UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2020/2021
MASTER'S DEGREE (MSC)	MECHANICAL ENGINEERING
SUBJECT	IMAGE PROCESSING IN MECHANICAL ENGINEERING - LABORATORY
TYPE OF EDUCATIONAL ACTIVITY	F
AMBIT	21265-Tirocini formativi e di orientamento
CODE	14506
SCIENTIFIC SECTOR(S)	
HEAD PROFESSOR(S)	PETRUCCI GIOVANNI Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	3
INDIVIDUAL STUDY (Hrs)	0
COURSE ACTIVITY (Hrs)	0
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Pass/Fail
TEACHER OFFICE HOURS	**PETRUCCI GIOVANNI** Monday 11:00 13:00 Ufficio del docente, Edificio 8, piano 1 Tuesday 11:00 13:00 Ufficio del docente, Edificio 8, piano 1 Wednesday 11:00 13:00 Ufficio del docente, Edificio 8, piano 1 Thursday 11:00 13:00 Ufficio del docente, Edificio 8, piano 1

DOCENTE: Prof. GIOVANNI PETRUCCI

PREREQUISITES	Basic notions of calculus and analytical geometry
LEARNING OUTCOMES	Knowledge and understanding abilities The course aims to develop the following knowledge and ability to understand: knowledge of the basic elements of a computer programming language; understanding of the theoretical, methodological and operational aspects of digital image processing with particular reference to industrial applications; an awareness of the wider multidisciplinary context of engineering, in particular the interactions between the areas of information technology and industrial engineering. Ability to apply knowledge and understanding The course aims to develop the following abilities to apply knowledge and understanding: the ability to choose and use equipment, tools and appropriate methods for the analysis of images in the industrial field; operational skills in the development of computer programs; ability to execute laboratory tests; ability to realize simple programs for image processing and for the determination of features of interest. Judgement skills The course aims to develop students' decision-making and interpretive skills concerning the choice of hardware and software tools for solving problems of digital image processing in the mechanical field. Communication skills The course aims to develop the student's ability to communicate and express issues concerning the subjects of the course, in order to effectively operate as part of a group.. Learning ability The course aims to develop learning skills of computer programming and image processing methods not covered during the course, but based on the principles set out in it.
ASSESSMENT METHODS	The evaluation is performed by means of a practical test, in which the student has to develop a computer program for image processing, and a short oral test that consists in a discussion about the program realized in the practical test. The aims of the test are to verify if the student have reached a level of knowledge and learning ability that enable him to develop its theoretical and technical knowledge for the solution of practical problems. In this case the student is considered as eligible.
EDUCATIONAL OBJECTIVES	Acquisition of the basics of the Matlab™ programming language and of the image processing technique for application in the industrial engineering field. Developing the ability to write simple image processing programs. Development of understanding and learning abilities of the trechniques of digital image processing.
TEACHING METHODS	Lectures, Practices in laboratory
SUGGESTED BIBLIOGRAPHY	Materiale didattico costituito da dispense e programmi informatici di tipo didattico forniti dal docente. Notes and didactic computer programs provided by the teacher.

SYLLABUS

Hrs	Frontal teaching
4	Programming Techniques and Matlab™ programming language: commands of general type, elementary operations on matrices, graphical instructions, strings of characters, control statements, relational and logical operators, conversion of variables, special variables and constants, mathematical functions and calculus.
2	Programming Techniques and Matlab™ programming language: commands for interpolation and approximation of data, functions for image processing.
4	General problems of digital processing of images: tools for data acquisition and processing, image format, image enhancement, segmentation.
2	Methods for measuring quantities of industrial engineering interest, based on image processing techniques: dimensional measurements, analysis of X-ray images and CT scans, edge detection, optical methods of stress analysis, microscopy images, particle counting.

Hrs	Workshops
12	Programming Techniques and Matlab™ programming language.
12	General problems of digital image processing.
4	Methods for measuring quantities of industrial engineering interest based on digital image processing