



Department of Applied Mathematics			LP: MA18183
M.Tech	: Bio Technology	Regulation: 2018	Rev. No: 00
Sub. Code / Sub. Name : MA18183 Mathematics for Biotechnologists			Date: 04.01.21
Unit	: I		

Unit Syllabus: First order partial differential equations - Lagrange's and Charpits method – Second order partial differential equations – simple applications to biology.

Objective: To know how to form and solve partial differential equations.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to first order partial differential equations	1 -Ch.17; Pg. 577 – 579	LCD/BB
2	Solving first order PDE using Lagrange's method	1 -Ch.17; Pg. 581 – 584	LCD/BB
3	<i>Tutorial class</i>	1 -Ch.17; Pg. 581 – 584	LCD/BB
4	Solving first order PDE using Charpits method	1 -Ch.17; Pg. 588 – 590	LCD/BB
5	More problems based on Charpits method	1 -Ch.17; Pg. 588 – 590	LCD/BB
6	Tutorial class	1 -Ch.17; Pg. 588 – 590	LCD/BB
7	Introduction to second order partial differential equations	1 -Ch.17; Pg. 590 – 592	LCD/BB
8	Solving second order PDE	1 -Ch.17; Pg. 592 – 596	LCD/BB
9	More problems based on second order PDE	Worksheet	LCD/BB
10	More problems based on second order PDE	1 -Ch.17; Pg. 592 – 596	LCD/BB
11	Simple applications to biology	1 -Ch.18; Pg. 600 – 601	LCD/BB
12	Tutorial class	1 -Ch.17; Pg. 592 – 596	LCD/BB
Content beyond syllabus covered (if any): Nil			

- **Session duration: 50 mins**



Sub. Code / Sub. Name : MA18183 Mathematics for Biotechnologists

Unit : II

Unit Syllabus: Formulation – Graphical solution – Simplex method – Big M method - Two phase method - Transportation and Assignment models.

Objective: To introduce the concepts of Linear Programming models and methods.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Introduction to Linear programming	7 -Ch.1; Pg. 1 – 10	LCD/BB
14	Graphical solution	7 -Ch.2; Pg. 12 – 18	LCD/BB
15	Problem based on Graphical method	7 -Ch.2; Pg. 12 – 18	LCD/BB
16	Simplex method and Problems.	7 -Ch.3; Pg. 76 – 83	LCD/BB
17	Tutorial class	7 -Ch.3; Pg. 76 – 83	LCD/BB
	Continuous Assessment Test-I	7 -Ch.3; Pg. 76 – 83	LCD/BB
18	Big M method	7 -Ch.3; Pg. 84 – 92	LCD/BB
19	Problem based on Big M method	7 -Ch.3; Pg. 84 – 92	LCD/BB
20	Two phase method	7 -Ch.3; Pg. 92 – 95	LCD/BB
21	Tutorial class	7 -Ch.3; Pg. 92 – 95	LCD/BB
22	Transportation and Assignment models	7 -Ch.5; Pg. 166 – 193	LCD/BB
23	Problem based on Transportation and Assignment models	7 -Ch.5; Pg. 194 – 205	LCD/BB
24	Tutorial class		

Content beyond syllabus covered (if any):

Nil

* Session duration: 50 mins



Sub. Code / Sub. Name : MA18183 Mathematics for Biotechnologists

Unit : III

Unit Syllabus: Correlation coefficient, properties-problems-Rank correlation-Regression equations problems- curve fitting by the method of least squares-fitting curves of the form $y = ax + b$, $y = ax^2 + bx + c$, $y = ab^x$ and $y = ax^b$ - Bivariate correlation application to biological problems

Objective: To introduce the concepts of Correlation coefficient, Regression equations and curve fitting.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Introduction to Correlation coefficient and its properties	3 -Ch.4; Pg. 4.17 – 4.20	LCD/BB
26	Problems based on Correlation coefficient.	3 -Ch.4; Pg. 4.22 – 4.31	LCD/BB
27	Rank correlation and Problems.	3 -Ch.4; Pg. 4.21 – 4.22 & 4.31 – 4.35	LCD/BB
28	Tutorial class	3 -Ch.4; Pg. 4.21 – 4.22 & 4.31 – 4.35	LCD/BB
29	Regression equations problems	3 -Ch.4; Pg. 4.35 – 4.48	LCD/BB
30	Problems based on that	3 -Ch.4; Pg. 4.35 – 4.48	LCD/BB
31	Tutorial class	3 -Ch.4; Pg. 4.35 – 4.48	LCD/BB
32	Curve fitting by the method of least squares-fitting curves of the form $y = ax + b$	2 -Ch.10; Pg. 10.1 – 10.10	LCD/BB
33	Fitting curves of the form $y = ax^2 + bx + c$	2 -Ch.10; Pg. 10.1 – 10.10	LCD/BB
34	Fitting curves of the form $y = ab^x$	2 -Ch.10; Pg. 10.10 – 10.14	LCD/BB
35	Fitting curves of the form $y = ax^b$ and Bivariate correlation application to biological problems	2 -Ch.10; Pg. 4.33 – 4.35	LCD/BB
36	Tutorial class	2 -Ch.10; Pg. 4.33 – 4.35	LCD/BB
	CAT - II		

Content beyond syllabus covered (if any):

Nil

- Session duration: 50 mins



Sub. Code / Sub. Name : MA18183 Mathematics for Biotechnologists

Unit : IV

Unit Syllabus: Concept of sampling-Methods of sampling-sampling distributions and Standard Error-Small samples and large samples-Test of hypothesis-Type I, Type II Errors-Critical region-Large sample tests for proportion, mean-Exact test based on normal, t , f and chi-square distribution-problems-Test of goodness of fit.

Objective: To know about sampling distributions and statistical techniques for large and small samples.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction and Concept of sampling.	3 - Ch.9; Pg.9.1 - 9.7	LCD/BB
38	Large sample test: Testing of hypothesis for difference between population mean and sample mean	3 -Ch.9; Pg.9.8 - 9.9 & 9.17 - 9.19	LCD/BB
39	Large sample test: Testing of hypothesis for difference between two sample means	3 -Ch.9; Pg.9.9 - 9.10 & 9.20 - 9.22	LCD/BB
40	Large sample test: Testing of hypothesis for difference between population proportion and sample proportion.	3 -Ch.9; Pg.9.8 - 9.12 & 9.20 - 9.14	LCD/BB
41	Large sample test: Testing of hypothesis for difference between two sample proportions.	3 -Ch.9; Pg.9.8 & 9.15 - 9.17	LCD/BB
42	Tutorial class	3 -Ch.9; Pg.9.8 & 9.15 - 9.17	LCD/BB
43	Small sample test: Student t -test(population mean and sample mean)	3 -Ch.9; Pg.9.30 - 9.33 & 9.36 - 9.39	LCD/BB
44	Small sample test: Student t -test (two sample means)	3 -Ch.9; Pg.9.33 - 9.34 & 9.39 - 9.34	LCD/BB
45	Tutorial class	3 -Ch.9; Pg.9.33 - 9.34 & 9.39 - 9.34	LCD/BB
46	Small sample test: F-test between variances	3 -Ch.9; Pg.9.34 - 9.35 & 9.43 - 9.47	LCD/BB
47	Small sample test: Chi-square distribution and Chi-square test(goodness of fit)	3 -Ch.9; Pg.9.49 - 9.66	LCD/BB
48	Tutorial class	3 -Ch.9; Pg.9.49 - 9.66	LCD/BB

Content beyond syllabus covered (if any):

Nil

* Session duration: 50 minutes



Sub. Code / Sub. Name : MA18183 Mathematics for Biotechnologists
Unit : V

Unit Syllabus: Basic principles of experimentation-Analysis of variance-one-way, Two-way classifications- Randomized block design, Latin square design-problems

Objective: To introduce some aspects of experimental design briefly and analysis of data from such experiments using analysis of variance techniques.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Introduction to the design of experiments and Basic principles of experimentation	3 -Ch.10; Pg.10.1 - 10.3	LCD/BB
50	ANOVA One way classification	3 -Ch.10; Pg.10.3 - 10.6	LCD/BB
51	ANOVA Two way classification	3 -Ch.10; Pg.10.7 - 10.9	LCD/BB
52	Completely randomized design	3 -Ch.10; Pg.10.11 - 10.16	LCD/BB
53	More problems in Completely randomized design	3 -Ch.10; Pg.10.11 - 10.16	LCD/BB
54	Tutorial class	3 -Ch.10; Pg.10.11 - 10.16	LCD/BB
55	Randomized block design	3 -Ch.10; Pg.10.16 - 10.21	LCD/BB
56	More problems in Randomized block design	3 -Ch.10; Pg.10.16 - 10.21	LCD/BB
57	Tutorial class	3 -Ch.10; Pg.10.16 - 10.21	LCD/BB
58	Latin square design	3 -Ch.10; Pg.10.9 - 10.11	LCD/BB
59	More problems in Latin square design	3 -Ch.10; Pg.10.21 - 10.25	LCD/BB
60	Tutorial class	3 -Ch.10; Pg.10.21 - 10.25	LCD/BB
Content beyond syllabus covered (if any): 2 ² – Factorial design may be included.			

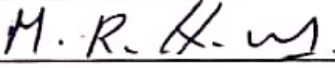
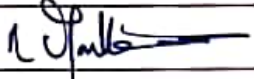
* Session duration: 50 mins



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REFERENCES:

1. Grewal, B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, 2015
2. Vittal, P.R.& V.Malini."Statistical and Numerical Methods".Margham Publications
3. Veerarajan,T. "Probability, Statistics and Random Processes".3rd ed., Tata Mc Graw-Hill, 2008.
4. Johnson, R. A."Miller & Freund's Probability and Statistics for Engineers". 6th ed.
5. PHI,2003.
6. Comprehensive Statistical Methods by P. N. Arora, Smeet Arora, S. Arora – S. Chand & Co.
7. Taha, H.A., "Operations Research, An Introduction", 9th Edition, Pearson education, New Delhi, 2016.

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Designation	Assistant Professor	Professor and Head
Date	04.01.2021	04.01.2021
Remarks *:	The same Lesson Plan may be used for MA18183 Mathematics for Biotechnologists in the subsequent semester	
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD