquisition instrumentation, conditioning and processing of measurement data for mechanical applications . Fiber Bragg gratings (FBG) for strain and temperature measurements.
5	Programming techniques and LabVIEW TM programming language. The virtual instrumentation approach and the GProgramming. LabVIEW TM environment. Virtual instrumentation implementation techniques for data acquisition and processing of mechanical and thermal measurement signals.
Hrs	Practice
5	Laboratory experience on the following topics: digital acquisition of analog dynamic signal, spectral analysis, setup of analog filters and data acquisition of filtered signals, signal conditioning by means of digital filters, numerical generation and D/A conversion of voltage signals with assigned dynamic features.