Course Code	**EM 316**
Course Title	**Numerical Methods for Electrical and ElectronicEngineers**
No. of Credits	**2**
Pre-requisites	**EM211, EM212**
Compulsory / Optional	**Compulsory for Electrical and Electronic Engineering specialization**

Aim(s): To provide a fundamental understanding of the properties of different numerical methods so as to be able to choose appropriate methods and interpret the results in solving problems.

Intended Learning Outcomes :

On successful completion of the course, the students should be able to;

- Apply appropriate numerical methods for solving problems.
- Analyze errors arising in numerical computation.
- Assess the reliability of the numerical results.

Time Allocation (Hours) : Lectures 26**Tutorials** 4 **Assignments**

Course content/ Course description :

- **Fundamental concepts:**Fixed point and floating point; Truncation and round off errors; error propagation through arithmetic operations; Taylor theorem and its applications in approximation and error analysis.
- **Iterative methods and applications:** Contraction mapping theorem; fixed point iteration; Secant method; Newton-Raphson method; Applications in computing zeros and extreme points of nonlinear equations in one variable.
- **Numerical linear algebra:** Gaussian elimination and back substitution; Iterative methods; power method for eigenvectors and eigenvalues.
- **Interpolation and splines:** Linear and polynomial Interpolation; curve fitting; Lagrange Interpolation; splines.
- **Numerical differentiation and integration:** Numerical computation of derivatives; rectangular, trapezoidal and Simpson's rules for numerical integration.
- **Numerical solutions of ODEs:** Implicit and explicit Euler method, fixed step methods, Runge-Kutta method for solving IVP; Finite difference method for solving BVP.
- **Solving nonlinear systems of equations:** Solving and finding extreme points of nonlinear systems of equations.

Recommended Texts:

- Steven Chapra and Raymond Canale, Numerical Methods for Engineers, 7th edition, 2014, McGraw-Hill.
- Ackleh et al.,Classical and Modern Numerical Analysis, 2009, Chapman and Hall/CRC.

Assessment	**Percentage Mark**
In-course	
Tutorials	20
Mid Semester Examination	30
End-semester	50