SHORT SYLLABUS

BMAT202L Probability and Statistics

3 Credits (3-0-0)

Prerequisites: Calculus Introduction to statistics and data analysis; Measures of central tendency; Measures of variability; Random variables, Probability mass Function, Distribution and density functions, Joint Probability distribution and Joint Density functions; Mathematical expectation, and its properties; Covariance; Moment generating function; Characteristic function. Correlation and Regression; Rank Correlation; Partial and Multiple correlation; Some standard discrete and continuous distributions; Testing of hypothesis; Large sample tests - Z test; Small sample tests- Student's t-test, F-test; Chi-square test; Design of Experiments; Analysis of variance; CRD-RBD- LSD; Hazard function; Reliabilities of series and parallel systems; System Reliability; Maintainability; Preventive and repair maintenance; Availability.

BMAT202L	Probability and Statistics	L	T	P	C
		3	0	0	3
Pre-requisite	**BMAT101L, BMAT101P**	Syllabus version			
		1.0			

Course Objectives :

1. To provide students with a framework that will help them choose the appropriate descriptive methods in various data analysis situations.
2. To analyze distributions and relationship of real-time data.
3. To apply estimation and testing methods to make inference and modelling techniques for decision making.

Course Outcome :

At the end of the course the student should be able to:

1. Compute and interpret descriptive statistics using numerical and graphical techniques.
2. Understand the basic concepts of random variables and find an appropriate distribution for analyzing data specific to an experiment.
3. Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data.
4. Make appropriate decisions using statistical inference that is the central to experimental research.
5. Use statistical methodology and tools in reliability engineering problems.

Module:1	Introduction to Statistics	6 hours

Statistics and data analysis; Measures of central tendency; Measure of Dispersion, Moments-Skewness-Kurtosis (Concepts only).

Module:2	Random variables	8 hours

Random variables- Probability mass function, distribution and density functions-Joint probability distribution and Joint density functions; Marginal, Conditional distribution and Density functions- Mathematical expectation and its properties- Covariance, Moment generating function.

Module:3	Correlation and Regression	4 hours

Correlation and Regression – Rank Correlation; Partial and Multiple correlation; Multiple regression.

Module:4	Probability Distributions	7 hours

Binomial distribution; Poisson distributions; Normal distribution; Gamma distribution; Exponential distribution; Weibull distribution.

Module:5	Hypothesis Testing-I	4 hours

Testing of hypothesis –Types of errors - Critical region, Procedure for testing of hypothesis-Large sample tests- Z test for Single Proportion- Difference of Proportion- Mean and difference of means.

Module:6	Hypothesis Testing-II	9 hours

Small sample tests- Student's t-test, F-test- chi-square test- goodness of fit - independence of attributes- Design of Experiments - Analysis of variance – One way-Two way-Three way classifications - CRD-RBD- LSD.

Module:7	Reliability	5 hours

Basic concepts- Hazard function-Reliabilities of series and parallel systems- System

Reliability - Maintainability-Preventive and repair maintenance- Availability.		
Module:8	**Contemporary Issues**	**2 hours**
	Total lecture hours:	**45 hours**

Text Book:

1. R. E. Walpole, R. H. Myers, S. L. Mayers, K. Ye, Probability and Statistics for engineers and scientists, 2012, 9th Edition, Pearson Education.

Reference Books

1. Douglas C. Montgomery, George C. Runger, Applied Statistics and Probability for Engineers, 2016, 6th Edition, John Wiley & Sons.
2. E. Balagurusamy, Reliability Engineering, 2017, Tata McGraw Hill, Tenth reprint.
3. J. L. Devore, Probability and Statistics, 2012, 8th Edition, Brooks/Cole, Cengage Learning.
4. R. A. Johnson, Miller Freund's, Probability and Statistics for Engineers, 2011, 8th edition, Prentice Hall India.
5. Bilal M. Ayyub, Richard H. McCuen, Probability, Statistics and Reliability for Engineers and Scientists, 2011, 3rd edition, CRC press.

Mode of Evaluation: Digital Assignments, Continuous Assessment Tests, Quiz, Final Assessment Test.

Recommended by Board of Studies	24-06-2021		
Approved by Academic Council	No. 64	Date	16-12-2021