NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MATHEMATICS

COURSE PLAN

Course Title	NUMERICAL METHODS AND APPLIED STATISTICS		
Course Code	MA601	No. of Credits	3
Session	July-2023	MTech Civil Transportation Engg.	
Pre-requisites Course Code	Nil		
Name of Faculty	K. Sreelakshmi, PhD Scholar (Mentor: Dr. N. Shivaranjani)		
Email of Course Teacher	416122005@nitt.edu ranjani@nitt.edu	Mobile No.	9961710605 9159177345
Course Type	General Institute Requirements (Core course)		

COURSE OVERVIEW

This course will introduce

1. The concepts of linear and nonlinear systems and solve them using direct and indirect methods
2. To solve the problems through linear programming approaches.
3. To develop statistical models.
4. To do hypothesis tests and find the best options in practical problems.
5. To correlate results using statistical methods.

COURSE OBJECTIVES

Objective of the course is

1. To give ideas about various numerical techniques.
2. To gain an understanding of statistical methods relevant to interdisciplinary courses
3. To study the concepts of both discrete and continuous probability distributions
4. To calculate the confidence interval for various population parameters
5. To analyze the problems using linear programming approach

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
On completing this course student will be able 1. to distinguish the concepts of linear and nonlinear systems 2. to solve the problems through linear programming approaches 3. to correlate any results using statistical methods 4. to develop statistical models between variables	(a) (c) (d)

MA601 – NUMERICAL METHODS AND APPLIED STATISTICS

Linear Systems - Gaussian Elimination and Gauss - Jordan Methods - Matrix Inversion - Gauss Seidel Method - Nonlinear Equations – Regula- Falsi and Newton - Raphson Methods - Interpolation - Newton's and Lagrange's Interpolation

Linear Programming - Graphical and Simplex methods - Big-M method - Two phase method - Dual simplex method - Dual theory - Sensitivity analysis - Integer programming –applications

Random Variable - Two Dimensional Random Variables - Standard Probability Distributions - Binomial Poisson and Normal Distributions - Moment Generating Function

Sampling Distributions - Confidence Interval Estimation of Population Parameters - Testing of Hypotheses - Large Sample Tests for Mean and Proportion – t - Test, F-Test and Chi-Square Test

Curve Fitting - Method of Least Squares - Regression and Correlation - Rank Correlation - Multiple and Partial Correlation - Analysis of Variance - One Way and Two-Way Classifications -Experimental Design -Latin Square Design - Time Series Analysis.

TEXT BOOKS

1. Bowker and Liberman, Engineering Statistics, Prentice-Hall, 1972.
2. Venkatraman, M. K., Numerical Methods in Science and Engineering, National Publisher Company,5th Edition, 1999.
3. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for scientific and engineeringcomputation, 6 th edition, New Age International (p) Limited, 2007.
4. Operations Research: An introduction, Hamdy A. Taha, 10th edition Pearson Prentice Hall, 2007.
5. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, 7th Revised and Enlarged Edition,2014.
6. S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, 2014.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week	Topic	Mode of Delivery
1.	Week- 1	Linear Systems - Gaussian Elimination and Gauss - Jordan Methods - Matrix Inversion - Gauss Seidel Method	
2.	Week-2	Nonlinear Equations - Regula-Falsi and Newton - Raphson Methods - Interpolation - Newton's and Lagrange's Interpolation	Chalk & Talk
3.	Week-3	Linear Programming - Graphical and Simplex methods – Big-M method	
4.	Week-4	Two phase method - Dual simplex method. Dual theory	

5.	Week- 5	Sensitivity analysis - Integer programming –applications.	
6.	Week- 6	Random Variable - Two Dimensional Random Variables - Standard Probability Distributions	
7.	Week- 7	Binomial Poisson and Normal Distributions - Moment Generating Function.	
8.	Week- 8	Sampling Distributions - Confidence Interval Estimation of Population Parameters - Testing of Hypotheses	
9.	Week- 9	Large Sample Tests for Mean and Proportion – t - Test, F-Test and Chi-Square Test	
10.	Week- 10	Curve Fitting - Method of Least Squares - Regression and Correlation	
11.	Week- 11	Rank Correlation - Multiple and Partial Correlation.	
12.	Week- 12	Analysis of Variance - One Way and Two-Way Classifications -Experimental Design	
13.	Week- 13	Latin Square Design - Time Series Analysis.	
14.	Week- 14	Problem Solving related to the topics covered.	

COURSE ASSESSMENT METHODS

S. No.	Assessments	Week/Date	Duration	% Weightage
1.	Assessment – I	6th week	1 hour	20%
2.	Assessment - II	12th week	1 hour	20%
3.	Compensation Assessment	14th week	1 hour	20%
4.	Assignment	--	--	10%
5.	End Semester Exam	15th or 16th week	3 Hours	50%

COURSE EXIT SURVEY

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

COURSE POLICY

1. Examination:

a) Students who have missed the first or second assessment or both assessments due to genuine reasons can register for the compensation assessment which shall be conducted after the completion of the second assessment test and before the regular semester examination.

b) The compensation assessment shall be conducted for 30 marks comprising the syllabus of both first and second assessment tests.

c) Students should submit the assignments before the last date of submission. In case students fail to submit their assignments; he/she will get zero mark for that particular assignment.

2. Attendance:

a) The minimum attendance for appearing the final assessment is 75%.

b) Minimum of 10% shall be allowed On Duty (OD) category.

c) The students who are having less than 65% attendance will be prevented from writing the final assessment and be awarded 'V' grade.

3. Grading:

a) Students who have failed in the final assessment with 'F' grade and those who have missed the final assessment with valid medical/genuine reason shall take the Re-assessment.

b) Students awarded 'V' grade must compulsorily redo the course.

c) Passing minimum is as per the institute norms.

ACADEMIC DISHONESTY AND PLAGIARISM

1. Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
2. Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
3. The departmental disciplinary committee including the course faculty member, PAC chairperson and the HOD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
4. The above policy against academic dishonesty shall be applicable for all the programmes.
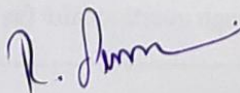
ADDITIONAL COURSE INFORMATION

1. Students can meet the faculty (with prior appointment) at any stage in the course duration in case he/she finds difficulty in understanding the topic.
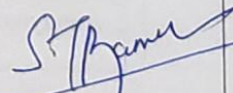
FOR APPROVAL

Course Faculty: CC-Chairperson   HOD

Dr. R. SENTHIL KUMAR