1. **Course number and name**
   EE 221: Numerical Computing for Engineers

2. **Credits and contact hours**
   2 credits, 2 lecture hours

3. **Instructor’s or course coordinator’s name**
   Ahmed Abu Hajar

4. **Textbook, title, author, and year**

   **Other supplemental materials**

5. **Specific course information**
   a. **Catalog description**: Solutions to engineering problems making extensive use of modern software tools (MATLAB).
   b. **Prerequisites or corequisites**: Math:220, Math:172, Linear algebra, calculus II and complex numbers.

6. **Specific goals for the course**
   By the end of the course, students will be able to
   - Competently use the MATLAB programming environment (2a, 2b, 2c, 2d, 2e, 2g).
   - Understand the vector-matrix paradigm underlying MATLAB (6a, 6b, 6c).
   - Understand the consequences of finite precision on numeric computational and understand the inherent limits of many numerical methods (2b, 6a, 6b, 6c, 7a, 7b, 7f, 7g).
   - Translate a textual or mathematical descriptions of a solution into a well-written computer based solution using MATLAB (1a, 1b, 1c, 1d, 1e).
   - Choose between various numerical methods to use the right method for a particular problem (6b, 7a, 7b, 7f, 7g).
• Understand the mathematical concepts upon which numerical methods rely.

7. Brief list of topics to be covered
   • Introduction to MATLAB:
     Running interactively
     Syntax (including colon notation), vectors, matrices
     Mathematical operations, built-in commands
     Complex numbers, strings
     Plotting
   • Programming:
     m-files
     Flow control, relational operators
     Scope
     Variable number of function arguments
     Style, comments, organization
     Debugging
   • Finite precision, inherent algorithmic errors
   • Root-finding
   • Solving systems of equations:
     Review of linear algebra and related operations
     Gaussian elimination
   • Least-squares fitting
   • Numerical integration