Syllabus

Descrizione corso

Titolo insegnamento	Matematica
Codice insegnamento	42600
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	MATH-04/A
Lingua	Inglese
Corso di Studio	Corso di laurea professionalizzante in Tecnologie del Legno
Altri Corsi di Studio (mutuati)	
Docenti	dr. Ivano Colombaro, Ivano.Colombaro@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/47959
Assistente	
Semestre	Primo semestre
Anno/i di corso	1
CFU	5
Ore didattica frontale	50
Ore di laboratorio	0
Ore di studio individuale	75
Ore di ricevimento previste	15
Sintesi contenuti	• Functions: domain, range, inverse. • Derivatives. • Integrals. • Function analysis. • Differential equations. • Linear algebra
Argomenti dell'insegnamento	Functions: Definitions, notation y=f(x). Table and graph of a function. Domain and range, simple examples, recall of integer and fractional equations and inequalities of I, II degree. Injective

	functions. Polynomial functions of I and II degree. Functions xn, n-th root, sinx, cosx. Complex numbers. Range of rational fractional functions. Derivatives and integrals: Derivative of a function, incremental ratio and tangent line. Numerical examples. Derivatives of the elementary functions, of products and ratios. Derivative of function of function. Physical notation "dy/dx", chain rule dy/dx=(dy/du)(du/dx). Maxima, minima, and horizontal inflection points. Simplified scheme for studying the graph of a function (without asymptotes and convexity). Examples of functions containing roots and logarithms. Indefinite integrals. Elementary primitives. Integration rules. Applications to kinematics: uniform and accelerated motion. Definite integrals. Geometrical meaning. Application to dynamics: work of an elastic force. Fundamental theorem of the integral calculus. Integration by parts and by substitution. Rotation integrals. Multiple integrals and partial derivatives. Function analysis: Taylor polynomials. Convexity, second derivatives. Inverse functions and their graphs. Inverse of the elementary functions. Restrictions of the domain. Relationship between the range of a function and the domain of its inverse. Derivative of the inverse function. Limits at finite and infinite. Limits of the elementary functions. Determinate and indeterminate forms. Elimination of the indetermination. Limits of rational functions. Horizontal and vertical asymptotes. Rule of de l'Hopital. Differential equations: concept of differential equation of the I order. Direct verification of the solutions. Equations with separation of variables. Logistic equation. Linear equations of the I order. Linear and quadratic interpolation. Problems of forecasting. Linear Algebra: introduction to vectors and matrices. Operations between vectors and matrices and linear systems. Practical applications.
Parole chiave	functions, calculus, linear algebra
Prerequisiti	Strong mathematical basis
Insegnamenti propedeutici	

Modalità di insegnamento	Lecture-based teaching
Obbligo di frequenza	Attendance is not compulsory but recommended
Obiettivi formativi specifici e risultati di apprendimento attesi	The course aims at reinforcing and deepen the mathematical skills acquired by students in the high school, from the theoretical and practical points of view. In particular, the focus is given to the concepts of equation and function, the main notions from differential and integral calculus, an introduction to differential equations and the basis of linear algebra. Knowledge and understanding: 1. Knowledge of the main mathematical concepts and formalism of calculus and linear algebra. 2. Proficiency in the techniques of integral and differential calculus, and the linear algebra. Applying knowledge and understanding: 3. Ability in solving problems concerning function analysis by means of the calculus tools. 4. Ability to apply mathematical techniques and methods learned in the course. 5. Ability to adopt the mathematical formalism in problem solving. Making judgments 6. Efficiency in recognizing the right approach and convenient tools, to suitably deal with mathematical problems and questions. Communication skills 7. Proficiency to use English at an advanced level, especially in reporting on the calculations in a clear and effective way, by means of the written production and oral presentations. Learning skills 8. Ability to deal with problems in an appropriate way and to apply the suitable techniques. 9. Capability in abstracting and generalizing problems, using the suitable scientific formalism and methods.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	The written exam will consist of solving exercises. The use of calculators and books is not permitted. A list of necessary constants and formulas will be provided along with the exam text. Formative Assessment:

	Form Length/duration ILOs assessed In class exercises 6 hours 1,2,3,4,5,6 Home assignments 4 hours 2,3,4,6,7,8,9 Summative assessment: Form: 100% written exam problems Lenght/duration: 150 minutes ILOs assessed: 1,2,3,4,5,6,7,8,9
Criteri di valutazione	Written test: every exercise has some points assigned. Points are added according to correctness of the results and exact solving procedure. To pass the written exam the score must be greater or equal to 18. Oral test: it consist in a discussion of the written test and it can add an extra mark ranging from 0 to +2, summing up to the score of the written exam. If the final score is greater than 30, a "with honors" is awarded.
Bibliografia obbligatoria	Lecture notes
Bibliografia facoltativa	Any book of "Calculus" in the Library reserve collection
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità