UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica
ACADEMIC YEAR	2016/2017
BACHELOR'S DEGREE (BSC)	COMPUTER SCIENCE
SUBJECT	NUMERICAL ANALYSIS
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	10701-Attività formative affini o integrative
CODE	01746
SCIENTIFIC SECTOR(S)	MAT/05
HEAD PROFESSOR(S)	VETRO CALOGERO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	05880 - PROGRAMMING AND LABORATORY - INTEGRATED COURSE 16448 - MATHEMATICAL METHODS FOR COMPUTER SCIENCE
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**VETRO CALOGERO** Tuesday 15:00 17:00 Dipartimento di Matematica e Informatica, stanza 102, I° piano, via archirafi 34

DOCENTE: Prof. CALOGERO VETRO

PREREQUISITES	basic concepts of calculus and linear algebra
LEARNING OUTCOMES	Knowledge of: key tools and numerical methods for the approximate solution of physical and mathematical problems, in particular, arising in computer sciences. Comprehension of: mathematical tools in accordance with investigated problems. The skills evaluation is performed using in itinere exam and final exams. Autonomy to: evaluate the consequences of theoretical and algorithmic choices in dealing with numerical and optimization problems. Ability to: explain the studied issues, by using technical language. Learning of: training courses and talks in the field of applied mathematics. In particular, in dealing with the problems arising in computer sciences, applied mathematics, and so on.
ASSESSMENT METHODS	in itinere exam: written. Final exam: written, oral. The exam consists of a written part (4 exercises in 2 hours) and an oral part, on the whole program by referring to the bibliography. The board of examiners evaluates the knowledge of the topics, the exposition and critical abilities of the student. The evaluation is expressed in thirtieths according to the evaluation table below (minimum threshold of sufficiency 18/30). The students following the entire course have the possibility of an optional in itinere written part (4 exercises in 2 hours) on the two first arguments in program, at the mid of the course. The exam is completed with an oral part on the remaining arguments in program, at the end of the course. Evaluation Table Rating: Excellent Grade: 30-30 cum laude. Outcome: Excellent knowledge of the topics, excellent language skills, good analytical skills, ability to effective interaction and work in a group, the student is able to apply knowledge to solve proposed problems. Rating: Very good Rating: 27-29 Outcome: In-depth knowledge of the contents, good technical language, good ability of interaction and working in group, the student is able to apply knowledge to solve the proposed problems. Rating: Good Grade: 24-26 Outcome: Basic knowledge of the main topics, fair language skills, fair ability to work in groups, with limited ability to apply the knowledge to the solution of the proposed problems. Rating: Satisfactory Grade: 21-23 Outcome: The student knows the main topics without a full awareness of the knowledges, satisfactory language skills, inadequate ability to apply autonomously the acquired knowledge. Rating: Sufficient Rating: 18-20 Outcome: Minimum knowledge of the main topics and the technical language, the student is not able to autonomously apply the gained knowledges. Rating: Unsufficient Outcome: The student does not have an acceptable knowledge of the topics covered in the course.
EDUCATIONAL OBJECTIVES	The aim of the course is to introduce the students to numerical methods in approximation theory and optimization, by using both quantitative and qualitative mathematical models. The course also aims to present the necessary tools and concepts to successfully implement and apply the above methods.
TEACHING METHODS	lectures
SUGGESTED BIBLIOGRAPHY	R. Bevilacqua, D. Bini, M. Capovani, O. Menchi, Metodi Numerici, Zanichelli, Bologna, 1992. V. Comincioli, Analisi Numerica, McGraw-Hill, Milano, 1995. V. Comincioli, Metodi numerici e statistici per le scienze applicate, CEA Casa Editrice Ambrosiana, 1992. F.S. Hillier, G.J. Lieberman, Ricerca Operativa: Fondamenti, 9/ed, McGraw-Hill, 2010.

	F.S. Hillier, G.J. Lieberman, Introduction to Operational Research, 7/ed, McGraw-Hill, 2001.

SYLLABUS

Hrs	Frontal teaching
12	Nonlinear equations: bisection, regula falsi, secant method, Newton's method. Convergence analysis. One-point iteration methods and fixed point problems: local and global convergence conditions. Convergence acceleration methods. Extensions of Newton's method.
12	Numerical integration: interpolatory quadrature formulas. Error and convergence analysis. Cubature formulas. Complements.
6	Data approximation: the method of least squares and its variants. Error and convergence analysis.
18	Mathematical programming: introduction and classification of optimization problems. Decision problems: mathematical formulation and solution. Integer and continuous linear programming problems.