Unit-V Undecidability: Recursively enumerable and recursive languages, undecidable problems about Turing machines: halting problem, Post Correspondence Problem, and undecidability problems about CFGs.

Readings:

1. J. E. Hopcroft, R. Motwani, and J. D. Ullman, **Introduction to Automata Theory, languages, and computation**, 2016.

2. H.R. Lewis, C.H. Papadimitriou, C. Papadimitriou, **Elements of the Theory of Computation** (2nd ed.), Pearson Education, 2015

3. P. Linz, **Introduction to Automata Theory, Languages, and Computation**, Jones & Bartlett, 2016.

MCAE 204 Statistical Methods

Course Objectives: To equip students with the skills necessary to apply statistical methods for various applications.

Course Learning Outcomes:

On completing this course, the student will be able to:

CO1: apply descriptive statistical techniques to summarize and interpret data
CO2: apply inferential statistical methods, including hypothesis testing and confidence interval estimation.
CO3: perform and interpret simple and multiple linear regression analysis
CO4: apply principles of experimental design in the context of a problem

Syllabus:

Unit-1 Introduction: Descriptive statistics: measures of central tendency and variability, representation of data: stem and leaf diagram, histogram, boxplot, and ogive; bar diagram and its variations, Pie charts; probability distributions: discrete and continuous, joint and conditional probability; theory of attributes: coefficient of association and coefficient of colligation.

Unit-II: Statistical Inference: Parameter and statistic; sampling distributions, confidence intervals and margin of error, hypothesis testing; non-parametric inference: non-parametric tests: Mann-Whitney U test, Kruskal-Wallis test, Spearman's rank correlation coefficient.

Unit-III Regression and Classification: Correlation: measure and significance, simple linear regression, multiple linear regression, one-way classification, analysis of variance, two-way classification, analysis of covariance, curvilinear regression, factorial experiments.

Readings:

1. Robert S. Witte and John S. Witte, **Statistics**, John Wiley & Sons Inc; 11th edition, 2021
2. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, **An Introduction to Statistical Learning**, Springer, 2023.
3. G. W. Snedecor, W. G. Cochran, **Statistical Methods**, Iowa State University Press, 1973
4. John A. Rice, **Mathematical Statistics and Data Analysis**, Cengage, 2013