Department of Mathematics

College of Science

University of Salahaddin- Erbil

Subject: Statistical Modeling with Application

Course Book: Master’s degree Mathematics

Lecturer's name: Swar Omer Ahmed

Academic Year: Second semester-2024

Course Book

1. Course name	**Statistical Modeling with Application**
2. Lecturer in charge	**Swar Omer Ahmed**
3. Department/ College	**College of Science- Department of Mathematics**
4. Contact	**e-mail :swar.ahmed@su.edu.krd** **Tel: (optional)**
5. Time (in hours) per week	**Theory: 3 Tutorial:0**
6. Office hours	
7. Course code	
8. Teacher's academic profile	Swar Omer Ahmed, PhD in Applied Statistics, Mathematics Department- College of Science- Salahaddin University-Erbil. Qualification PhD In Applied Statistics (2020) Salahaddin University-Erbil. M.Sc. In Statistics (2007), Mustansiriyah University – Baghdad. B.Sc. in Mathematics (1999), Salahaddin University-Erbil. Scientific Title: 2007-2015: Assistant Lecturer, 2015-2023: Lecturer, 2023- Present: Assistant Professor
9. Keywords	Correlation Analysis, Regression Analysis, Stochastic processes ... etc.

10. **Course overview:**

This course introduces students to advanced statistical methods commonly used in data analysis and modeling. Topics covered include correlation analysis, regression analysis, stochastic processes, Markov chains, and Poisson processes. Emphasis is placed on both theoretical understanding and practical application through exercises and examples

11. Course objective:

Understand and apply correlation analysis techniques to assess relationships between variables. Develop proficiency in regression analysis for predictive modelling and hypothesis testing. Gain insight into stochastic processes and their applications in various fields. Analyse and model Markov chains to study probabilistic systems. Understand the concept of Poisson processes and their significance in counting phenomena.

12. Course Reading List and References:

1. Archdeacon, T. J. (1994). Correlation and regression analysis: a historian's guide. Univ of Wisconsin Press.
2. Jones, P. W., & Smith, P. (2017). Stochastic processes: an introduction. CRC Press.

17. The Topics:	**Lecturer's name**

1 Correlation Analysis 1.1 Definition 1.2 Assumption of Correlation 1.3 Bivariate Correlation 1.4 Partial Correlation 1.5 Correlation Coefficients: Pearson, Kendall, Spearman **2 Regression Analysis** 2.1 Definition 2.2 Objectives of Regression Analysis 2.3 Assumption of Regression Analysis 2.4 Simple Regression Model 2.5 Multiple Regressions Model **3 Stochastic processes** 3.1 Review of Probability 3.2 Definition of Stochastic Process 3.3 Characterization of Stochastic Processes 3.4 Classification of Stochastic Processes **4 Markov Chains** 4.1 Discrete – Time Markov Chains 4.2 Higher Transition probability matrix and Probability Distributions 4.3 Stationary Distribution and Regular Markov Chain 4.4 Classification of States **5 Poisson Processes** 5.1 Counting Process 5.2 Poisson Process	**14 Weeks**	**Swar Omer Ahmed**
18. Practical Topics (If there is any)		