COURSE: Numerical Analysis
ACADEMIC YEAR: 2019/2020
TYPE OF EDUCATIONAL ACTIVITY: Characteristic
TEACHER: Concetta Laurita
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phone: 00390971205846
Language: Italian
ECTS: 6
n. of total hours: 54
n. of hours of lessons: 32
n. of hours of practice: 22
Campus: Potenza
School of Engineering
Program: Mechanical Engineering
Semester: I

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES
To know the main numerical methods applied in different contexts.
To be able to choose between antagonists methods for solving a specific problem comparing the order of convergence, stability of algorithms, computational cost.
To achieve a good level in programming algorithms, for example, in Matlab in order to apply the studied numerical methods.
To be able to read the numerical results provided by the machine when a numerical procedure is implemented.
To be able to communicate, in written and oral form, the studied numerical problems and the related resolution methods to argue about the choice of the most competitive procedure to use.
The activities aim to provide a methodology and a capacity to address and solve numerical problems that are not necessarily the same as those dealt with during the course.

PRE-REQUIREMENTS
The knowledge of the arguments from Calculus and Linear Algebra, basic of computer science and Matlab programming fundamentals. The knowledge of the arguments from Calculus and Linear Algebra, basic of computer science and Matlab programming fundamentals.

SYLLABUS
Errors and computer arithmetic
Numerical methods for linear systems
Numerical methods for the solution of nonlinear equations
Approximation of functions
Algebraic polynomial approximation by Lagrange interpolation. Interpolation by piecewise polynomial functions. Spline functions.
Numerical integration

TEACHING METHODS
Theoretical lessons, Laboratory tutorials.

EVALUATION METHODS
Practical test and oral examination.
The aim of the examination is to test the level of achievement of the previously mentioned educational goals.
The exam is divided into 2 parts:
0 a practical test with the computer (resolution of three numerical exercises) on all the topics covered in the course;
the test is intended to assess the understanding of the topics and the ability to choose between the different methods studied in the numerical solution of a specific problem. The student who does not show sufficient
knowledge of the subjects is not admitted to the oral test; to pass the test one must acquire at least 18 points out of 30. The estimated time for the test is 2.5 hour.

- an oral test which will evaluate the ability to link and compare different aspects covered during the course; to pass the test one must acquire at least 18 points out of 30.

**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

Lecture notes and teaching material for exercises provided by the teacher, available on a shared folder with the students enrolled in the course.

**TEXTBOOKS**

- G. Monegato, Fondamenti di Calcolo Numerico, CLUT (Torino)
- A. Quarteroni, R. Sacco, F. Saleri, Matematica Numerica, Springer

**INTERACTION WITH STUDENTS**

At the beginning of the course, after describing the objectives, program and evaluation methods, the teacher collects the list of students who intend to enroll in the course, together with name, serial number and email. The teacher at the beginning of the discussion on each item makes available the lecture notes on the online learning platform of the University of Basilicata.

Office hours: Monday and Wednesday from 15.30 to 17.30.

In addition to weekly reception, the teacher is available at all times for a contact with the students through their email.

**EXAMINATION SESSIONS (FORECAST)**


**SEMINARS BY EXTERNAL EXPERTS**

- YES □ NO x

**FURTHER INFORMATION**

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