EXTENDED LECTURE OUTLINE

AST6 311 **Statistical Methods** **(2+1)**

THEORY CLASSES

SL. No.	Course Content
1.	**Introduction to Statistics:** Meaning and definition of Statistics; applications of Statistics with special reference to Food Science.
2.	**Data:** Meaning and definition of data; raw data; primary and secondary data; sources of primary and secondary data; qualitative and quantitative data; discrete and continuous variables.
3.	**Frequency Distribution:** Meaning and definition of frequency distribution; types of frequency distributions – discrete frequency distribution and continuous frequency distribution; methods of forming continuous frequency distributions – inclusive method, exclusive method, and open-end class intervals.
4.	**Diagrammatic Representation of Data:** Meaning and advantages of diagrammatic representation; types of diagrams – bar diagrams and pie diagrams.
5.	**Graphical Representation of Data:** Meaning of graphical representation; types of graphs – histogram, frequency polygon, frequency curve, and cumulative frequency curve (ogive); difference between diagrams and graphs.
6.	**Measures of Central Tendency:** Meaning and definition; characteristics of a good average; Arithmetic Mean – concept, merits, demerits, uses, simple numerical problems for grouped and ungrouped data, weighted arithmetic mean, combined mean, and mathematical properties of arithmetic mean; Median and Mode – concepts, merits, demerits, uses, and simple numerical problems for grouped and ungrouped data; Geometric Mean and Harmonic Mean – concepts, merits, demerits, and uses for ungrouped data only; quartiles, deciles, and percentiles for ungrouped data.
7.	**Measures of Dispersion:** Meaning and definition; range, quartile deviation, mean deviation, variance, standard deviation, and coefficient of variation for grouped and ungrouped data.
8.	**Skewness and Kurtosis:** Meaning and definition of skewness and kurtosis; types of skewness and kurtosis; moments; measures of skewness and kurtosis.
9.	**Probability:** Meaning and definition of probability; basic concepts and terminology – random experiment, sample space, and events; addition and multiplication theorems of probability (without proof).
10.	**Probability Distributions:** Meaning and basic concepts of probability distributions; Binomial, Poisson, and Normal distributions – meaning, parameters, characteristics, and uses; Standard Normal Distribution – concept and basic properties.
11.	**Correlation:** Meaning and definition of correlation; types and properties of correlation; methods of studying correlation – scatter diagram, Karl Pearson's coefficient of correlation, and rank correlation coefficient.

12.	**Regression:** Meaning and definition of regression; dependent and independent variables; simple linear regression of Y on X and X on Y; properties of regression; difference between correlation and regression.
13.	**Introduction to Sampling Methods:** Meaning and basic concepts of population, sample, parameter, and statistic; sampling versus complete enumeration (census method); advantages and limitations of sampling; introduction to sampling methods.
14.	**Simple Random Sampling:** Meaning and basic principles of simple random sampling; Simple Random Sampling With Replacement (SRSWR) and Simple Random Sampling Without Replacement (SRSWOR); selection of a simple random sample using random number tables.
15.	**Tests of Significance:** Introduction; basic concepts of statistical hypotheses; null hypothesis and alternative hypothesis; level of significance; Type I and Type II errors; degrees of freedom; critical region and acceptance region; one-tailed and two-tailed tests; general steps involved in testing a hypothesis.
16.	**Z-Test, Student's t-Test, Chi-Square Test, and F-Test:** Z-test for one-sample and two-sample problems; Student's t-test – meaning, assumptions, and applications; one-sample t-test for testing a population mean; two-sample t-test for testing the difference between two population means; Chi-Square Test of Independence of Attributes in a 2 × 2 contingency table; F-test for testing the equality (homogeneity) of two population variances.
17.	**Analysis of Variance (ANOVA):** Introduction, meaning, and basic concepts of ANOVA; one-way and two-way classification; assumptions of ANOVA.

PRACTICAL CLASSES

Sl. No	Practical Topics
1.	Construction of Discrete and Continuous Frequency Distribution Tables.
2.	Graphical Representation of Data: Construction of Histogram and Ogive (Cumulative Frequency Curve)**.**
3.	Computation of Arithmetic Mean, Median and Mode for Ungrouped and Grouped Data.
4.	Computation of Geometric Mean (GM), Harmonic Mean (HM), Quartiles, Deciles and Percentiles for Ungrouped Data.
5.	Computation of Range, Mean Deviation, Variance and Standard Deviation, and the relative measure of dispersion—Coefficient of Variation (CV).
6.	Computation of Measures of Skewness and Kurtosis for Ungrouped Data.
7.	Simple problems on Probability, including the Addition and Multiplication Theorems of Probability.
8.	Simple problems on Binomial, Poisson and Normal Distributions.
9.	Computation and interpretation of Karl Pearson's Correlation Coefficient, Spearman's Rank Correlation Coefficient and Simple Linear Regression.
10.	Selection of a Random Sample using Simple Random Sampling.
11.	Application of One-Sample Z- and t-Tests and Two-Sample Z- and t-Tests.
12.	Chi-Square Test of Independence of Attributes using a 2 × 2 Contingency Table.
13.	Analysis of Variance (ANOVA) for One-Way and Two-Way Classifications.

References Books:

1. A Textbook of Agricultural Statistics: R. Rangaswamy
2. Fundamentals of Statistics: S. C. Gupta
3. Agriculture and Applied Statistics – I: P. K. Sahu
4. Agriculture and Applied Statistics – II: P.K. Sahu