भारतीय प्रौद्योगिकी संस्थान तिरुपति
TIRUPATI

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
भारतीय प्रौद्योगिकी संस्थान तिरुपति
Yerpedu-Venkatagiri Road, Yerpedu Post, Tirupati District, Andhra Pradesh - 517 619

1.	Title of the course	Scientific Computing Laboratory
2.	Course number	MA635P
3.	Structure of credits (L-T-P-C)	0-0-2-1
4.	New course/modification to	New
5.	To be offered by	Mathematics and Statistics
6.	Prerequisite	CoT
7.	**Course Objective(s):** To practice rudimentary numerical analysis using Python/C++. To develop algorithms to find roots of nonlinear equations. To generate pseudocode for matrix decompositions. To translate integration and interpolation algorithm to Python/C++ code.	
8.	**Course Content:** Computation time, big-O computation, Polynomial interpolation, Newton-divided differences, Hermite interpolation, Roots of nonlinear equations: open and closed methods, Systems of linear equations: LU decomposition method, Richardson method, Jacobi method, Gauss-Seidel method, relaxation methods, power method, QR and singular value decompositions, Numerical integration: Newton-Cotes rule, trapezoidal rule, Simpson rules, quadrature and Romberg integrations, Numerical differentiation: Runge-Kutta and shooting methods, finite difference methods.	
9.	**Textbook(s):** 1. Richard L B and Douglas J F, Numerical Analysis, 9th Edition, Cengage India Pvt. Ltd. (2012). 2. Kincaid D and Cheney W, Numerical Analysis: Mathematics of Scientific Computing, 3rd Edition, American Mathematical Society (2009).	
10.	**Reference(s):** 1. James V L, Amber S M and Vivian A M, Explorations in Numerical Analysis: Python Edition, World Scientific (2021). 2. Robert J, Numerical Python, 2nd Edition, Apress (2018). 3. Holger W, Numerical Linear Algebra, Cambridge University Press (2017). 4. Gene H G and Charles F V L, Matrix Computations, 4th Edition, John Hopkins University Press (2013).	