



Department of Applied Mathematics		LP: MA18353
B.Tech: Artificial intelligence and Data science	Regulation: 2018	Rev. No: 00
Sub. Code / Sub. Name : MA18353 Probability and Statistics for Data Science		Date:
Unit : I		24.08.2021

Unit Syllabus: Descriptive statistics and probability

Introduction – Measures of central tendency-Mean, Median, Mode – Measures of Dispersion – Range, Interquartile range, Standard deviation – Probability – Axioms of probability – Conditional probability – Bayes' theorem.

Objective: Understand the basic concepts of the probability and to apply the same for Engineering Problems

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction for unit syllabus	3-Ch.2; Pg. 11-21	Pen Tablet/ PPT
2	Measures of central tendency-Mean, Median, Mode	3-Ch.2; Pg. 27-32	Pen Tablet/ PPT
3	Problems based on Mean, Median, Mode	3-Ch.2; Pg. 27-32	Pen Tablet/ PPT
4	Measures of Dispersion – Range, Interquartile range, Standard deviation	3-Ch.2; Pg. 33-39	Pen Tablet/ PPT
5	Problems based on Range, Interquartile range, Standard deviation	3-Ch.2; Pg. 33-39	Pen Tablet/ PPT
6	Tutorial class	3-Ch.2; Pg. 41-42	Pen Tablet/ PPT
7	Probability – Axioms of probability	1 -Ch.1; Pg. 1 – 13	Pen Tablet/ PPT
8	Conditional probability	1 -Ch.1; Pg. 15 – 16	Pen Tablet/ PPT
9	Tutorial class	1 -Ch.1; Pg. 51 – 52	Pen Tablet/ PPT
10	Bayes' theorem	1 -Ch.1; Pg. 16 – 24	Pen Tablet/ PPT
11	Problems based on Bayes' theorem	1 -Ch.1; Pg. 16 – 24	Pen Tablet/ PPT
12	Tutorial class	1 -Ch.1; Pg. 52 – 53	Pen Tablet/ PPT
Content beyond syllabus covered (if any):			

* Session duration: 50 minutes



Sub. Code / Sub. Name: MA18353 Probability and Statistics for Data Science

Unit : II

Unit Syllabus : Random variables

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson and Normal distributions. Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Central limit theorem (for independent and identically distributed random variables).

Objective: Understand the fundamentals of one and two dimensional random variables and to introduce some standard distributions applicable to data science.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Discrete and continuous random variables	1 -Ch.2; Pg. 59 – 70	Pen Tablet/ PPT
14	Problems based on Discrete and continuous random variables	1 -Ch.2; Pg. 59 – 70	Pen Tablet/ PPT
15	Tutorial class	1 -Ch.2; Pg. 76 – 84	Pen Tablet/ PPT
16	Moments and Moment generating functions	1 -Ch.3; Pg. 85 – 101	Pen Tablet/ PPT
17	Problems based on Moments and Moment generating functions	1 -Ch.3; Pg. 85 – 101	Pen Tablet/ PPT
18	Binomial distribution, Poisson distribution and Problems	1 -Ch.4; Pg. 111 – 116 & Pg. 130-133	Pen Tablet/ PPT
19	Normal distributions and problems	1 -Ch.4; Pg. 144 – 147	Pen Tablet/ PPT
20	Tutorial class	1 -Ch.4; Pg. 155 – 166	Pen Tablet/ PPT
	CAT - I		
21	Joint distributions, Marginal and conditional distributions and problems	1 -Ch.5; Pg. 167 – 182	Pen Tablet/ PPT
22	Covariance, Correlation, linear regression and problems	1 -Ch.5; Pg. 184 – 187	Pen Tablet/ PPT
23	Central limit theorem and problems	1 -Ch.6; Pg. 227 – 229	Pen Tablet/ PPT
24	Tutorial class	1 -Ch.6; Pg. 227 – 229	Pen Tablet/ PPT
Content beyond syllabus covered (if any):			

* Session duration: 50 mins



Sub. Code / Sub. Name: MA18353 Probability and Statistics for Data Science

Unit : III

Unit Syllabus: Testing of hypothesis –Large samples

Sampling distributions – Population and Samples – Estimation of parameters – Statistical hypothesis – Confidence Interval – Large sample test for single mean, single proportion, difference of means and difference of proportions.

Objective: Provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Introduction to Sampling distributions, Population and Samples.	3-Ch.6; Pg. 193-209	Pen Tablet/ PPT
26	Estimation of parameters, Statistical hypothesis and Confidence Interval.	3-Ch.7; Pg. 215-230	Pen Tablet/ PPT
27	Large sample test for single mean	3-Ch.7; Pg. 236-240	Pen Tablet/ PPT
28	Large sample test for single proportion	3-Ch.9; Pg. 280-287	Pen Tablet/ PPT
29	More problems on single mean and proportion	3-Ch.9; Pg. 260-263	Pen Tablet/ PPT
30	Tutorial class	3-Ch.7; Pg. 260-263	Pen Tablet/ PPT
31	Large sample test for difference of means	3-Ch.7; Pg. 250-253	Pen Tablet/ PPT
32	Problems based on difference of means	3-Ch.7; Pg. 250-253	Pen Tablet/ PPT
33	Tutorial class	3-Ch.7; Pg. 260-263	Pen Tablet/ PPT
34	Large sample test for difference of proportions	3-Ch.9; Pg. 288-294	Pen Tablet/ PPT
35	Problems based on difference of proportions	3-Ch.9; Pg. 288-294	Pen Tablet/ PPT
36	Tutorial class	3-Ch.9; Pg. 294-297	Pen Tablet/ PPT
	CAT - II		

Content beyond syllabus covered (if any):

* Session duration: 50 mins



Sub. Code / Sub. Name: MA18353 Probability and Statistics for Data Science

Unit : IV

Unit Syllabus: **Testing of hypothesis –Small samples**

Tests based on t, F and chi-square distributions for mean, variance and proportion – Tests for independence – Goodness of fit.

Objective: Identify of appropriate test in Statistics based on the given Data and also to apply and validate

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction to Small samples.	3-Ch.6; Pg. 193-209	Pen Tablet/ PPT
38	Tests based on t for single mean	3-Ch.7; Pg. 240-241	Pen Tablet/ PPT
39	Tests based on t for difference of means	3-Ch.7; Pg. 254-260	Pen Tablet/ PPT
40	More problems on t - test	3-Ch.7; Pg. 260-262	Pen Tablet/ PPT
41	Tutorial class	3-Ch.7; Pg. 247-250	Pen Tablet/ PPT
42	F- test based on difference of variance	3-Ch.8; Pg. 275-278	Pen Tablet/ PPT
43	More problems on F- test	3-Ch.8; Pg. 278-279	Pen Tablet/ PPT
44	Tutorial class	3-Ch.8; Pg. 278-279	Pen Tablet/ PPT
45	Chi-square test for independence	3-Ch.9; Pg. 297-300	Pen Tablet/ PPT
46	Chi-square test for Goodness of fit.	3-Ch.9; Pg. 300-302	Pen Tablet/ PPT
47	More problems based on chi-square test	3-Ch.9; Pg. 302-305	Pen Tablet/ PPT
48	Tutorial class	3-Ch.9; Pg. 302-305	Pen Tablet/ PPT
Content beyond syllabus covered (if any):			

* Session duration: 50 mins



Sub. Code / Sub. Name: MA18353 Probability and Statistics for Data Science

Unit : V

Unit Syllabus: Introduction to Random process

Introduction – Classification – Stationary Processes – Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density.

Objective: Understand the concept of Random Process and Applications to Engineering Problems

Session No *	Topics to be covered	Ref	Teaching Aids
49	Introduction to Random process	1 -Ch.8; Pg. 267 - 268	Pen Tablet/ PPT
50	Classification of Random process, Stationary Processes and problems	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
51	More problems based on Stationary Processes.	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
52	Tutorial class	1 -Ch.8; Pg. 294 - 304	Pen Tablet/ PPT
53	Auto correlation functions and its properties	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
54	Problems based on Auto correlation functions and its properties	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
55	Cross correlation functions and its properties	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
56	Problems based on Cross correlation functions and its properties	1 -Ch.8; Pg. 269 - 275	Pen Tablet/ PPT
57	Tutorial class	1 -Ch.8; Pg. 294 - 304	Pen Tablet/ PPT
58	Power spectral density, Cross spectral density and its properties.	1 -Ch.8; Pg. 284 - 292	Pen Tablet/ PPT
59	Problems based on Power spectral density and Cross spectral density	1 -Ch.8; Pg. 284 - 292	Pen Tablet/ PPT
60	Tutorial class	1 -Ch.8; Pg. 294 - 304	Pen Tablet/ PPT
	CAT - III		
Content beyond syllabus covered (if any):			

* Session duration: 50 mins



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TEST BOOKS:

1. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.
2. Richard A J, Irwin Miller, John Freund, Miller and Freund's - Probability and Statistics for Engineers, Pearson Education, Asia, Eighth Edition, 2007.

REFERENCES:

3. Johnson. R.A. and Gupta. C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.
4. Walpole R E, Myres, R H, Myres SL and Ye K, Probability and Statistics for Engineers and Scientists, Pearson Education, Asia, Eighth Edition, 2007.
5. Spiegel M R, Schiller J and Srinivasan R A, Schaum Outline of Theory and Problems of Probability and Statistics, Tata McGraw Hill Edition, 2004.

	Prepared by	Approved by
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Date	24.08.2021	24.08.2021
Remarks *	The same lesson plan may be followed in the subsequent semester.	
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* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD