
COURSE: Mathematics for Chemistry

ACADEMIC YEAR: 2019-2020

TYPE OF EDUCATIONAL ACTIVITY: affine

TEACHER: Occorsio Donatella

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website:

phone: +390971205848

mobile (optional):

Language: Italian

ECTS: **6** (lessons e
tutorials/practice)n. of hours: (124 hours for
lessons and 36 hours for
tutorials/practice)Campus: **Potenza**
Dept./School: **Dipartimento di
Scienze**
Program:Semester: I
**01/10/ 2019 -
20/12/20/01 2020**

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

In this course will be introduced basic elements in programming and in numerical computations.

The main goals:

Basic programming in Matlab. Numerical solutions of linear systems of equations, zeros of functions, approximation of eigenvalues and eigenvectors, best fitting by polynomials and approximation of functions by splines.

Final competences:The student will be able to solve the assigned problem, by choosing among different methods in order to obtain efficient procedures. "A priori" theoretical estimates of the errors are introduced.

PRE-REQUIREMENTSCalculus

SYLLABUS**(10 h) Programming in Matlab**

Basic algorithm and translation in Matlab

(5h) The machine arithmetic. Epsilon machine, absolute and relative errors, exact and significant digits. Stability of algorithms and conditioning of problems analysis.**(8h) Basic linear algebra.**

Vector spaces. Algebra of Matrices . Linear algebra basic. Rank and determinant of a matrix.

(10 h) Numerical solution of linear system

Conditioning study. Gauss elimination . Partial pivoting. Inverse of a matrix.

(10h) Approximation of functions zeros

Bisection and Newton methods. Convergence order of iterative methods .

(7h) Numerical computation of eigenvalues and eigenvectors of a matrix

Power method, Qr method.

(10h) Approximation of functionsLinear and cubic splines. Best fitting by polynomials. Error estimates .

TEACHING METHODSTheoretical lessons: 36 hours, Laboratory tutorials: 24 hours. Personal training in numerical laboratory are provided.

EVALUATION METHODSPractical examinations in Matlab and oral examinations.

The practical examination can be divided into two parts for regular attending student to Laboratory sessions. e oral examination in this last case can be skipped for student which have obtained 18/30 in mean at the two practical examinations.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Notes by the teacher on the website of the degree course

Istitutional book: *G. Monegato, Fondamenti di Calcolo Numerico, Edizioni C.L.U.T. Torino*

INTERACTION WITH STUDENTS

Receiving schedule

Monday 17 - 18

Tuesday 15 - 17

at the office 217 3d

EXAMINATION SESSIONS (FORECAST)¹

18/02/2020, 18/03/2020, 17/06/2020, 17/07/2020, 17/09/2020, 22/12/2020

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.