



BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2020-21
COURSE HANDOUT

Date: 15.01.2021

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

Course No : MATH F353
Course Title : **Statistical Inference and Applications**
Instructor-in-Charge : **Rakhee**

1. Course Description: Review of elements of probability and statistical methods, Classical Decision theory including parametric and non-parametric methods for testing of hypotheses, Analysis of Variance: One way and two way classifications, Design of experiments: Analysis of Completely randomized design, Randomized block design and Latin square design with one or more missing values, Statistical Quality control for variables and measurements.

2. Scope and Objective of the Course:

The course deals with some of the statistical techniques of decision-making. Test of hypotheses, both parametric and nonparametric methods will be discussed. Comparison of two treatments will be discussed. Comparison of several treatments using analysis of variance will be dealt with. Control charts for measurements and attributes will also be discussed.

3. Text Books:

1. Venkateswaran, S., & B. Singh, Operations Research, Notes-EDD, Vol.1 and 2, 1997

4. Reference Books:

1. Devore JL, Probability and Statistics for Engineering and the Sciences, 5th ed., Thomson, 2000.

5. Course Plan:

Module No.	Lecture Session	Reference	Learning outcomes
M.1	L1-6 Review of Elements of Probability Theory	Chapter 1	Revise the fundamentals of Probability theory
M.2	Classical decision theory (Tests of Parametric hypotheses). L 6: Classification of hypotheses, Distributional and parametric hypotheses. L 7-8: Hypothesis testing in General Terminology L9-10: Neymann Pearson's lemma, BCR (Simple vs. Simple hypotheses) L11-15: UMPCR (Simple vs composite, composite vs composite). Monotone likelihood ratio and its application. L16-18: GLRT (No derivation of GLRT need to be discussed. One example of derivation of GLRT, given in the book may be explained.) Use of various tests based on GLRT without derivation.	Chapter 2 2.1 to 2.4 2.5, 2.5.1 2.5.2-2.5.3 2.6, 2.7	To understand the classical theory for Parametric Hypothesis



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	L19: Approximate tests, paired t-test (Omit the derivations of GLRT, but the results to be applied to numerical problems) L20 Testing of hypotheses about multinomial probabilities.	2.8	
M.3	Classical Decision Theory (Non- parametric hypotheses) L17-18: Applications of the test in lect.1 (above) to distributional hypotheses and the resulting Chi-Square test of goodness of fit. L19: Kolmogorov-Smirnov one sample test L20-21: Chi-Square test for independence and homogeneity L22: Wilcoxon's test L23-24: Sign test, Signed rank-sum test	Chapter 3 3.2, 3.3 3.4 3.5, 3.6 3.7, 3.8, 3.8.2 3.9, 3.9.1, 3.9.2	To understand the non-parametric hypothesis
M.4	Analysis of Variance and Design of Experiments L25-26: Introduction and one-way classification (Fixed Effects Model) L27-30: Randomized Block Design for one-way classification, two-way classification (one observation per cell-interaction absent.) L31-32 Latin Square Design and missing values L 33-34: Test for testing the equality of variances	Chapter 4 4.1, 4.2 4.3,4.3.1-4.3.3 and 4.4 4.5 & 4.6 4.7	Students can understand ANOVA and other DoE concepts
M.5	Lecture 35-40: Statistical Quality Control	Chapter 5	Motivate to apply the concept learned in Statistical Quality Control.

6. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	30	<TEST_1>	Open Book
Quiz		15	To be announced in the class	Open Book
Assignment		10	To be announced in the class	Open book
Comprehensive Examination	3 h	45	<TEST_C>	Open book

7. Chamber Consultation Hour: will be announced in the class.

8. Notices: Notices concerning the course will be displayed on the **NALANDA only**.

9. Make-up Policy: Make-up for any component of evaluation will be given only in genuine cases of absence.

10. Note (if any): Students are strongly advised to work out all the relevant problems in the text-book and do similar problems from the reference books.

Rakhee
Instructor-in-charge
Course No. MATH F353