NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I				
Name of the programme and specialization	**M.Tech. / Industrial Safety Engineering / First Year**			
Course Title	**Probability and Statistics**			
Course Code	**MA611**		**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**-**			
Session	**July 2021**		**Section**	**-**
Name of Faculty	**Dr. P.SAVITHA**		**Department**	**Mathematics**
Official Email	**savitha@nitt.edu**		**Telephone No.**	**7639325777**
Name of Course Coordinator(s)	**-**			
Official E-mail	**-**		**Telephone No.**	**-**
Course Type	✓ **Core course**		**Elective course**	

Syllabus (approved in BoS)

Random variable – Two dimensional random variables – Standard probability distributions – Binomial, Poisson and Normal distributions - Moment generating function.

Special distributions – Uniform, Geometric, Exponential, Gamma, Weibull and Beta distributions – Mean, Variance, Raw moments from moment generating functions of respective distributions.

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-Time Series Analysis

Basics concepts of reliability - Failure rate analysis – Reliability of systems – Series, Parallel – Maintenance - Preventive and corrective – Maintainability equation – Availability – Quality and Reliability.

ESSENTIAL READINGS : Reference books
1. BOWKER and LIBERMAN, Engineering *Statistics*, Prentice-Hall. 2. GUPTA, S.C. and KAPOOR, V.K., *Fundamentals of Mathematical Statistics*, Sultan Chand and Sons. 3. SPIEGEL, MURRAY R., *Probability and Statistics*, Schaum's series. 4. SPIEGEL, MURRAY R., *Statistics*, Schaum's series. 5. TRIVEDI K.S., *Probability and Statistics with Reliability and Queuing and Computer Science Applications*, Prentice Hall of India.

COURSE OBJECTIVES

1) To learn the concepts of probability and statistics to safety engineering problems.
2) Familiar with reliability engineering theory in determining the reliability of the safety systems.
3) To predict the relationship between parameters through correlation and regression analysis.
4) Compute the reliability of the systems.
5) Solve real-world problem using probability techniques.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)

Course Outcomes (CO)	Aligned Programme Outcomes (PO)
On completion of this course students will be able to: 1. Identify an appropriate probability distribution for a given discrete or continuous random variable and use its properties to calculate probabilities. 2. Derive the probability density function of continuous random variables and use mgf techniques. 3. Test the hypothesis using t-test, F-test, Chi –square test. 4. Analyse the correlation between the variables using coefficient of correlation and regression and ANOVA. 5. Translate real-world problems into probability models and compute the reliability of the system.	1 to 5

	COURSE PLAN – PART II	
COURSE OVERVIEW		

1. Identify an appropriate probability distribution for a given discrete or continuous random variable and use its properties to calculate probabilities.
2. Derive the probability density function of continuous random variables and use mgf techniques.
3. Test the hypothesis using t-test, F-test, Chi –square test.
4. Analyse the correlation between the variables using coefficient of correlation and regression and ANOVA.
5. Translate real-world problems into probability models and compute the reliability of the system.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topics	Mode of Delivery
1.	1st, 2nd & 3rd week	Random variable – Two dimensional random variables – Standard probability distributions – Binomial, Poisson and Normal distributions - Moment generating function.	Online, Through MS Teams
2.	3rd, 4th, 5th & 6th week	Special distributions – Uniform, Geometric, Exponential, Gamma, Weibull and Beta distributions – Mean, Variance, Raw moments from moment generating functions of respective distributions.	Online, Through MS Teams
3.	6th week	**Assessment - 1**	
4.	7th, 8th & 9th week	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.	Online, Through MS Teams
5.	9th, 10th & 11th week	Curve fitting - Method of least squares - Regression and correlation – Rank correlation – Multiple and partial correlation – Analysis of variance - One way and two way classifications	Online, Through MS Teams
6.	12th Week	**Assessment - 2**	

7.	12th , 13th & 14th week	Basics concepts of reliability - Failure rate analysis – Reliability of systems – Series, Parallel – Maintenance - Preventive and corrective – Maintainability equation – Availability – Quality and Reliability.	Online, Through MS Teams
8.	After 14th Week	**Final Assessment**	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment- 1 (online written exam)	6th Week	1.5 hours	25
2.	Assessment -2 (online written exam)	12th Week	1.5 hours	25
3.	Assessment - 3&4 (Assignments1 & 2)	5th week & 11th week		20
CPA	Compensation Assessment	14th Week	1.5 hours	(25)
4.	Final Assessment* (online written exam)	After 14th Week	2 hours	30

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feedback from the students during class committee meetings and in the class after the assessments 1 and 2.
2. Online feedback through questionnaire before the final assessment.
3. Student knowledge about the topics covered in this course will be judged through marks obtained in examination.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified

MODE OF CORRESPONDENCE (email / phone etc)
Students can meet the course faculty for clarifying doubts by fixing appointment through E- mail (savitha@nitt.edu) .

COMPENSATION ASSESSMENT POLICY

a) Students who have missed (only based on genuine reasons) either Assessment-1 or Assessment- 2 or both can only register for Compensation Assessment which shall be conducted soon after the completion of the Assessment-2 and before the Final Assessment.

b) The Compensation Assessment shall be conducted for the weightage of 25% comprising the syllabus of both Assessment -1 & Assessment - 2.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- ➢ **At least 75% attendance in each 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.**

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 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.

FOR APPROVAL

Dr.P.Savitha
Course Faculty

27/09/2021
CC-Chairperson

HOD 27/09/2021