Course Outline
STA201: Elements of Statistics and Probability

Semester   :   Fall 2021
Course Title   :   Elements of Statistics and Probability
Course Code   :   STA201
Course Credits   :   03

Course Instructors:

Initials	Name	Email	Designation	Section(s)
RFI	Dr Mohammad Rafiqul Islam	mrafiq@bracu.ac.bd	Associate Professor	3, 9
MZR	Mr. Md. Mahfuzur Rahman	mahfuz.rahman@bracu.ac.bd	Lecturer	12
TSM	Mr. Mirza Md. Tanjim Shorif Mugdho	mirza.mugdho@bracu.ac.bd	Lecturer	2
MIT	Mr. Mirza Md. Tausif Shorif Snigdho	mirza.tausif@bracu.ac.bd	Lecturer	4
LFA	Ms. Lubaba Ferdous Alim	lubaba.ferdous@bracu.ac.bd	VC's Fellow	6, 8, 10, 11
SYED	Mr. Shehran Syed	shehran.syed@bracu.ac.bd	VC's Fellow	5, 7, 13, 14
MQH	Ms. Mahfuza Haque Mahi	ext.mahfuza.haque@bracu.ac.bd	Adjunct Faculty	1

Course Coordinators:

Mr. Mirza Md. Tausif Shorif Snigdho (MIT)   Mr. Shehran Syed (SYED)
Lecturer   Lecturer, Vice Chancellor's Fellowship
Department of CSE   Department of MNS
School of Data and Sciences   School of Data and Sciences
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Course Curriculum:

Frequency distribution; mean, median, mode and other measures of central tendency; standard deviation and other measures of dispersion; measure of skewness; and box-whisker plot; correlation and regression analysis; elementary probability theory; conditional probability and Bayes' Theorem; random variables and joint probability distributions; discrete probability distributions: geometric, binomial and Poisson distribution; continuous probability distributions: normal and exponential distributions; statistical hypothesis testing: one-sample and two-sample z-test and t-test.

Course Learning Outcomes (CLOs):

On successful completion of this course, students should be able to:

CLO1: Distinguish between different types of data and describe data using tables and graphs.

CLO2: Summarize and analyse data using different summary measures.

CLO3: Calculate and interpret results from correlation and regression analysis.

CLO4: Demonstrate systematic understanding of the basic concepts of probability, Bayes' Theorem, and random variables.

CLO5: Compute probabilities and make inferences using discrete probability distributions and continuous probability distributions.

CLO6: Understand and apply the concepts of statistical hypothesis testing to draw conclusions from real-life scenarios.

Course Delivery and Performance Evaluation:

- There will be two lectures delivered per week, along with 3 hours of scheduled consultation.
- Students will be evaluated based on their performance on post-lectures assessments, assignments, quizzes, a viva-voce assessment, a midterm exam and a final exam.

Remote Learning Administrative Information:

- All lecture material (videos, assessments, notes, etc.) will be posted on buX on a weekly basis.
- The discussion forum on buX should be used to discuss ideas and issues related to the lecture topics.
- Section-wise consultation and communication will be conducted using platforms chosen by the section instructor. (e.g. Google Meet / Zoom / Microsoft Teams for consultation; Slack / Discord / Google Classroom for communication, etc.)
- Average scores of the best 3 (three) quizzes out of 4 (four) will be considered. There will be no make-up quizzes. All the quizzes will be administered in buX.
- There will be no makeup midterm examination, unless a student submits an application through the corresponding chair of the department before the midterm exam.
- A total of at-least 5 (five) assignments will be assigned throughout the semester. Average scores of all the assignments will be counted.
- Each assignment will be graded out of 30 raw points, of which 20 points are allocated to solving the problems, 7 points are allocated to on-time submission, and 3 points are allocated to attempting all problems, overall effort, and presentation. For submissions after the deadline, 1 mark will be deducted each day up-to a maximum of 7 marks (7 days).

Mark Distribution:

Class Participation (Post-Lecture Assessments)	10%
Assignment (Average of all)	20%
Quiz (Best 2 out of 3)	15%
Viva Voce Assessment	15%
Midterm Exam	20%
Final Exam	20%

NOTE: The mark distribution may change, if necessary, according to the circumstances of the term.

Grading Policy (Fall 2021):

Numerical Scores	Letter Grade	Grade Points
97 to ≤ 100	A+ (Exceptional)	4.0
90 to < 97	A (Excellent)	4.0
85 to < 90	A-	3.7
80 to < 85	B+	3.3
75 to < 80	B (Good)	3.0
70 to < 75	B-	2.7
65 to < 70	C+	2.3
60 to < 65	C (Average)	2.0
57 to < 60	C-	1.7
55 to < 57	D+	1.3
52 to < 55	D (Poor)	1.0
50 to < 52	D-	0.7
< 50	F (Failure)	0.0

Brac University Plagiarism Policy:

Cheating, Plagiarism, and Copying are serious academic misconducts, and the University has placed a "zero tolerance" approach to all unethical practices. Plagiarism is a serious **academic offence** *(Brac University Regulations of Students Conduct, P. 6-13)*. Students caught plagiarising may face either academic or disciplinary consequences. If found guilty of plagiarism, it may result in the following:

- A failing grade of an assignment or course
- Suspension from the university for a period of time
- Permanent expulsion from the university

Student Honour Code:

I will not cheat, use unfair means, join intentionally or unintentionally any online or offline group in which exam answers are posted or discussed, or engage in any behaviour that would commonly be deemed to be academically unethical. I will immediately notify the course teacher of any such activity or online or offline groups that I become aware of. I acknowledge that I may be suspended or expelled from Brac University if I am found to have engaged in any academically unethical behaviour.

Text References:
1. Probability and Statistics for Engineering and the Sciences - Jay Devore
2. Statistical Techniques in Business and Economics - Lind, Marchal, & Wathen
3. Introduction to Probability Models - Sheldon M. Ross

Lecture Plan:

Week	Lecture	Topics	Quiz	Asgmt.	Text: Chapter
1	1	Introduction and Basic Concepts of Statistics		1	1: 1
	2	Graphical Representation of Data			1: 1
2	3	Arithmetic Mean; Median; Mode	1	2	1: 1
	4	Geometric Mean; Harmonic Mean; Weighted Mean; Quantiles			1: 1
3	5	Variance and Standard Deviation			1: 1
	6	Empirical Rule of Standard Deviation; Shape Characteristics of Distributions			1: 1
4	7	Correlation Analysis	2	3	1: 12; 2: 13
	8	Rank-Order Correlation			2: 16
5	9	Simple Linear Regression Analysis			1: 12, 2: 13
	10	Introduction to Multiple and Logistics Regression			2: 14
6	11	Set Theory and Basic Probability	3	4	1: 2
	12	Bayes' Theorem			1: 2
7		**MIDTERM EXAMINATION**			
8	13	Introduction to Random Variables and Mathematical Expectation	3	5	1: 3, 4
	14	Joint Probability and Conditioning on Random Variables			1: 5
9	15	Binomial and Geometric Distribution	4		1: 3
	16	Poisson Distribution			1: 3
10	17	Normal Distribution			1: 4
	18	Exponential Distribution			1: 4
11	19	Introduction to Statistical Hypothesis Testing		6	1: 8
	20	Terminologies of Hypothesis Testing			1: 8
12	21	One-Sample z-Test for a Population Mean			1: 8
	22	One-Sample t-Test for a Population Mean			1: 8
13	23	Two-Sample z-Test for Population Means			1: 9
	24	Two-Sample t-Test for Population Means			1: 9
		FINAL EXAMINATION			

NOTE: There may be changes in the plan, if necessary, according to the circumstances of the term.