Department of Mathematical & Physical Sciences
EAST WEST UNIVERSITY
Aftabnagar, Dhaka 1212, Bangladesh

Course Outline of Course DSA503 (Statistical Inference)
Summer 2023 Semester; Course Instructor: Zakir Hossain

Course Information

Course Code : DSA503
Course Title : Statistical Inference
Pre-requisite : NA
Credit Hours : 3

Class Time :	Section	Day	Time	Room No
	TBA	F	9:00 am –12:00 pm	C.Lab-1

Make-up Schedule : Makeup classes will be suitably arranged.

Instructor Information

Course Instructor : Zakir Hossain (Zakir)
Tel. No. : 09666775577
E-mail : drzakir.hossain@ewubd.edu
Office : MPS Department, Room # TBA

Office Hours :	Day	Time
	F	TBA

Course Objective

The principal objectives for this course are for you to learn the fundamental concepts, principles, and theories of foundations of statistical inference and to develop the ability to solve problems. Compared with your previous statistics courses, you may find that concepts have a greater emphasis here. Lectures are structured to help you understand the conceptual basis of statistical inference and examples are designed to re-enforce those concepts. The course contents are designed to give students a clear idea about:

- Background concepts of parameter and statistic, sampling distribution, central limit theorem,
- Estimator and its properties, methods of estimation,
- Constituting confidence interval,
- Forming hypothesis related to different statistical tests,
- Parametric and non-parametric tests, etc.

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Learning Outcomes

Upon the successful completion of this course, a student will be able to:

- Understand the basic ideas and methods about fundamental principles for statistical inference.
- Construct point and interval estimators
- Develop confidence interval with interpretation
- Define null and alternative hypotheses for parametric and non-parametric tests
- Construct important steps of hypothesis
- Understand statistical tables used in estimation and hypothesis testing
- Test the hypothesis for a specific problem and come to a conclusion or make a decision.

Course Contents/Descriptions

1. **Review of the concepts (Lecture 01)**
   Parameter and statistic; sampling distribution; standard normal, t, F, and chi-square statistics; table values; and the central limit theorem.

2. **Point Estimation (3 Lectures)**
   Point Estimation and Properties of Good Estimator, Maximum likelihood estimator, Methods of moments estimator, Least squares estimator.

3. **Interval Estimation (2 Lectures)**
   Concepts of interval estimation with real life examples, Pivotal quantity method, confidence interval for the mean, variance, and proportions.

4. **Introduction to test of hypothesis (3 Lectures)**
   Definitions, Type I and Type II errors, power of the test, level of significance, one tail vs two tails tests, Test of hypothesis for population mean, proportion and variance for Small and Large Samples.

5. **Nonparametric Tests (3 Lectures)**
   Assumption, Empirical distribution, goodness-of-fit test: Kolmogrov-Smirnov, Anderson-Darling test, Cramèr-Von Mises test, Shapiro-Wilk test; PP plot, QQ plot, Run test for randomness, Sign test and Signed rank test for one-sample and paired sample, Mann-Whitney U test and Wilcoxon rank sum test for independent sample, One-Way Layout: Kruskal-Wallis test for one way ANOVA and multiple comparison procedures, Two-Way Layout: The Friedman Test for two way ANOVA and multiple comparison procedures, Rank Correlation.

Course Materials

Text Book:

Hogg, R. V., & Craig, A. T. (1995). Introduction to mathematical statistics.(5th edition). *Englewood Hills, New Jersey*.

Reference Book:

Mann, P. S. (2013). Introductory statistics. (8th edition). John Wiley & Sons.

Assessment Tools

Assessment tools include **Class Tests** (**Short Quizzes), Class Performance, Presentations, and Exams**. The Class Tests are about 15-20 minutes in class and the Mid-1, Mid-2, and Final Exams are 80 minutes duration in class. Class & Exam Test dates will be announced in the Class.

Assessment/Evaluation/Grading Policy

The relative contributions of Class Tests, Exams etc. are as follows:

Test/Exam	% of Marks
Class Tests (Three)	20
Presentation/Viva	10
Class Performance	10
Mid-1	20
Mid-2	20
Final	20

The University Grading Scheme is the following

Range of Marks (%)	Grade	Range of Marks (%)	Grade	Range of Marks (%)	Grade
Below 60	F	70 – 72	C	83 – 86	B+
60 – 62	D	73 – 76	C+	87 – 89	A-
63 – 66	D+	77 – 79	B-	90 – 96	A
67 – 69	C-	80 – 82	B	97 – 100	A+

Essential Policy Information

1. There is zero tolerance for cheating at EWU. Students caught with cheat sheets in their possession, whether used or not used, &/or copying from cheat sheets, writings on the palm of hand, back of calculators, chairs or nearby walls, etc. would be treated as cheating in the exam hall. The only penalty for cheating is expulsion from EWU.
2. Regular Class attendance will be taken. The students are advised to attend classes regularly. The number of lectures shown may slightly vary.
3. Makeup exam for mid terms and final may be arranged for compelling reasons. For the makeup exam, the student must apply with supporting documents.
4. A student may be forced to drop/withdraw the course if her/his attendance falls below 80%.