# COURSE DESCRIPTION
# CALCULUS 2

# SSD: ANALISI MATEMATICA (MAT/05)



DEGREE PROGRAMME: ARCHITETTURA (N14)
ACADEMIC YEAR 2022/2023

## COURSE DESCRIPTION

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## GENERAL INFORMATION ABOUT THE COURSE



INTEGRATED COURSE: NOT APPLICABLE
MODULE: NOT APPLICABLE
CHANNEL: 01 Cognome A - Z
YEAR OF THE DEGREE PROGRAMME: II
PERIOD IN WHICH THE COURSE IS DELIVERED: SEMESTER I
CFU: 8

### REQUIRED PRELIMINARY COURSES

Analisi matematica I e Geometria

### PREREQUISITES



Differential and integral calculus for scalar functions of one real variable. Elements of analytic geometry in the plane and in the space 3D. Algebraic structures. Basic notions of vector space with the application to linear systems.

### LEARNING GOALS

Acquisition of the basic methodological tools necessary for the advanced study of applied disciplines of physical-engineering content. The objective of the teaching is to make the student acquire the language and mathematical tools suitable for the formulation of application problems and for their resolution, completing the path started with Mathematical Analysis I and Geometry. The contents concern the differential calculus of scalar and vector functions, measurement and integration, and ordinary differential equations.

## EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

**Knowledge and understanding**

The student must demonstrate knowledge and understanding of the fundamental elements of differential calculus for scalar and vector functions of 2 and more variables, of measurement and integration and of some classes of ordinary differential equations.

**Applying knowledge and understanding**

The student must demonstrate that he has acquired the basic methodological knowledge and tools necessary for the advanced study of applied disciplines of physical-engineering content.

## COURSE CONTENT/SYLLABUS

Linear differential equations. Cauchy's problem. Existence and uniqueness theorem. General integral. General integral of a linear differential equation of the first order. Examples of non-linear differential equations: with separable variables, of the Bernoulli type. The regular curves. the Frenet trihedron. Notable curves. Functions of two variables. Limits and continuity. Linearization of the graph. Differentiability and partial derivatives. Directional derivatives. Compound function derivation. Plane tangent to the graph as the plane of lines tangent to curves plotted on the graph. Higher order approximations: Taylor's formula. Hessian. Relative minimums and maximums. Regular parametric surfaces. Integration. Extension of the concept of measurement. Integral extended to an interval. Integrability of continuous functions. Fundamental theorem of integral calculus. Length of a regular curve. Curvilinear integral. Curvilinear integrals on vector fields. Double integrals. Reduction formulas on particular domains. Change of variables. Area of regular surfaces and surface integral. Masses, centers of gravity, wires and sheets. Differential operators. Green's theorem, divergence theorem, rotor theorem

## READINGS/BIBLIOGRAPHY

Reference text: G. Anatriello, DA EUCLIDE ALL'ANALISI DIFFERENZIALE DI CURVE E SUPERFICI, Aracne 2020.

Other material will be distributed during the course

## TEACHING METHODS OF THE COURSE (OR MODULE)

Lectures (42 hours) and related exercises also with the use of specialized software (22 hours).

## EXAMINATION/EVALUATION CRITERIA

**a) Exam type**

- [x] Written
- [x] Oral
- [ ] Project discussion

☐ Other

**In case of a written exam, questions refer to**

☐ Multiple choice answers

☑ Open answers

☑ Numerical exercises

**b) Evaluation pattern**

The outcome of the written test is not binding for the purposes of access to the oral exam and accounts for 10% of the
overall rating.