Numerical Methods

1. **Course number and name:** 020MENES1 Numerical Methods

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

3. **Name(s) of instructor(s) or course coordinator(s):** Hassan Mcheik

4. **Instructional materials:**
   Analyse Numérique, Dany Mezher and Romain Bossart, October 2016.

5. **Specific course information**
   a. **Catalog description:**
      Introduction to numerical calculation, error analysis and propagation, numerical software, interpolation and approximation, integration and differentiation, numerical solution to differential equations, finite difference method, matrices, resolution of linear systems, matrix decomposition, eigenvalues and eigenvectors, non-linear system of equations.

   b. **Prerequisites: [**Linear Algebra **(**020ALNNI2) or Algebra 1 (020AL1CI2)] and [Differential Calculus (020CDFNI4) or Analysis 2 (020AN2CI3)].

   c. **Required** for ME students, **Selected Elective** for CCE and EE students.

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
      The student will be able to identify, formulate and solve an engineering problem using numerical methods to solve differential equations.

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

PI	1.2	1.3	6.3	6.4
Covered	x	x	x	x
Assessed	x	x	x	x

7. **Brief list of topics to be covered**
   - Error analysis and propagation.
   - Numerical software.
   - Interpolation and approximation, Lagrange, Newton, Spline.
   - Differentiation and integration.
   - Numerical solutions to differential equations.
   - Finite difference method.
   - Matrices.
   - Resolution of linear system of equations.
   - Resolution of non-linear system of equations.
   - Eigenvalues and eigenvectors.