Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2018-2019

07-01-2018

Course Handout Part II

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 : ***V V Haragopal***

Scope and Objective of the Course:

The goal of statistical inference is to study data with the intention of inferring knowledge that goes beyond the immediate scope of the data. One usually focusses on two kinds of inferences: Estimation and testing of hypothesis. More specifically, the course deals with some of the statistical techniques of decision making. Both parametric and non-parametric methods will be discussed. Comparisons of two treatments is discussed, several treatments using analysis of variance is dealt with.

Textbooks:

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

Reference books:

1. Vijay K. Rohatgi: Statistical Inference: Dover Publications, Inc. New York, 2003.
2. Michael W. Trosset, An Introduction to Statistical Inference and Its Applications with R, CRC Press, 2009.
3. Devore JL, Probability and Statistics for Engineering and the Sciences, 11th ed., Thomson, 2010
4. Johnson, R.A.: Miller Freund's Probability and Statistics for engineers, 8th. Ed., PHI, 2005.

Course Plan:

Lecture	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-7	Probability theory makes predictions about experiments whose outcomes depend upon chance. Consequently, it lends itself beautifully to the use of computers as a mathematical tool to simulate and analyze experiments. Students will learn the theory, methods and practice of forming Judgements about the parameter of population and the reliability of statistical relationships, typically on the basis of random sampling. Students will learn the concept of likelihood ratios and the concept of Hypothesis testing, possible coming of errors, power of the test, Best Critical Regions and Uniformly Most powerful Critical regions, Generalized likelihood ratio tests.	Review of Elements of Probability Theory and Statistical Concepts.	Chapter 1
8-9		Classification of hypotheses as simple and composite, Distributional and parametric hypotheses. Examples	2.1 to 2.2
10-11		Hypothesis testing in General Terminology	2.3 to 2.4
12-13		Neymann Pearson's lemma, BCR (Simple vs. Simple hypotheses)	2.5,2.5.1
14-15		UMPCR (Simple vs composite, composite vs composite). Monotone likelihood ratio and its application.	2.5.2-2.5.3
16-17		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.	2.6
18	Students will learn to compare Parametric tests and Non parametric tests. Students learn to investigate the cause of rejection of the hypothesis in multiple comparison procedures. Identify the multiple applications where non parametric approaches are appropriate.	Approximate tests, paired t-test (Omit the derivations of GLRT but the results to be applied to numerical problems)	2.7
19		Testing of hypotheses about multinomial probabilities.	2.8
20-22		Applications of the test in lect.1 (above) to distributional hypotheses and the resulting Chi-Square test of goodness of fit.	3.2,3.3
23-24		Kolmogorov-Smirnov one sample	3.4

		test.	
25-26		Chi-Square test for independence and homogeneity	3.5,3.6
27-28		Wilcoxon's test	3.7,3.8,3.8.2
29-31		Sign test, Signed rank-sum test	3.9,3.9.1,3.9.2
32-33	Students learn the use of Analysis of Variance (ANOVA-one way, Two Way Classifications) when there are more than two independent populations means to be compared. They learn basic experimental designs (CRD, RBD, and LSD).	Introduction and one-way classification (Fixed Effects Model)	4.1,4.2
34-37		Randomized Block Design for one and classification, two-way classification (one observation per cell-interaction absent.)	4.3,4.3.1,4.3.3 and 4.4
38-40		Latin Square Design and missing values	4.5,4.6
41-42		Test for testing the equality of variances	4.7

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Max Marks	Date & Time	Nature of Component
1.	Quizzes(3)	To be announced.	12%	To be Announced	Closed Book
2.	Mid Sem	90 min	28%	16/3 11.00 -12.30 PM	Closed Book
3.	Assignment & Presentation	To be announced	20%	To be announced	Open Book
4.	Comprehensive	3 Hours	40%	13/05 AN	Closed Book

Chamber Consultation Hour: Will be announced in the class.

Notices: All notices in relation to above course will be put up in CMS.

Make-up Policy: Make up will be granted only in genuine cases. Permission must be taken in advance except in extreme cases.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE