

# AEROSPACE ENGINEERING (LM52)

(Brindisi - Università degli Studi)

## Teaching MATHEMATICAL AND NUMERICAL METHODS IN AEROSPACE ENGINEERING, WITH

GenCod A003291

Owner professor Raffaele VITOLO

**Teaching in italian** MATHEMATICAL AND NUMERICAL METHODS IN AEROSPACE ENGINEERING, WITH

**Teaching** MATHEMATICAL AND NUMERICAL METHODS IN AEROSPACE

**SSD code** MAT/07

**Reference course** AEROSPACE ENGINEERING

**Course type** Laurea Magistrale

**Credits** 6.0

**Teaching hours** Front activity hours: 54.0

**For enrolled in** 2023/2024

**Taught in** 2023/2024

**Course year** 1

**Language** ENGLISH

**Curriculum** CURRICULUM AEROSPACE DESIGN

**Location** Brindisi

**Semester** First Semester

**Exam type** Oral

**Assessment** Final grade

**Course timetable**  
<https://easyroom.unisalento.it/Orario>

### BRIEF COURSE DESCRIPTION

Algorithms and methods of approximate solution of algebraic and differential equations, with computer experiments.

### REQUIREMENTS

Calculus of functions of one or more real variables; linear algebra.

### COURSE AIMS

The Students will reach the following objectives:

- Knowledge and understanding: partial differential equations and their origin as mathematical models for physics and engineering.
- Ability to apply knowledge and understanding: computational abilities for differential equations. The techniques will be taught during the lectures.
- Autonomy: all concepts will be based on computations that the Students can repeat or expand in an autonomous way, and can be used in a variety of situations.
- Communicating abilities: the course does not involve communicative abilities in a significant way.
- Learning abilities: the Students will learn that complex mathematical problems can be solved with computer.

### TEACHING METHODOLOGY

Lectures and computer experiments.

### ASSESSMENT TYPE

Oral exam on the course program (as exposed during the lectures) and proof of knowledge of the Matlab language.

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## FULL SYLLABUS

Matrix computations  
Principles of numerical mathematics  
Direct methods for the solution of linear systems  
Iterative methods for the solution of linear systems  
Iterative methods for eigenvalues and eigenvectors  
Solution of non-linear algebraic equations  
Polynomial interpolation of functions and data  
Numerical integration  
Orthogonal polynomials and Fourier transform  
Numerical solution of ODEs  
Introduction to PDEs for Engineers  
Finite difference methods and finite element methods for PDEs.

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## REFERENCE TEXT BOOKS

Quarteroni, Sacco, Saleri: Numerical Mathematics, 2nd ed., Springer 2006.