Numerical Analysis

1. **Course number and name:** 020ANNCS1 Numerical Analysis

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Names of instructors:** Rafic FADDOUL

4. **Instructional materials:**
   - Lecture notes
   - Assignment handouts
   - References
     - Applied Numerical Analysis (6th Edition), Curtis F. Gerald, Patrick O. Wheatley, Published by Addison-Wesley (1998).
     - Numerical Analysis, Richard L. Burden and J. Douglas Faires, - 9th Edition
     - Numerical methods for engineers, Steven C. Chapra and Raymond P. Canale. - 6th ed.

5. **Specific course information**
   a. **Catalog description:**
   General introduction to numerical methods, Approximation and interpolation, Numerical integration, Numerical derivation, Numerical solution of differential equations, Systems of linear equations, Nonlinear equations and systems of equations, Methods of calculating eigenvalues, Partial differential equations.

   b. **Prerequisites:** 020AN2NI4 Analysis 2 - 020ALBNI3 Bilinear Algebra and Geometry

   c. **Required/Selected Elective/Open Elective:** Required

6. **Specific goals for the course**
   a. **Specific outcomes of instruction:**
   By the end of the course, the student will be able to:
     - Carry out mathematical modeling of engineering problems
     - Identify the advantages and limitations of the various numerical tools;

   b. **PIs addressed by the course:**

PI	1.1	1.2	1.3
Covered	x	x	x
Assessed	x	x	x

7. **Brief list of topics to be covered**
   - Systems of linear equations
   - Interpolation
   - Numerical differentiation
   - Numerical integration
   - Numerical solutions for first order ordinary differential equations
   - Numerical solutions for nth order ordinary differential equations

- Numerical solutions for partial differential equations
- Numerical solutions for (systems) nonlinear equations
- Numerical solutions for eigenvalues