Syllabus

Descrizione corso

Titolo insegnamento	Laboratorio di Matematica
Codice insegnamento	42601
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	NN
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	4
Ore didattica frontale	0
Ore di laboratorio	40
Ore di studio individuale	60
Ore di ricevimento previste	12
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 exercises and practical activities
Obbligo di frequenza	Attendance is not compulsory but recommended
Obiettivi formativi specifici e risultati di apprendimento attesi	The course aims to reinforce and deepen the mathematical skills acquired by students in high school, from both theoretical and practical perspectives. In particular, it focuses on the concepts of equations and functions, key notions from differential and integral calculus, an introduction to differential equations, and the fundamentals 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 exam consists in the preparation of a presentation, which must be handed in and orally presented. Furthermore, homework and class participation will be evaluated. Formative assessment:

	Form: In class activities Lenght/duration: 10hours ILOs assessed: 1,6,7,8,9 Summative assessment: Form: 100% oral presentation Lenght/duration: 30 minutes ILOs assessed: 1,2,3,4,5,6,7,8,9
Criteri di valutazione	Laboratories are graded on a pass/fail basis
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