UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica
ACADEMIC YEAR	2018/2019
BACHELOR'S DEGREE (BSC)	COMPUTER SCIENCE
INTEGRATED COURSE	CALCULUS
CODE	01238
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	MAT/05
HEAD PROFESSOR(S)	CAPONETTI DIANA — Professore Associato — Univ. di PALERMO
OTHER PROFESSOR(S)	CAPONETTI DIANA — Professore Associato — Univ. di PALERMO BELLOMONTE GIORGIA — Ricercatore a tempo determinato — Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	Annual
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**BELLOMONTE GIORGIA** Tuesday 11:00 13:00 — Gli Allievi sono invitati a concordare un appuntamento via e-mail. Lo studio e' il n. 217, II piano. Sara' possibile concordare appuntamenti in altri giorni o altri orari. Students are kindly requested to book an appointment by e-mail. The office is the room 217, second floor. It will be also possible to book an appointment in other days or at other time. **CAPONETTI DIANA** Friday 9:30 11:30 — DMI-Via Archirafi 34-II piano-Studio 221. PROSSIMO RICEVIMENTO VENERDI' 24 MAGGIO. Necessaria la prenotazione via portale. Tramite e-mail, si puo' richiedere un appuntamento in giorni ed orari differenti da quelli previsti. Students can book an appointment by the web page, and by e-mail they can agree for an appointment in a different day or time.

DOCENTE: Prof.ssa DIANA CAPONETTI

PREREQUISITES	The only prerequisite needed in order to follow this teaching is the basic mathematical knowledge requested for the registration to the CdL
LEARNING OUTCOMES	KNOWLEDGE AND UNDERSTANDING: The student must acquire the knowledge of the language, the formalism and the basic theoretical concepts and methods of mathematical analysis. APPLYING KNOWLEDGE AND UNDERSTANDING: The student must acquire the ability of applying the techniques presented in the course in various contexts in which the mathematical analysis is required, both from the point of view of representation of mathematical models and from that of pure computation. MAKING JUDGEMENT: The student must be able to analyze and formalize a problem and identify the mathematical tools and strategies to solve it. COMMUNICATION SKILL: The student must be able to express with logical rigor, with properties of language and competence the concepts and the topics of the discipline. The student must be able to write the solution of problems in a rigorous and correct way, both in form and in substance. LEARNING SKILLS: The student must be able of using independently the acquired knowledge and must have the ability of developing advanced mathematical concepts through independent consultation of scientific texts.
ASSESSMENT METHODS	EXAMINATION: Final exam consists of a written test and an oral test. The written exam and the oral exam are evaluated out of 30 (each one is passed with a grade not less than 18/30) and the final vote is the average of the marks obtained in each test. The written test (3 hours) requires the resolution of 4 exercises concerning the main topics covered in the course. The written test is intended to evaluate the computing capacity, the degree of knowledge of the concepts presented in the course and the ability of the students to apply them independently. The oral test consists of the discussion of the topics of the written test and of an interview on the main results presented in the course. The oral test will also allow to evaluate the acquired properties of language and reasoning skills. INTERMEDIATE WRITTEN TESTS: The written test of the exam can be replaced, only in the case of students attending the course, by two midterm written tests which will take place at the end of each module, during the examination period. Each midterm test (1 hour and 30 minutes) requires the resolution of 2 exercises concerning the main topics covered in the course. Each written test will be evaluated out of 30. If each test has a score of not less than 15 / 30 and the average of the two evaluations is not less than 18/30 the student can directly support the oral exam of Mathematical Analysis (the final vote will be obtained as in the case of the standard examination). FINAL ASSESSMENT: The final assessment, properly graded, will be made on the basis of the following criteria: Rating: Excellent: 30-30 cum laude. Outcome: in-depth knowledge of the topics, excellent properties of language and analytical skill, the student is able to apply independently the knowledge to solve the proposed problems. Rating: Very good: 26-29. Outcome: in-depth knowledge of the topics, good mathematical language; the student is able to apply the knowledge to solve the proposed problems. Rating: Good. Rating: 24-25. Outcome: good knowledge of the main topics and properties of language, the student has a fairly good capacity to apply the knowledge to solve the proposed exercises. Rating: Satisfactory. Rating: 21-23. Outcome: basic knowledge of the main topics and sufficient command of the language, the student has a limited capacity of apply the knowledge independently, is able to solve basic exercises. Rating: Sufficient. Rating: 18-20. Outcome: acceptable knowledge of the proposed topics and acceptable command of the language, the student has a limited capacity of apply the knowledge independently, is able to solve standard exercises. Rating: Unsufficient: 18. Outcome: inadequate knowledge of the contents.
TEACHING METHODS	The course consists of two modules, Mathematical Analysis I (6 credits) and Mathematical Analysis II (6 credits), which take place respectively in the first and second semester of the first year of the degree course. Didactic activity is based on lectures and exercises delivered in classroom.

MODULE
MATHEMATICAL ANALYSIS I

Prof.ssa DIANA CAPONETTI

SUGGESTED BIBLIOGRAPHY	
M. Bramanti - C.D. Pagani - S. Salsa, Matematica, Calcolo infinitesimale e Algebra lineare, Ed. Zanichelli (vol. unico). S. Salsa - A. Squellati Marinoni, Esercizi di matematica, Calcolo Infinitesimale e Algebra lineare, vol. 1, Ed. Zanichelli.	
AMBIT	50167-Formazione matematico-fisica
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56
EDUCATIONAL OBJECTIVES OF THE MODULE	
This module aims to enable the student to acquire the fundamental concepts of Calculus for real-valued functions of a real variable with emphasis on the concepts of limit, continuity, derivative and integration. This module encourages the student to develop skills and confidence in the use of mathematical approaches in solving problems.	

SYLLABUS

Hrs	Frontal teaching
4	Numerical sets. Basic trigonometry. Complex numbers.
4	Real sequences.
4	Real-valued functions of a real variable. Limits and continuity.
4	Differential calculus: derivative of real-valued functions of a real variable. Differentiation Rules: sum, product, quotient, chain rules, derivatives of the inverse functions.
4	Mean Value Theorem. L'Hôpital's Rule. Taylor Polynomials.
4	Graph of a function.
4	Integration: Riemann sums and the definite integral, antiderivatives and indefinite integrals, immediate and quasi-immediate integrals, the Fundamental Theorem of Calculus.
4	Basic techniques of integration: substitution, integration by parts. Applications. Improper integrals

Hrs	Practice
6	Exercises and complements on complex numbers and real sequences.
6	Exercises and complements on real-valued functions of a real variable and differential calculus: derivative of real-valued functions of a real variable .
6	Exercises and complements on Taylor Polynomials and graph of a function.
6	Exercises and complements on integral calculus, areas and volumes of rotation solids and generalized integrals.

MODULE MATHEMATICAL ANALYSIS II *Prof.ssa GIORGIA BELLOMONTE*	
SUGGESTED BIBLIOGRAPHY	
M. Bramanti, C.D. Pagani, S. Salsa, Matematica, Calcolo infinitesimale e algebra lineare, Ed. Zanichelli (vol. unico), 2004. S. Salsa, A. Squellati Marinoni, Esercizi di Matematica, vol. 2, Calcolo infinitesimale, Ed. Zanichelli, 2006.	
AMBIT	50167-Formazione matematico-fisica
INDIVIDUAL STUDY (Hrs)	94
COURSE ACTIVITY (Hrs)	56
EDUCATIONAL OBJECTIVES OF THE MODULE	
The module aims to enable the student to acquire the analytical techniques available to solve ordinary differential equations and, as an application, to understand the idea of mathematical modeling. Moreover, it aims to let the student acquire the ability to deal with differential calculus and integrals of functions of two variables and to have a knowledge about power series. This module encourages the student to develop skill and confidence in the use of mathematical approaches in solving problems.	

SYLLABUS

Hrs	Frontal teaching
6	Ordinary differential equations (ODE). General integral of an ODE. Cauchy problems. Separable variable differential equations.
6	First and second-order linear differential equations. Models.
6	Differential calculus for functions of two variables. Topology in R^2. Graphs and level sets. Limits and continuity for functions of two variables. Partial derivatives. Differentiability.
6	Unconstrained and constrained optimization. Double integrals.
4	Numerical series. Sequences and series of functions.
4	Power series and MacLaurin series.

Hrs	Practice
4	Exercises and complements on the ordinary differential equations.
4	Exercises and complements on the first and second-order linear differential equations.
4	Exercises and complements on the differential calculus for functions of two variables.
4	Exercises and complements on unconstrained and constrained optimization, double integrals.
4	Exercises and complements on numerical series, sequences and series of functions.
4	Exercises and complements on power series and MacLaurin series.