Semester	AUG 2022
Open to semester	5,21
Course code	**EC3114/EC6114**
Course title	**Numerical Computation**
Credits	4 /4
Course Coordinator & participating faculty (if any)	Suhas Ettammal
Nature of Course	Lectures and Lab
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	The course gives an introduction to numerical methods and algorithms widely used for solving wide ranges of applied mathematical problems. In addition, students will become familiar with MATLAB based scientific computing/programming environment.
Course contents (details of topics /sections with no. of lectures for each)	Introduction to scientific computing. Basics of MATLAB programming: basics of MATLAB programming, array operations in MATLAB, Loops and execution control, working with files: Scripts and Functions, file input/output operations, visualization. Floating point arithmetic: Floating point system, measures and types of errors, the IEEE standards. Linear algebra: Linear algebra in MATLAB, Gauss elimination, Gauss-Jordan elimination, LU decomposition and stability, QR decomposition method, Eigen value-Eigen vectors. Interpolation: linear interpolation, Newton and Lagrange polynomial interpolation, Piece-wise interpolation method: cubic spline method. Least-square method: Design matrix, Matrix method based least-square solver, QR decomposition based least-square method. Numerical differentiation: Finite difference method, centered, backward and forward difference methods. Numerical Integration: Trapezoidal and Simpson method, composite Trapezoidal and Simpson's method, data adaptive Simpson integration method. ODE/PDE solvers: Euler method, Runge-kutta 2nd order and 4th order method, solving coupled ODE/PDEs, MATLAB

	built-in ODE solvers.
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-40% Others-Weekly assignments: 20%%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1) Numerical Recipes, W.H. Press et al., Cambridge University Press, 2007. 2) Introduction to Numerical Analysis, J. Stoer and R. Bulirsch, Springer, 2003. 3) Linear Algebra and its Applications, Gilbert Strang, 4th edition, 2014.