

Ministry of Higher Education and Scientific research



***Department of Mathematics***

***College of Science***

***University of Salahaddin-Erbil***

**Course Book**

***Applied Statistics using SPSS***

***Final Year Mathematics***

***Academic Year 2024***

***Instructors***

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**Course Description:** This course, which is proposed for final year mathematics students at undergraduate level, is designed to teach basic data analysis methods and to demonstrate applying data analysis techniques through SPSS. The course will demonstrate how to decide on appropriate methods for summarizing and analyzing empirical data and presenting statistical results. The course will also highlight basic features of SPSS such as data manipulation (loading and creating data files, how to manage, manipulate and expand on existing data files), performing statistical analyses and working on the output (interfacing to other software). The course is divided into theoretical and practical units. The course will alternate between lectures and practical lab sessions where students will be encouraged to apply the material while learning to program in the most sophisticated statistical software package SPSS.

The first part of this course focuses on two main topics; first students are oriented to an introduction to SPSS program and how to examine data sets, which will be taught parallel to applied statistics and statistical inference; second will revise the quantitative techniques to summarize and present different types of data with applications. The second part focuses on statistical methods and shows how to perform a number of statistical tests using SPSS to solve real life problems. Topics addressed will include statistical tests, correlation, simple linear regression and multiple regression, analysis of variance for comparing means using ANOVA, categorical data analysis, using SPSS.

**General Course Objectives:** The main objective is to help undergraduate students gain a thorough understanding of applied statistics and learn how to explore and handle data in a systematic manner using the most popular professional social statistics program (SPSS) in the market today “Statistical Package for the Social Sciences (SPSS) with practical applications for statistical methods. Another objective for the course is to give the student good understanding of the role of statistical analysis and its methodology in solving problems and help in applying theoretical concepts they have learned to solve real-world problems through analyzing data, interpreting the results and communicating findings.

**Teaching Methods:** For this course, different forms of teaching methods such as the lecture method, discussion method, and demonstration-performance method, in addition to practical part using SPSS, are covered. Power point presentations are used for the head titles, definitions and summary of conclusions, classification of materials and explanation of SPSS software. Moreover, students will be asked to prepare an individual, or in group, research study on selective topics then asked to give a seminar that will be submitted as a written article; this will be evaluated then considered as a written exam for final evaluation. There will be classroom tutorials and assignments with practical examples that use statistical methods to evaluate and analyze data to solve real life problems. To get the best of the course, it is suggested that students attend classes and computer labs for practical exercises as much as possible and solve given assignments.

**Learning outcomes:** By the end of the course students will acquire good understanding of applied statistics and survey research in addition to basic data analysis; learn how to conduct statistical analysis using SPSS; gain skills of describing and interpreting statistical data; apply statistical inferences to address research questions; evaluate the role of statistical methods in solving real life problems. As a result, the student will possess a basic understanding of descriptive and inferential statistics, and their practical use in making decisions in business and industry. Emphasis will be placed on application versus theory, with examples and case studies drawn from actual data obtained from public institutions and companies across Kurdistan Region of Iraq or data from other resources.

**Method of Evaluation:** Could include any of the following: exams, problem solving exams, essays, research papers, oral presentations, group projects, quizzes, homework.

**Grading Policy:** There will be two examinations and a comprehensive final examination. Announced and unannounced quizzes may be given. Various home works may be used in grading.

Consideration will be given to such qualities as attendance, class participation, attentiveness, attitude in class, and cooperation to produce the maximum learning situation for everyone.

**Written Exams:** Exams with 25% of total marks. Programming assignments with SPSS: weekly assignment program, total 15%. Additional marks will be given to extra optional seminars and reports on the related topics and data analysis. Final exam (40% theory and 20% practical).

### **Course Outline:**

#### **Theoretical Part: (Applied Statistics)**

**Week 1&2:** A brief review to statistics and statistical methods, the assumption of normality and statistical tests, statistical estimation.

**Week 3 & 4:** Research process and data collection, measurement error, and variability and reliability

**Week 5 & 6:** Correlation, covariance and the correlation coefficients, examples and applications

**Week 7&8 :** Regression; simple regression; methods of regression and the Method of Least Square , examples

**Week 9 & 10 :** Categorical Data Analysis (CDA), Examples

**Week 11&12 :** Testing Hypothesis

**Weeks 13&14 :** Parametric and Non-Parametric and Examples

#### **Practical part: (Introduction to SPSS & Applications)**

- Getting started
- The data editor, the data view and the variable view
- Storing and retrieving data files
- Description of data
- Transformation
- Methods of analysis, applications using statistical methods (from theoretical part)
- Practical examples (statistical methods using SPSS)
- Exploring assumptions
- Practical examples

#### **References:**

Collier, J. (2009), *Using SPSS Syntax: A Beginner's Guide*, London, SAGE

Davis, C. (2002), *Statistical Methods for the Analysis of repeated measurements*, USA, Springer-Verlang.

Field, A. (2000), *Discovering statistics Using SPSS for Windows: Advance technique for the beginners*, London, SAGE publication Ltd.

Hogg, R. and Craig, A. (1970), *Introduction to Mathematical Statistics*, Third Edition, London, The Macmillan Company.

Landau, S. And Exeritt, B. (2004), *A Handbook of Statistical Analyses Using SPSS*, London, Chapman & Hall/CRC Press LLC. (**Text Book**)

RAO, C. (2009), *Linear Statistical Inference and its Application*, London, John Wiley & Sons.

SPSS Tutorials <http://www.spsstools.net/spss.htm>.

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**Note:** For this course, other references such as books or internet links, on applied statistics using SPSS could be useful.