NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI- 620 015

This course outline template acts as a guide for writing your course outline. As every course is different, please feel free to amend the template/ format to suit your requirements.

COURSE OUTLINE TEMPLATE			
Course Title	**Numerical Techniques**		
Course Code	**MAIR41**	No. of Credits	**3**
Department	**Mathematics**	Section	**MME**
Pre-requisites Course Code	**MAIR11, MAIR21, MAIR31, MAIR32**		
Faculty	**Prof. R. Nallaswamy**	Course Coordinator(s) (if, applicable)	**NIL**
Other Course Teacher(s) / Tutor(s) E-mail	**nalla@nitt.edu**	Telephone No.	**0431-2503665**
Course Type	**Core course**		

COURSE OVERVIEW

- To understand the fundamental concepts of numerical technique.
- To impart the basic concepts of numerical techniques and system of equation, differetial and integral, which arise in the Engineering applications.

COURSE OBJECTIVES

To introduce

- Numerical Methods for Solving Linear Systems
- Methods to solve equations of One Variable as well as system of equations with two variables.
- Interpolating Polynomials and best curve fitting methods for the given data.
- Numerical Differentiation and Integration
- Numerical Solutions of Ordinary Differential Equations
- Numerical Methods to solve partial differential equations.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes(PO)
1. Understanding the basics concept of matrix and linear system of equations. 2. To Compute numerical solution of f(x) = 0 and nonlinear equations with two variables. 3. Understanding the basic concepts of numerical techniques in differentiation and integration. 4. To compute differentiation and integration of $f(x)$ by numerical techniques. 5. To solve initial and boundary value problem (heat and wave equations) by numerical technique.	The engineering under-graduates will apply their knowledge of numerical techniques to solve industrially applicable problems.

COURSE TEACHING AND LEARNING ACTIVITIES			
S. No.	**Week**	**Topic**	**Mode of Delivery**
1.	**Week 1**	Solution of linear system - Gaussian elimination and Gauss-Jordan methods.	
	Week 2	LU - decomposition methods - Crout's method - Jacobi and Gauss-Seidel iterative methods - sufficient conditions for convergence.	Chalk and Talk
	Week 3	Power method to find the dominant eigenvalue and eigenvector	
2.	**Week4**	Bisection method - Secant method - Regula falsi method.	
	Week 5	Newton- Raphson method for f(x) = 0 and for f(x,y) = 0, g(x,y) = 0 - Order of convergence.	Chalk and Talk
	Week 6	Horner's method - Graeffe's method- Bairstow's method	
3.	**Week 7**	Newton's forward, backward and divided difference interpolation.	
	Week 8	Lagrange's interpolation – Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 and 3/8 rules.	
	Week9	Method of least squares and group averages. Euler's method - Euler's modified method	
	Week 10	Taylor's method and Runge-Kutta method for simultaneous equations and 2nd order equations.	Chalk and Talk
	Week11	Multistep methods - Milne's and Adams' methods - Laplace equation and Poisson equation by Liebmann's method.	
	Week 12	Heat flow equation - Bender - Schmidt recurrence relation.	
	Week 13	Crank - Nicolson method - Solution of one dimensional wave equation.	

COURSE ASSESSMENT METHODS					
S. No.	**Plan**	**Week/Date**	**Duration**	**% Weightage**	
1.	Cycle Test –I	7th week	1 Hour	20%	
2.	Cycle Test-II	12th week	1 Hour	20%	
3.	Retest	14th week	1 Hour		
4.	Assignments (two assigment each assigmnet five mark weightage)			10%	
5.	End Semester Exam		3 Hours	50%	Total : 100 Marks

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

Reference Books:

1. David Kincaid and Ward Cheney, Numerical Analysis\, 3rd edition, American Mathematics Society, (Indian edition) – 2010.
2. Gerald C.F., and Wheatley P.O., Applied Numerical Analysis, Addison-Wesley Publishing Company, 1994.
3. Jain, M.K., Iyengar, S.R. and Jain, R.K., Numerical Methods for Scientific and Engineering Computation, New Age international,2003.
4. Atkinson, K.E., An Introduction to numerical Analysis, John Wiley & Sons, 2008.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. Feedback from students during class committee meeting.
2. Anonymous feedback through questionnaire (as followed previously).

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

1. Test-I and Test-II will be conducted in regular class.
2. 75% attendance is compulsory for writing the end semester examination.

ADDITIONAL COURSE INFORMATION

Faculty is available for discussion after the class hours at the Department on the first floor of Lyceum. Room No. 203.

FOR SENATE'S CONSIDERATION

Course Faculty

CC-Chairperson

HOD 4/11/2017

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