



DPG Institute of Technology and Management

Sector 34, Gurugram HR 122004

Lesson Plan

Course Name: Mathematics III (PDE, Probability & Statistics)

Faculty Name: DR. LEENA CHAWLA

No. of Lecture Hours/Week	4	Exam Hours	3
Total No. of Lecture Hours	44	Exam Marks	75
Course Code:	BSC-ME- 203G	Semester	3

COURSE OBJECTIVES:

1. To develop general analytical solutions to solve field problems in engineering involving PDEs.
2. To formulate and solve problems involving random variables.
3. To develop inferential statistics to test your hypothesis or make estimates.
4. To use statistical methods for analyzing experimental data.

S. No	Topics to be covered	Teaching Methodology	Class Activity/Event	Remark/ CO
SECTION A	Unit 1			C01
1	Definition of Partial Differential Equations	Chalk &Talk		
2	First order partial differential equations	Chalk &Talk		
3	Solutions of first order linear PDEs	Chalk &Talk		
4	Solution to homogenous partial differential equations	Chalk &Talk		
5	Solution to non-homogenous linear partial differential equations of second order by complimentary function	https://youtu.be/ZnNzXEpl14Q?si=UZ0siS1MSPdwDwX4		
6	Solution to non-homogenous linear partial differential equations of second order by particular method	Chalk &Talk		
7	Second order linear equations and their classification	Chalk &Talk		
8	Initial and boundary conditions	Chalk &Talk	Quiz/MCQ	
9	D'Alembert's solution of the wave equation	Chalk &Talk	Assignment	

SECTION B	Unit 2			C02
10	Duhamel's principle for one dimensional wave equation.	https://youtu.be/-MctxyHeFHI?si=ayh6aSJ02Dr8MwZR		
11	Heat diffusion and vibration problems	Chalk &Talk	Group Discussion	
12	Separation of variables method to simple problems in Cartesian coordinates	Chalk &Talk		
13	The Laplacian in plane, cylindrical and spherical polar coordinates	Chalk &Talk		
14	Solutions with Bessel functions and Legendre functions	Chalk &Talk		
15	One dimensional diffusion equation	Chalk &Talk	Assignment	
16	Solution by separation of variables	Chalk &Talk		
SECTION C	. Unit 3			C03
17	Probability spaces, conditional probability	Chalk &Talk		
18	Independence; Discrete random variables	Chalk &Talk		
19	Independent random variables, the multinomial distribution	Chalk &Talk		
20	Poisson approximation to the binomial distribution	Chalk &Talk		
21	Infinite sequences of Bernoulli trials, sums of independent random variables	Chalk &Talk		
22	Sums of independent random variables	Chalk &Talk	Group Discussion	
23	Expectation of Discrete Random Variables	Chalk &Talk		
24	Moments, Variance of a sum	Chalk &Talk		
25	Correlation coefficient, Chebyshev's Inequality	https://youtu.be/d5pnfVvggYk?si=OFKFOiX6W0-KDdG		
26	Continuous random variables and their properties	Chalk &Talk		
27	Distribution functions and densities	Chalk &Talk		
28	Normal, exponential and gamma densities	Chalk &Talk		
29	Bivariate distributions and their properties, distribution of sums and quotients	Chalk &Talk	Quiz/MCQ	
30	Conditional densities, Bayes' rule	Chalk &Talk		

SECTION D	Unit 4			
31	Basic Statistics, Measures of Central tendency	Chalk &Talk		
32	Moments	Chalk &Talk		
33	skewness and Kurtosis	Chalk &Talk		
34	Probability distributions: Binomial	Chalk &Talk		
35	Probability distributions: Poisson and Normal	https://youtu.be/OZ_SA8H6JXU?si=AzDv8YU5fSQfcUTg		
36	Probability distributions: Normal -evaluation of statistical parameters for these three distributions	Chalk &Talk		
37	Correlation -Rank correlation	Chalk &Talk	Assignment	
38	Regression –Curve fitting by the method of least squares	Chalk &Talk		
39	Fitting of straight lines, second degree parabolas and more general curves	Chalk &Talk		
40	Large sample test for single proportion, difference of proportions, Tests for single mean,	Chalk &Talk	Quiz/MCQ	
41	Difference of means, and difference of standard deviations	Chalk &Talk		
42	Test for ratio of variances – Chi square test for goodness of fit and independence of attributes.	Chalk &Talk		
Content Beyond Syllabus				
43	Chi square test	PPT		
44	Independence of attributes.	Chalk,Talk & NPTEL Video		

C04

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
4. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Course Outcomes:

At the end of the course, the student will be able:

CO201.1	To solve field problems in engineering involving PDEs.
CO202.2	To formulate and solve problems involving random variables.
CO202.3	To use inferential statistics to test your hypothesis or make estimates.
CO202.4	To apply statistical methods for analysing experimental data.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1	1		1	1						3	2	1	2
CO2	2	1	3	2	2		1		2	2	2	3	2	2	2
CO3	2	1	3	2	2		1		2	2	2	3	2	2	2
CO4	2	1	3	2	2		1		2	2	2	3	2	2	2

Signature of Staff In-charge

Dr. Leena Chawla

Signature of HOD

Dr. Simpi Mehta

