UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	
ACADEMIC YEAR	
ANNO ACCADEMICO EROGAZIONE	
SUBJECT	
CODE	
SCIENTIFIC SECTOR(S)	
HEAD PROFESSOR(S)	DI RUZZA SARA Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	
TERM (SEMESTER)	
ATTENDANCE	
EVALUATION	
TEACHER OFFICE HOURS	**DI RUZZA SARA** Wednesday 11:00 13:00 Dipartimento di Matematica e Informatica, Via Archirafi, 34, 90123 PALERMO

PREREQUISITES	Basic notions of algebra common to all high schools.
LEARNING OUTCOMES	1. Knowledge and understanding: Acquisition of basic mathematical and physical tools useful for dealing with the topics that will be proposed during the agricultural studies. Know the specific terminology and know how to use it. Master different expressive forms of mathematics and physics (text, graph, formulas); 2. Ability to apply knowledge: Recognize the graphs of elementary functions, be able to construct the graph of a function and be able to calculate the area of a plane figure. Apply physical concepts to professional reality. 3. Judgment autonomy: Being able to evaluate the implications and analytical results. 4. Communication skills: Ability to clearly present the contents learned, using specific language. 5. Learning skills: Ability to use the knowledge acquired in the course to analyze and solve problems from a mathematical and physical point of view.
ASSESSMENT METHODS	The exam is divided into a compulsory written test and an oral test which allow to get the grade 30/30. The written test consists of some open-ended exercises that cover the entire program carried out in class and are used to verify whether the student has acquired the calculation tools on which he practiced during the course. The oral test consists of an interview on the topics in the program, aimed at completing the assessment of the tools acquired by the student in the study of mathematics. The evaluation of the final exam, expressed out of thirty, is assigned on the basis of the following scale: 18-22: Sufficient phenomenological understanding of the concepts addressed during the course, and ability to express them with correct language. Sufficient ability to apply the concepts learned to the quantitative resolution of exercises that represent real situations. 23-27: Good understanding of the concepts addressed during the course, both from a phenomenological and quantitative point of view. Good communication skills and to illustrate the concepts learned with rigorous language. Good ability to apply the concepts learned to the quantitative resolution of exercises that represent real situations. 28-30L: Excellent qualitative and quantitative understanding of the concepts covered in the course, and excellent ability to apply them to the resolution of exercises that represent real situations. Excellent language property. Ability to apply to situations slightly different from those dealt with during the course. Compensatory tools and dispensatory measures will be guaranteed by the Disability and Neurodiversity Center - University of Palermo (Ce.N.Dis.) to students with disabilities and neurodiversity, based on specific needs and in implementation of current legislation.
EDUCATIONAL OBJECTIVES	The fundamental objective of the course is to provide students with the main tools for analyzing problems from a mathematical and physical point of view. The training objectives will therefore be: 1. Promote intuitive and logical faculties; 2. Acquire abstraction and formalization skills; 3. Develop the ability to critically review and logically systematize the knowledge acquired; 4. Get used to the application of analysis and synthesis skills to concrete problems; 5. Getting used to the search for alternative construction solutions; 6. Getting used to generalizing the solution of a specific problem in algorithms; 7. Enhance the ability to use mathematical methods, tools and models in different situations; 8. Promote understanding of the transversal concepts of the discipline and get used to grasping structural analogies between different areas.
TEACHING METHODS	Lectures and exercises. The lessons will be held with the help of a tablet, projector and a blackboard.
SUGGESTED BIBLIOGRAPHY	E.N. Bodine, S. Lenhart, L.J. Gross, G. Caristi, M. Mozzanica, G. Tommei, Matematica per le scienze della vita, UTET Università. Anna Maria Brigatti, Grazia Tamone, Matematica zero, Casa editrice ambrosiana (ISBN: 978-88-08-62026-2). Anna Maria Brigatti, Lorenzo Robbiano, Matematica di base, Casa editrice ambrosiana (ISBN: 978-88-08-72013-9). G. Zwirner, Istituzioni di Matematica parte prima, Ed Cedam, Padova. Appunti del docente.

SYLLABUS

Hrs	Frontal teaching
4	Sets and operations on sets. Numeric sets: natural, integer, rational, irrational, real. Equations and inequalities. Powers and properties. Logarithms and properties.
6	The Cartesian plane and the straight line, the circumference, the parabola.

SYLLABUS

Hrs	Frontal teaching
4	The goniometric circumference. Definition of sine, cosine and tangent of an oriented arc. Trigonometric functions of an oriented angle. Trigonometric formulas. Triangle theorems.
8	Scalar and vector quantities. Vectors sum of 2 or more vectors. Scalar and vector product. International system of measurement. Forces and moments.
4	Barycenter of a solid body. Moment of inertia, static moment.
8	Definition, domain and range of a real function of a real variable. Elementary function graph. Definition of limit and continuity of real functions. Operations with limits. Properties of continuous functions defined on an interval.
9	Definition of derivative. Geometric meaning of the derivative. Points of non-differentiability. Operations with derivatives. Derivative of compound functions. Characterization of the monotony of a function by means of the derivatives. Relative maxima and minima of a differentiable function. Subsequent derivatives of the first order. Characterization of convexity through the sign of the second derivative. Asymptotes. Study of the graph of a function.
5	Primitive of a function. Indefinite and definite integral. Properties of integrals. Fundamental formula of integral calculus. Calculation of flat areas.

Hrs	Practice
20	Review of equations and inequalities. Powers and properties of powers. Logarithms and properties of logarithms. Trigonometry. Limits and continuity of a function. Differential calculus. Qualitative study of a function. Integral calculus. Exercises on vectors, forces, barycenter and moment of inertia.