

Department of Mathematics

<b>COURSE OUTLINE</b>			
Course Title	<b>PROBABILITY, STATISTICS AND LINEAR PROGRAMMING</b>		
Course Code	<b>MAIR33</b>	No. of Credits	<b>3</b>
Department	<b>Mathematics</b>	Section	<b>CIVIL – A &amp; B</b>
Pre-requisites Course Code	<b>MAIR11, MAIR21</b>		
Faculty	<b>Dr. R. SATHYA</b>	Course Coordinator(s) (if, applicable)	<b>NIL</b>
Other Course Teacher(s) / Tutor(s) E-mail	<b>sathyar@nitt.edu</b>	Telephone No.	<b>9944474850</b>
Course Type	<b>Core course</b>		
<b>COURSE OVERVIEW</b>			
<ul style="list-style-type: none"> <li>• To understand the concepts of probability, statistics and linear programming problems which arise in engineering application.</li> <li>• To impart the basic concepts of linear programming technique.</li> <li>• To analyse the defectives arising in the engineering products and quality of the components purchased for the projects.</li> </ul>			
<b>COURSE OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>• To learn the techniques of probability and distribution functions which is applied in solving several applications.</li> <li>• To apply the concepts of random sampling, test statistical hypotheses and analysis of variance in solving many real life applications.</li> <li>• To understand the characteristics of Linear Programming Problem (LPP) and use of graphical solution in resolving LPP and its application in industry and business.</li> </ul>			
<b>COURSE OUTCOMES (CO)</b>			
Course Outcomes	Aligned Programme Outcomes(PO)		
<ol style="list-style-type: none"> <li>1. Able to apply probability theory via Baye’s rule and to describe discrete and continuous distribution functions together with moments and moment generating function.</li> <li>2. Understand the concept of Central limit theorem and its application.</li> <li>3. Able to use basic statistical knowledge in testing hypotheses on large and small samples and estimations.</li> <li>4. Understand the mathematical tools that are needed to solve linear and integer programming, transportation and assignment problems.</li> </ol>	The engineering under- graduates will apply their knowledge of Mathematical probability, Statistics and Linear programming techniques to solve industrial oriented problems.		

### MAIR33 : PROBABILITY, STATISTICS AND LINEAR PROGRAMMING

Total, Compound, Marginal and conditional probability, Bayes' theorem - Binomial, Poisson and Normal distributions, Moment generating function, Characteristic function.

Central Limit Theorem, Law of large numbers, Tests of significance, large and small samples, t- test, F-test and chi-square test for goodness of fit. Estimation theory, ANOVA table and analysis, Multiple and partial correlation – Regression.

Convex spaces, LPP statement, basic feasible solution, Graphical solution - Slack and surplus variables - Artificial variable technique - Charne's penalty method - Two phase method - Dual simplex method - Primal dual problems, Transportation and Assignment problems.

Integer programming - Gomory's cutting plane method - Branch and bound method.

#### COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	Week 1	Total, Compound, Marginal and conditional probability, Bayes' theorem	Chalk and Talk
	Week 2	Binomial, Poisson and Normal distribution	
	Week 3	Moment generating function, Characteristic function, Central Limit Theorem.	
2.	Week 4	Law of large numbers, Tests of significance, large and small samples	Chalk and Talk
	Week 5	t- Test, F-test, chi-square test for goodness of fit	
	Week 6	Estimation theory, ANOVA-Analysis	
	Week 7	Multiple and partial correlation – Regression.	
3.	Week 8	Convex spaces, LPP statement, basic feasible solution, Graphical solution - Slack and surplus variables - Artificial variable technique - Charnel's penalty method.	Chalk and Talk
	Week 9	Two phase method, Dual simplex method - Primal dual problem.	
	Week 10	Transportation and Assignment problems	
4.	Week 11	Integer programming.	Chalk and Talk
	Week 12	Gomora's cutting plane method.	
	Week 13	Branch and bound method.	



**COURSE ASSESSMENT METHODS**

S. No.	Plan	Week/Date	Duration	% Weightage
1.	Assessment –I	7 <sup>th</sup> week	1 Hour	20%
2.	Assessment -II	12 <sup>th</sup> week	1 Hour	20%
3.	Compensatory * Assessment	13 <sup>th</sup> week	1 Hour	
4.	Assignments* (each units two marks weightage)		3 Hours	10%
5.	Final Assessment			50% Total : 100 Marks

**ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc****Reference Books:**

1. Gupta. S.C. and Kapoor. V.K, Fundamentals of Mathematical Statistics, 7th Edition, Sultan Chand and Sons, 1980.
2. Kantiswarup, Gupta P.K. and Man Mohan, Operations Research, 11th Edition, Sultan Chand and Sons, 2003.
3. Taha, H.A. "Operations Research: An Introduction", Pearson Education Inc., 9<sup>th</sup> edn, 2014.

**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. Online feedbacks collected by academic section through (MIS). The feedback is to be filled honestly by the students.

**COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)****1. ACADEMIC DISHONESTY & PLAGIARISM:**

- ✓ Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- ✓ Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- ✓ The departmental disciplinary committee constituted with the 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.

**2. \*COMPENSATORY ASSESSMENT POLICY:**

- ✓ Students who have missed the **Assessment I and II** or both (genuine reasons with proof) can register for **Compensatory Assessment** examination which shall be conducted soon after the completion of the second Assessment and before the regular semester examination.
- ✓ Compensatory Assessment shall be conducted for 20 marks comprising the syllabus of both first and second Assessment.

**3. \*ASSIGNMENTS:**

- ✓ Students should submit assignments before last date of submission. In case students fails to submit their assignments, he/she will get zero mark for that particular assignment.

#### 4. ATTENDANCE POLICY:

The attendance will be taken in all the contact hours. Students are encouraged to attend all the classes without absence.

- ✓ At least 75% attendance in the course is mandatory.
- ✓ A maximum of 10% shall be allowed under On Duty (OD) category.
- ✓ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

5. The passing mark for the course is obtained (as per Institute policy) from the rule  $\max\{35, \bar{x}/2\}$  where  $\bar{x}$  is the average mark of the class.

#### ADDITIONAL COURSE INFORMATION

Faculty is available for discussion after the class hours at the Department of Mathematics Lyceum Block Room No. 214.

#### FOR APPROVAL

Dr.   
Course Faculty DR. R. SATHYA CC-Chairperson  HOD 