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Marco Feder <marco.feder@sissa.it>

Numerical Analysis
Applied Mathematics

Target Audience

- **SISSA PhD Students with little or no background in Numerical Analysis**
- **Laurea Magistrale in Matematica (II year)**
- **Laurea Magistrale in Data Science and Scientific Computing (I year)**

Rough program of the course

- **Basics** (basic definitions, stability, convergence, well posedness, etc.)
- **Interpolation** (Lagrange polynomials, Bernstein Polynomials, etc.)
- **Integration** (L2 projections, interpolatory quadrature formulas, Gauss q.f., etc.)
- **Numerical linear algebra** (direct and iterative solvers, least squares, eigenvalues/eigenvectors)
- **Introduction to ODEs** (explicit and implicit methods, a-stability, etc.)
- **Introduction to PDEs** (intro to finite differences, finite elements, etc.)

- **…and all of the above in PYTHON**

Exam Modality

- **Oral + optional python project)**
  Lasts usually 1 hour per student (or less):
  - Optional Python Project with deadline one day before the oral exam (**REQUIRED** for 30/30 cum Laude)
  - One open question with time to think (and write) (about 20 min) on one of the main topic of the course
  - (optional) discussion of the python project (if done by the student) (usually around 10 min)
  - Free questions inspired by answers to open question, or by python project (usually around 20-30 min)
  - **Maximum mark without Python project: 28/30**

Course Availability

- **The Course is in presence. If you need to follow remotely:**
  - **Zoom (https://shorturl.at/gORW1)**
- **Recording of lectures from 2020-2021:**
  - **https://shorturl.at/mBERZ**
- **Scratch Jupiter notebook**
  - **https://shorturl.at/azMNP**

Timetable

- **Lectures (Prof. Rozza, Prof. Heltai)**
  - **Tuesdays: 14:00 — 16.00 @SISSA A-128**
  - **Thursdays: 14:00 — 16:00 @SISSA A-128**

- **Some times, lecture room will change: A-005. We will send emails when this happens.**

- **Optional hours (Marco Feder <marco.feder@sissa.it>) (exercises, TO BE DEFINED)**