# Numerical analysis

1. **Course number and name:** 020ANNGS1 Numerical analysis.

2. **Credits and contact hours:** 4 ECTS credits, 2x1.25 hours

3. **Name(s) of instructor(s) or course coordinator(s):** Rafic FADDOUL

4. **Instructional Materials:**

   **a.** Applied Numerical Analysis (6th Edition), Curtis F. Gerald, Patrick O. Wheatley, Published by Addison-Wesley (1998).

   **b.** Numerical Analysis, Richard L. Burden and J. Douglas Faires, - 9th Edition

   **c.** 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 – Systems of linear equations – Approximation and interpolation – numerical differentiation – numerical integration – nonlinear equations – systems of nonlinear equations – numerical solutions of differential equations – numerical solutions for partial differential equations - numerical solutions for eigenvalues.

   **b. Prerequisites or co-requisites:** 020AN2NI4 or 020AN2CI3 Analysis 2 – 020ALBNI3 Bilinear Algebra or 020AL2CI3 Algebra 2

   **c. Required:** Required major course for Civil Engineering students.

6. **Educational objectives for the course**
   **a. Specific outcomes of instruction:**
   - Mathematical modeling of engineering problems
   - Advantages and limitations of the various numerical tools

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

| **PI** | 1.1 | 1.2 | 1.4 |
|---|---|---|---|
| **Covered** | yes | yes | yes |
| **Assessed** | | | |

7. **Brief list of topics to be covered:**

| No. Hours | Content |
|---|---|
| 4 | Systems of linear equations |
| 4 | Interpolation |
| 3 | Numrical differentiation |
| 3 | Numerical integration |
| 4 | Numerical solutions for first order ordinary differential equations |
| 4 | Numerical solutions for nth order ordinary differential equations |
| 4 | Numerical solutions for partial differential equations |
| 4 | Numerical solutions for (systems) nonlinear equations |
| 4 | Numerical solutions for eigenvalues |