



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2017/2018
MASTER'S DEGREE (MSC)	BUILDING ENGINEERING
INTEGRATED COURSE	EXPERIMENTAL DYNAMICS AND MONITORING - INTEGRATED COURSE
CODE	17514
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	ICAR/08, ICAR/06
HEAD PROFESSOR(S)	LO BRUTTO MAURO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	LO BRUTTO MAURO Professore Associato Univ. di PALERMO DI MATTEO ALBERTO Ricercatore a tempo determinato Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	DI MATTEO ALBERTO Friday 15:00 18:00 Ufficio, 1° piano Area Strutture LO BRUTTO MAURO Monday 09:00 12:00 Dipartimento di Ingegneria - Area Geomatica - viale delle Scienze - Edificio 8 - scala F6 - secondo piano. Tuesday 09:00 12:00 Dipartimento di Ingegneria - Area Geomatica - viale delle Scienze - Edificio 8 - scala F6 - secondo piano.

DOCENTE: Prof. MAURO LO BRUTTO

PREREQUISITES	Dynamics of multi degree of freedom systems Dynamics of continuous systems Frequency domain analysis Stochastic dynamics
LEARNING OUTCOMES	Knowledge and understanding The student, at the end of the course, will have acquired knowledge and methods to address and solve in an original way problems related to the monitoring of structural vibrations in both civil, mechanical and aerospace field. Applying knowledge and understanding The student at the end of the course will be able to independently develop vibration monitoring projects together with methodologies for the study of the effects induced by vibrations. Making judgments The student will be able to critically analyze and evaluate effectively the risk of any records of structural vibrations Communication The student will be able to communicate competently and with appropriate terms complex problems of mechanical language of vibrations even in highly specialized settings. Learning skills -The student will be able to deal autonomously issues related to the dynamics of structures. -The student will be able to analyze complex issues such as: the dynamic response of structures even with non-linear behavior, the dynamic stability of complex systems, the dangerous effect induced by vibration to operators using some machines.
ASSESSMENT METHODS	Oral examination with score given by a thirty-plus vote with possible praise according to the evaluation scheme in the bulletin board at the bottom of the study site's homepage under the heading "Evaluation Methods". The interview involves open response questions focused on these areas: issues related to monitoring of structural vibrations, both in civil and mechanical or aerospace structures, complex dynamics of complex systems, vibration-induced effects on the operator using some machines, types and systems of wired and wireless sensors, BIM modeling methodology of the building. The student will have to demonstrate the ability to elaborate the basic knowledge acquired during the course with a technically correct language on the content of the teaching. Particular attention will be paid to the units of measurement of physical quantities of interest. An on-the-go test will be provided to facilitate the student's study of the matter, especially with respect to the application part concerning both structural monitoring and geomatic aspects. This test will take place through an oral examination and will not contribute to the final evaluation
TEACHING METHODS	Lectures, practical exercises, workshops and webinars.

MODULE
MODULE 1 - INTEGRATED COURSE EXPERIMENTAL DYNAMICS AND MONITORING

Prof. ALBERTO DI MATTEO

SUGGESTED BIBLIOGRAPHY

Vibration Monitoring, Testing, and Instrumentation Edited by Clarence W. de Silva The University of British Columbia Vancouver, Canada Ltfi) CRC Press VV^ J Taylor & Francis Group Boca Raton London New York CRC Press is an imprint of the Taylor & Francis Group, an informa business© 2007

AMBIT	20562-A scelta dello studente
INDIVIDUAL STUDY (Hrs)	93
COURSE ACTIVITY (Hrs)	57

EDUCATIONAL OBJECTIVES OF THE MODULE

Teaching aims to provide the criteria and methods for designing and monitoring of Structural system

SYLLABUS

Hrs	Frontal teaching
10	Experimental setup for vibrations study
11	Signal Analysis
Hrs	Practice
3	Vibration tests
6	Experimental modal analysis
4	Monitoring
4	Experimental setup for remote control and monitoring
4	Seismic insulation at the base and vibration control
2	"Human reaction" to vibrations
6	Case Study: Palazzo Steri
7	Guided Skype experiment with national and international experimental dynamics laboratory

MODULE
MODULE 2 - INTEGRATED COURSE EXPERIMENTAL DYNAMICS AND MONITORING

Prof. MAURO LO BRUTTO

SUGGESTED BIBLIOGRAPHY

Materiale didattico fornito dal docente: Dispense, Articoli riviste.

AMBIT	20562-A scelta dello studente
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52

EDUCATIONAL OBJECTIVES OF THE MODULE

Surveying and modeling, in BIM environment, the building, with particular regard to the structure, the modeling of types of sensors in the same environment, the graphical presentation of the model and the results, data exporting in IFC towards and from structural software.

SYLLABUS

Hrs	Frontal teaching
2	Techniques for surveying of structures.
2	Instruments for surveying of structures
4	3D Restitution and representation of 3D models of structures.
4	2D and 3D modelling of building system.
4	Types of sensors (i.e. total stations, levels, inclinometers, accelerometers, GNSS receivers).
4	Data acquisition through sensors.
2	Wireless and network systems.
2	Protocols for sharing sensor data over the network.
4	Examples of static, dynamic and real-time monitoring.
Hrs	Practice
8	Building modeling.
8	BIM structural modeling.
8	Development of case study.