

Five Years Integrated M.Sc. (I.T.) (Semester 3)
Teaching Schedule

060010306: Computer Oriented Numerical and Statistical Methods

Objectives: To demonstrate understanding of numerical and statistical methods in support of the analysis, design and application for problem solving in the field of information technology.

Course Outcome:

Upon completion of the course students shall be able to:

- C01. Recognize the error in the number generated by the solution.
- C02. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Raphson method.
- C03. Apply method of interpolation and extrapolation for prediction.
- C04. Recognize elements and variable in statistics and summarize qualitative and quantitative data.
- C05. Calculate mean, median and mode for individual series.
- C06. Outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

Unit	Sub Unit	No. of Lecture (s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Evaluation Parameter
Unit 1: Introduction and solution of algebraic and Transcendental Equation						
	1.1	2	Number and their accuracy,Computer Arithmetic	NMBG#1-PageNo.1 -2	Chalk & Talk	
	1.2	2	Mathematical preliminaries, ErrorsAnd their Computation	SS # 1–Page No. 5 – 11		
	1.3	2	Bisection Method	SS # 2–Page No. 20 - 33		
	1.4	2	Newton-Raphson Method	SS # 2–Page No. 33 - 36		
	1.5	1	Rate of convergence of Iterative Methods(without proof)	MM#3-Page No. 3.16 – 3.18		Quiz-1
Unit 2: Interpolation						
	2.1	3	Finite differences, Differences tables	SS# 3-Page No. 65 - 67	Chalk & Talk	
	2.2	3	Newton’s forward and backward formulas	SS # 3–Page No. 73 – 78		
	2.3	2	Interpolation with unequal intervals: Lagranges’s Interpolation	SS # 3–Page No. 91 - 95		
Unit 3: Least Squares approximation						
	3.1	2	Linear Least squares approximation: Straight line equation	SS # 4–Page No. 137- 140	Chalk &Talk	
	3.2	3	Nonlinear Least Squares approximation: Higher order polynomial approximation	SS # 4–Page No. 140 – 142		
	3.3	2	Approximation by Exponential functions	SS # 4–Page No. 142 – 143		Unit Test - 1
	3.4	1	Approximation by Power function	NMBG # 5-Page No. 123- 125		

Unit 4: Introduction to Statistics					
	4.1	1	Define of Statistics	BS # 1 -Page No. 1 -5	Chalk & Talk
	4.2	1	Elements, variables and Observations, Scales of measurement	UBS # 1 - Page No. 5 - 9	
	4.3	1	Qualitative and Quantitative data, Cross-sectional and Time series data	BS # 1 – Page No. 5 – 6 UBS # 2–Page No. 57 -58	
	4.4	3	Summarizing Qualitative data: Frequency, Relative frequency and Percent frequency distributions, Bar graph and Pie chart	BS # 2–Page No. 13 -20 UBS # 2–Page No. 18 - 22	
	4.5	2	Summarizing Quantitative data: Frequency, Relative frequency and Percent frequency distributions, Dot plot, Histogram, Cumulative distributions, Ogive	BLA # 2–Page No. 23- 30	
Unit 5: Measure of central tendency and Measure of Dispersion					
	5.1	1	Type of Measure of central Tendency	BS # 3–Page No. 28 -29	Chalk & Talk
	5.2	2	Arithmetic mean for individual series, Discrete frequency distribution and Continuous frequency.(Direct method and assumed mean method)	BS # 3–Page No. 29 -38	
	5.3	1	Median for Individual series, Discrete frequency distribution and Continuous frequency distribution	BS # 3–Page No. 78	
	5.4	1	Mode for Individual series, Discrete frequency distribution and Continuous frequency distribution	BS # 3–Page No. 89 -93	
	5.5	1	Quartiles and Percentiles	BS # 3 – Page No. 79-83	
	5.6	2	Type of measure of Dispersion: Range, Inter-quartile Range, Mean Deviation, Standard Deviation and Variance	BS # 4–Page No. 104 -128	
Unit 6: Correlation Analysis					
	6.1	1	Types of correlation	BS # 5–Page No. 141 -142	Chalk & Talk
	6.2	2	Properties of correlation	BS # 5–Page No. 143 -145	
	6.3	4	Karl-Pearson’s coefficient of correlation	BS # 5–Page No. 146 -153	
Text Book:					
1. Introductory methods of Numerical Analysis, S.S.Sastry, PHI publication.[SS]					
2. Business Statistics, Nazneen khan Sarguroh, Himalaya publishing House.[BS]					
Reference Book:					
3. Understanding Basic Statistics, Brase/Brase, Cengage Learning.[UBS]					
4. Basic Statistics, B.L. Agarwal, New Age International Publishers.[BLA]					
5. Numerical Methods in Engg. And Sciences, B.S.Grewal, Khanna Publication, New Delhi.[NMBG]					
6. Computer Oriented Numerical Methods, V. Rajaraman, third edition, PHI Pvt. Ltd., New Delhi.[CNM]					
7. Mathematical Methods, Iyengar& Jain, Narosa.[MM]					
Note :# denotes chapter number.					
@ denotes Appendix Alphabets					

Course Objectives and Course Outcomes Mapping:

- To provide knowledge and understanding of numerical, statistical methods : C01, C04
- To learn application of numerical and statistical method in the field of computer science : C02, C03, C04, C05, C06

Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcome					
		C01	C02	C03	C04	C05	C06
1	Introduction and solution of algebraic and Transcendental Equation	✓	✓				
2	Interpolation			✓			
3	Least Squares approximation			✓			
4	Introduction to statistics				✓		
5	Measure of Central tendency and Measure of Dispersion					✓	
6	Correlation Analysis						✓

Course Outcomes and Programme Outcomes Mapping:

Course Outcome	Programme Outcome					
	P01	P02	P03	P04	P05	P06
C01	✓					✓
C02	✓					✓
C03	✓			✓		✓
C04	✓					✓
C05	✓			✓		✓
C06	✓			✓		✓

Hands-on experience activity:

- Students shall be implementing numerical and statistical methods by using C, C++ or Java on their personal laptops.

Modes of transaction (i.e. Delivery)

- Lecture Method alongwith discussion shall be used.
- Assignment shall be given to student for their practices.

Activities/Practicum:
The following activities shall be carried out by the students.

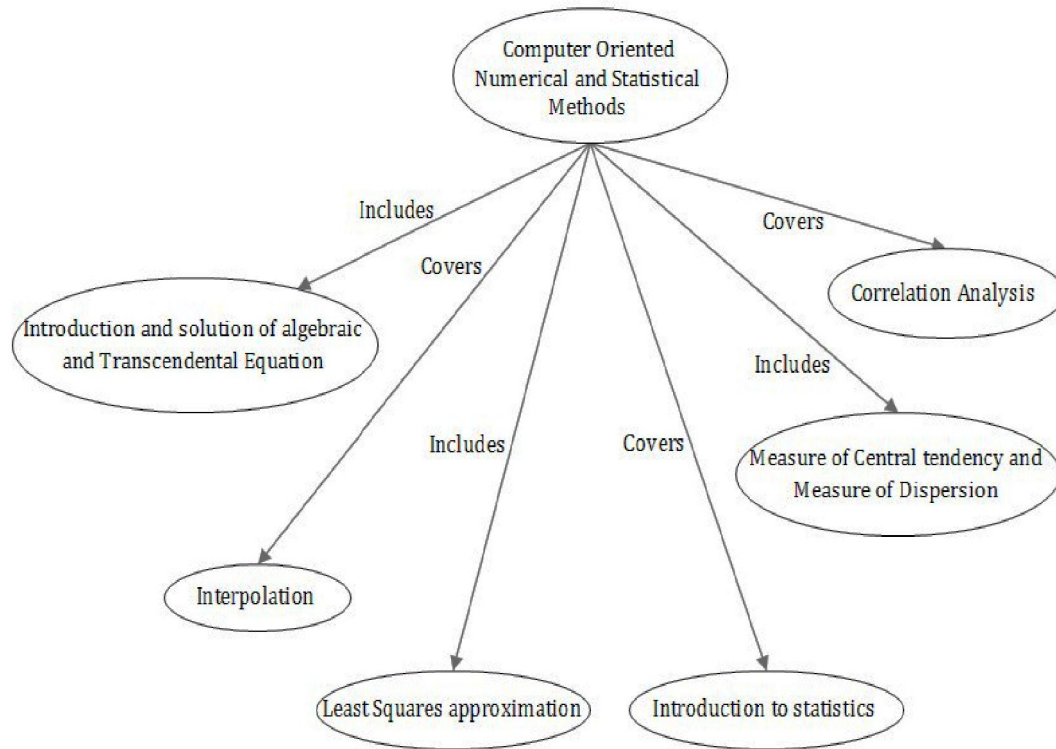
- To identify the applications of interpolation in computer graphics.
- To identify the use of correlation in forecasting techniques.
- To identify the merits and demerits of measure of central tendency and measure of dispersion.

The following activities shall be carried out by the teacher.

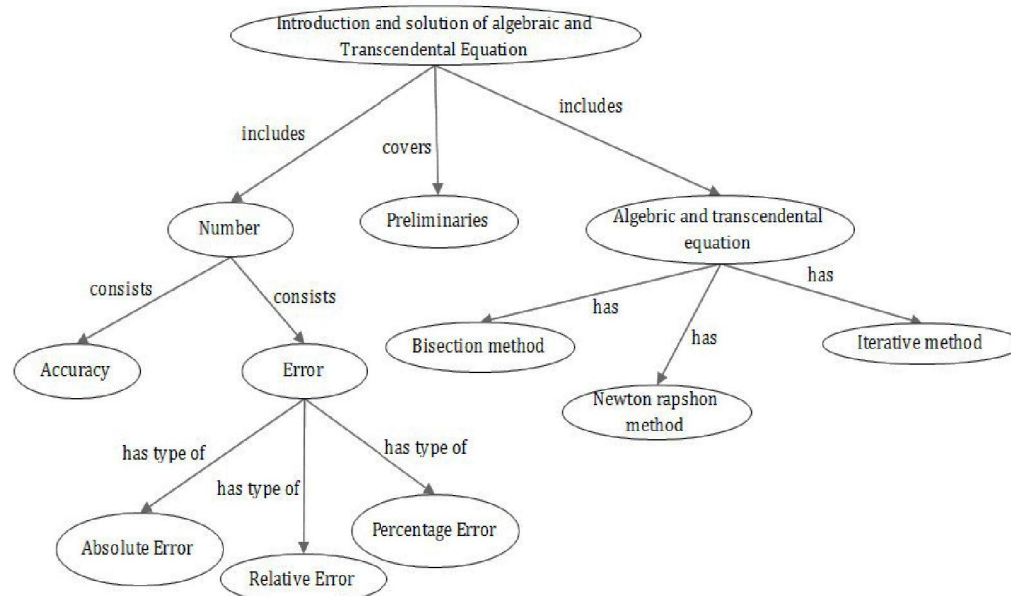
- To introduce the important of numerical methods in C programming languages.
- To introduce Applications of statistical methods in Data analysis and Data mining.

Concept Map

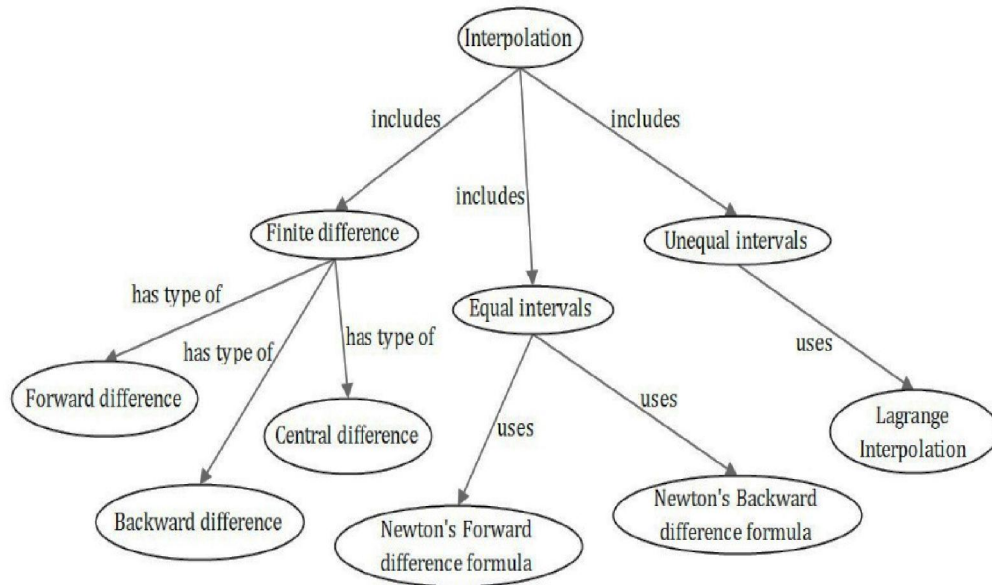
Computer Oriented Numerical and Statistical Methods



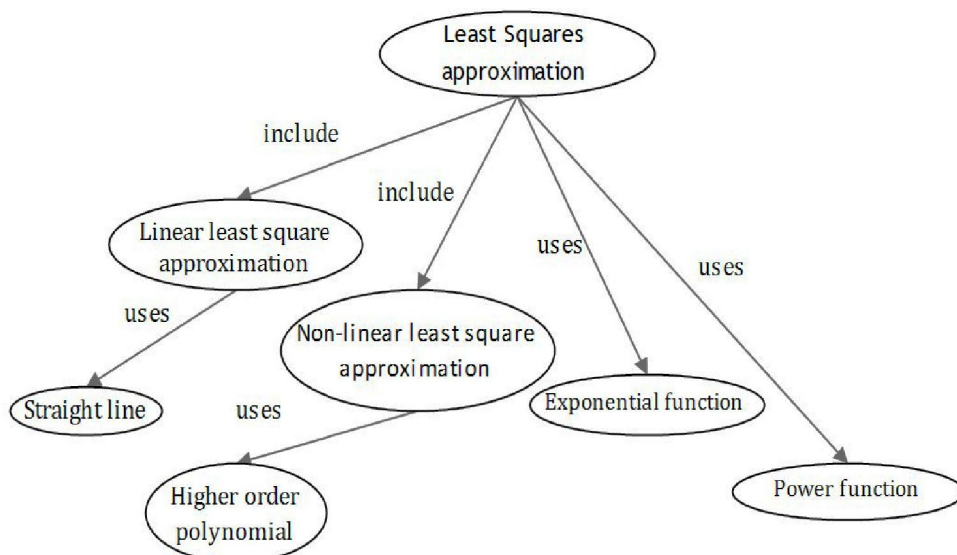
Unit-1: Introduction and solution of algebraic and Transcendental Equation



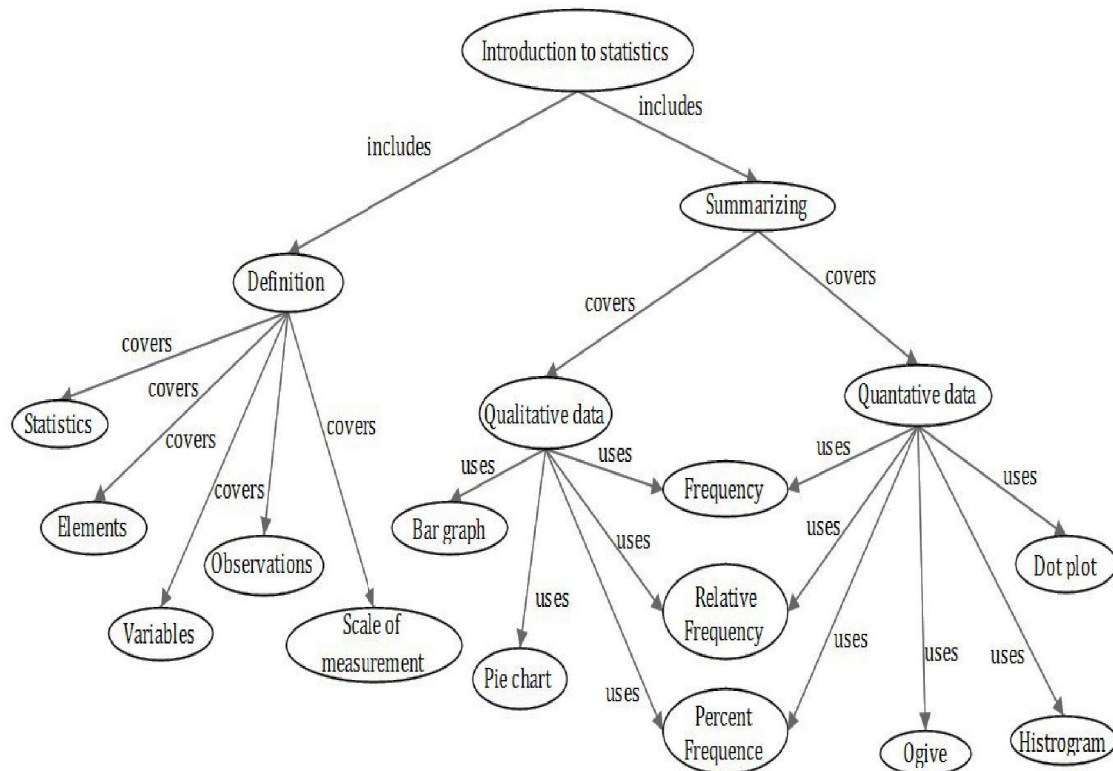
Unit-2: Interpolation



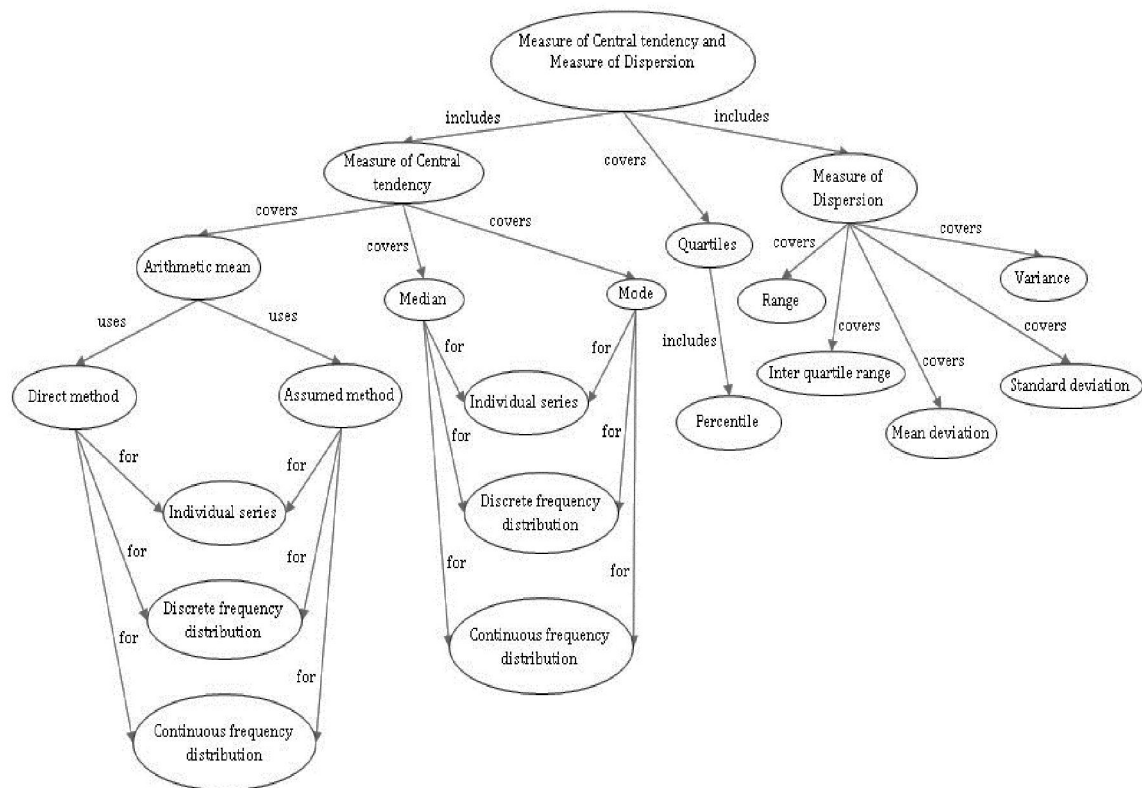
Unit-3: Least Squares approximation



Unit-4: Introduction to statistics



Unit-5: Measure of Central tendency and Measure of Dispersion



Unit-6: Correlation Analysis

