UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	URBAN DESIGN FOR THE CITY IN TRANSITION
SUBJECT	MATHEMATICAL AND STATISTICAL METHODS FOR THE TERRITORY
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50092-Matematica, informatica statistica
CODE	23093
SCIENTIFIC SECTOR(S)	MAT/05
HEAD PROFESSOR(S)	DALBONO FRANCESCA Ricercatore Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**DALBONO FRANCESCA** Thursday 14:00 16:30

PREREQUISITES	Basic knowledge of Mathematics: arithmetic (operations with natural numbers, integers, rational and real numbers); elementary algebra (linear and quadratic equations and inequalities); real functions of one real variable (elementary functions: power, logarithm and exponential functions with their corresponding properties); basic trigonometry (difference between angles measured in degrees versus angles measured in radians, the trigonometric functions sine,cosine and tangent of an angle and their values for known angles).
LEARNING OUTCOMES	Knowledge and Understanding: Acquisition of elementary concepts, tools and mathematical methods of calculus, geometry, linear algebra and statistics; development of critical thinking skills and logical reasoning abilities. Applying Knowledge and Understanding: Ability to apply the potentiality of mathematical tools in order to formalize problems and to construct mathematical models; skills to apply the theoretical concepts and the mains theorems learnt during the lectures in order to solve problems. Making Judgement: Acquisition of the ability to "analyze", "decide", "be able to do"; acquisition of the ability to choose the best and simplest strategy to handle and solve problems. Communication Skills: Acquisition of ability to present the concepts and topics of the discipline rigorously, competently and with clarity. Learning Skills: Ability to find and acquire information from books and texts written in a formalized scientific language; ability to use scientific methods and deductive reasoning in different contexts. The aim of the course consists also in stimulating the students to develop a scientific curiosity.
ASSESSMENT METHODS	Written and Oral Exam. Written exam. The written exam is composed of at least six exercises, and it will last three hours. In order to pass the written examination, the student will have to solve the exercises in a complete and detailed way, by explaining each step with mathematical rigour. In a 30-point grade scale, the student is admitted to the oral exam with a minimum passing grade of 16 in the written composition. The aim of the written exam consists in verifying the required knowledge and comprehension abilities. Intermediate (written) evaluation. The students can take an ongoing intermediate written examination, which is structured and evaluated in an analogous way to the written exam described above, with the difference that the midterm exam is composed of at least three exercises and it only concerns the topics treated in the first half of the course. The midterm exam is held in the middle of the semester, in the lecture-free week of the month of April. The final written exam of the students who pass the ongoing intermediate examination is shortened and concerns exclusively the topics treated in the second half of the course. Oral exam. The oral exam is divided in three parts. In the first part the student is asked to discuss the written exam (or the written exams, in case the student takes the ongoing intermediate examination), the second part consists in an oral exam in statistics, and the third part consists in an oral exam on a mathematical topic chosen by the student. A detailed list of possible topics will be available at the beginning of the course. In the discussion of the written exam, the student is asked to review the written examination, and to rectify the mistakes. If the written exam shows that the student has a weakness in a particular topic, the examiner may assign written supplemental exercises in that area (the student shall be able to exhibit an, at least partial, knowledge and comprehension of the topics). Extraordinarily, in the oral exam the examinator can ask the student to solve the same exercises he/she already solved in the written exam. In the second part of the oral examination, the student will have to answer at least two oral questions on statistics. As mentioned above, in the third part of the oral examination, the student has to choose a topic for a 15 minute presentation. The exposition should be rigorous and complete. After the exposition, the student will have to answer at least two oral questions on the chosen subject. The final evaluation aims at appraising whether the student possesses a good

	knowledge and comprehension of the discipline, and whether he/she has acquired the ability to interpret and to make autonomous judgements in concrete cases. The lowest evaluation grade will be achieved if the student proves his/her knowledge and comprehension of the main subjects, at least within a general framework, and is able to apply that knowledge to solve elementary exercises. Below that threshold, the student will not be able to pass the examination. On the contrary, the more the student will be able to interact with the examiner and discuss the topics, and the more he/she will prove to have acquired the basics of Mathematics, the higher will the evaluation grade be. The evaluation grades range is comprised between 18 and 30, according to the following criteria: Excellent (30 – 30 e lode): Deep and broad knowledge of the topics belonging to the program, excellent language skills, good analytical, creative and interpretative capacity, ability to apply knowledge to solve problems independently and rigorously. In a 30-point grade scale, the "Lode" ("praise") can be added to the maximum grade if the student is able to answer a last question on one of the topics belonging to the program. Very good (26-29): Deep knowledge of the topics belonging to the program, very good language skills, good analytical capacity, ability to apply knowledge to solve problems independently and rigorously. Good (24-25): Good mastery of the topics belonging to the program, good language skills; good ability to apply knowledge to solve problems. Average (21-23): Basic knowledge of the main topics belonging to the program, adequate language skills, limited ability to apply knowledge to solve problems independently; the student is able to solve simple basic problems. Pass (18-20): Minimal knowledge of the topics, sufficient language skills, very poor ability to apply knowledge to solve problems independently; the student is able to solve simple problems. Fail: The student does not have an acceptable knowledge of the topics and concepts of the course.
EDUCATIONAL OBJECTIVES	The course is devoted to teach elementary concepts, tools and mathematical methods of calculus, geometry, linear algebra and statistics. The aim of the course consists also in improving critical thinking skills and developing logical reasoning abilities.
TEACHING METHODS	Lectures - Classroom Exercises A lecture will be held in English. The above activities are integrated with site inspections and interdisciplinary seminars, developed within the framework of the Coordination activities of the first year courses of the Bachelor Degree, in order to provide students with a complementary, articulated and coherent teaching offer.
SUGGESTED BIBLIOGRAPHY	P. Marcellini, C. Sbordone - Elementi di Calcolo (Versione semplificata per i nuovi corsi di laurea) - 2004 - Liguori Editore - ISBN: 9788820736651. M. Bramanti, C.D. Pagani, S. Salsa - Matematica (Calcolo infinitesimale e algebra lineare) - Seconda edizione 2004 - Ed. Zanichelli - ISBN: 9788808075475. S. Barbero, S.J.N. Mosconi, A. Portaluri - Matematica per le scienze. Con elementi di probabilità e statistica - 2022 - Pearson - ISBN: 8891915408. Dispensa del docente.

SYLLABUS

Hrs	Frontal teaching
16	Functions, Derivatives, Integrals
8	Linear algebra
3	Introduction to plane geometry
5	Statistics

Hrs	Practice
8	Functions, Derivatives, Integrals
4	Linear algebra
2	Introduction to plane geometry
2	Statistics