

University of Mosul



First Cycle – Bachelor's Degree (B.Sc.) – Statistics and Informatics



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1. Overview

This catalogue presents the modules offered within the Bachelor of Science (B.Sc.) in Statistics and Informatics. The programme comprises 50 modules, with a total student workload of 6,000 hours and 240 ECTS credits, and is delivered in accordance with the Bologna Process.

2. Undergraduate Modules 2025–2026

Module 1

Code	Course/Module Title	ECTS	Semester
STAT101	Elementary Statistics I	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	93	82
Description			
The module introduces students to the fundamentals of statistics and its fields of application, methods of data collection, and the classification and presentation of data in order to obtain the information necessary for appropriate decision-making and to enable the use of such data for prediction. In addition, the module develops students' skills in research-design methodology and aims to enable them to interpret results and translate them into practical applications.			

Module 2

Code	Course/Module Title	ECTS	Semester
STAT102	Calculus I	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	93	82
Description			
Part A – Preliminary Principles: Understanding the concept of limits; evaluating limits algebraically and graphically; one-sided and infinite limits; defining continuity and its properties; identifying points and types of discontinuity (18 hours). Part B – Derivatives: Basic rules and differentiation techniques; derivatives of exponential, logarithmic, and trigonometric functions; applications of differentiation, such as optimization problems (36 hours). Part C – Fundamental Theorem of Calculus: Understanding the relationship between differentiation and integration and evaluating definite integrals using the Fundamental Theorem of Calculus (6 hours). Part D – Integration: Antiderivatives and indefinite integrals; definite integrals and their properties; integration techniques, including substitution and integration by parts; applications of integration, such as area under the curve and the average value of a function (30 hours).			

Module 3

Code	Course/Module Title	ECTS	Semester
STAT103	Basic Programming	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
The objective is to teach students the fundamentals of programming through practical application using the C++ programming language. The module covers programming fundamentals and object-oriented programming (OOP) concepts; creating C++ programs; tokens, expressions, and control structures in C++; systematic organization of similar data using arrays; classes and objects in C++; constructors and destructors; file management and templates in C++; and exception handling for error control.			

Module 4

Code	Course/Module Title	ECTS	Semester
STAT104	Linear Algebra	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
Part (1) – Definition and types of matrices; algebraic operations on matrices and determinants; methods for evaluating determinants and their properties (13 hours). Part (2) – Matrix inverse, methods for finding the inverse, and its properties (11 hours). Part (3) – Linear equations and methods for solving systems of linear equations (14 hours). Part (4) – Rank of a matrix, canonical form and equivalent matrices, and the relationship between rank and equations (14 hours). Part (5) – Eigenvalues, vectors, algebraic operations on vectors, linear combinations, distance, and Euclidean length (11 hours).			

Module 5

Code	Course/Module Title	ECTS	Semester
UOM104	Democracy & Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
Human-rights strategies are centered on three fundamental matters: General Strategy: Introducing university students to the concept of human rights from global, humanitarian, scientific, and religious perspectives in an objective manner, away from political, intellectual, sectarian, and other influences. Specific Strategy: Seeking to bring about a change in students' behavior consistent with the general objective by directing attention to the genuine content of human rights and their legal dimensions; studying international declarations and conventions; examining the effects of serious violations of these rules that affect the lives or dignity of all people; and emphasizing that human rights are universal and apply to all human societies.			

Module 6

Code	Course/Module Title	ECTS	Semester
UOM101	Arabic Language 1	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
This semester focuses on Arabic speech and its categories, the signs associated with each category, and language skills that develop linguistic appreciation, improve learners' style, and overcome common errors among speakers and writers through primary and secondary grammatical case markers. It also covers the Arabic verb in terms of soundness and weakness, transitivity and intransitivity, and tense, together with further related details addressed during the semester.			

Module 7

Code	Course/Module Title	ECTS	Semester
STAT107	Elementary Statistics II	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	93	82
Description			
The module introduces students to the fundamentals of statistics and its fields of application; the statistical method in scientific research; methods of data collection; and data classification and presentation to obtain the information required for appropriate decision-making and prediction. The module also develops students' skills in research-design methodology and enables them to interpret results and translate them into practical applications.			

Module 8

Code	Course/Module Title	ECTS	Semester
STAT108	Calculus II	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	93	82
Description			
Part A – Integration Techniques: Students learn different techniques for evaluating integrals more effectively, including substitution, integration by parts, trigonometric substitutions, and hyperbolic substitutions. They also study partial-fraction decomposition of rational functions into simpler fractions (42 hours). Part B – Infinite Series: Students study convergence and divergence of series and important series such as the geometric series. They also study power series and Taylor series, which express functions as infinite polynomials (30 hours). Part C – Vectors: Study of vectors and their properties; vector addition, subtraction, and scalar multiplication; dot and cross products and their geometric and algebraic interpretations (12 hours). Part D – Moments and Centers of Mass: Calculation of moments using the cross product and study of the concept of moments in different contexts, together with the definition of the center of mass (6 hours).			

Module 9

Code	Course/Module Title	ECTS	Semester
STAT109	Demography	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
Definition of demography, sources of population data, types of populations, calculation of demographic indicators, and standardization of rates. Methods for detecting errors in population data and methods of data editing; population forecasting; construction and analysis of ordinary and clinical life tables; calculation of vital rates and measures of association between vital factors; relative risk, its types and rates; and analysis of survival data and survival patterns.			

Module 10

Code	Course/Module Title	ECTS	Semester
STAT110	MATLAB programming	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Part A – Introduction to MATLAB: Introduction to MATLAB and Windows; important instructions and commands; entering data; matrices in MATLAB; and creating matrices using commands (12 hours). Part B – Creating Matrices in MATLAB: Entering matrices; commands used to manipulate matrices; creating row matrices, column matrices, or vectors with sequential elements; other matrix-creation commands; finding the inverse, determinant, and rank of a matrix; and reshaping matrices (12 hours). Part C – Algebraic Operations in MATLAB: Algebraic operations on matrices, raising a matrix to a power, finding square roots of matrix elements, and Boolean operations in MATLAB (12 hours). Part D – Boolean Operations in MATLAB: Using AND and OR between matrices whose elements are 0 and 1, and writing input and output commands (12 hours).			

Module 11

Code	Course/Module Title	ECTS	Semester
UOM102	English Language 1	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
The general methodological principles adopted in this module are based on integrating the four skills—reading, writing, speaking, and listening—within highly motivating activities. Meaningful learning is achieved through activities based on students’ interests to enhance motivation. The concept of the autonomous learner is also a fundamental methodological principle. In response to changes in language-teaching strategies, considerable attention is given to encouraging and motivating self-directed learning through continuous assessment. Students receive ongoing feedback on their progress so that they can adjust their learning when necessary. The module therefore includes activities designed to consolidate students’ language abilities and provide them not only with theoretical knowledge but also with the tools required to continue language learning through the self-learning techniques studied in the module.			

Module 12

Code	Course/Module Title	ECTS	Semester
UOM103	Computer 1	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
1	2	48	27
Description			
Introduction to the basic concepts of computers, hardware and software components, fundamentals of operating systems, graphical user interfaces, and file and folder management. Use of basic Microsoft Office applications for word processing and document creation and formatting; spreadsheets for data entry, basic operations, analysis and graphical representation; and preparation of presentations. Introduction to the Internet, web browsers, e-mail and communication tools, together with principles for diagnosing and resolving common computer hardware and software problems.			

Module 13

Code	Course/Module Title	ECTS	Semester
STAT201	Probability I	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	2	78	72
Description			
This module develops students' problem-solving skills through set theory and its fundamental principles and laws. It develops their ability to use counting methods, combinations, and permutations in probability problems, in addition to applying the binomial theorem. It also develops skills in applying probability theory and understanding its axioms, laws, and applications. Students are introduced to random experiments, resulting events, and the determination of the sample space; independent events; conditional probability; and its relationship to Bayes' theorem. The module provides a strong foundation for advanced study in probability and its applications and is essential for understanding many applied fields.			

Module 14

Code	Course/Module Title	ECTS	Semester
STAT202	Sampling Theory I	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	2	78	72
Description			
Basic concepts and definitions of sampling; sampling methods; sample selection in simple random sampling; simple estimation in simple random sampling (12 hours). Simple random sampling with replacement (SRSWR); simple random sampling without replacement (SRSWOR); pseudo-random numbers (PRN); probability sampling; qualitative and quantitative variables in sampling (12 hours). Experiments and surveys; steps for planning a survey; determining sample size in sampling and estimation; sampling distribution of an estimator; expected values; variances; probability sampling design; prediction approach; advantages and limitations of sampling; estimation of the population total (12 hours). Simple random sampling with replacement: estimation of the population mean or total; covariance between two sample means; probability of selecting any population unit on any draw, equal to the reciprocal of the population size (12 hours). Simple random sampling with auxiliary estimation methods and confidence intervals; estimation of proportions; ratio estimation (12 hours). Selection of sample sizes and estimation of sample size (12 hours).			

Module 15

Code	Course/Module Title	ECTS	Semester
STAT203	Numerical Analysis I	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
The indicative content includes: Part A – Fundamental Concepts of Numerical Analysis: Reasons for using numerical analysis, problems encountered in applying numerical methods, and determining the nature of a problem before selecting the appropriate numerical method (12 hours). Part B – Linear and Nonlinear Equations: Implementation of numerical algorithms for solving linear and nonlinear equations and systems (12 hours). Part C – Interpolation: Construction of interpolation functions using different numerical methods (12 hours).			

Module 16

Code	Course/Module Title	ECTS	Semester
STAT204	Calculus III	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Part A – Linear Differential Equations: Fundamental concepts and techniques related to linear differential equations; first-order differential equations, including separable, exact, and linear equations; and second-order linear differential equations, with emphasis on homogeneous and nonhomogeneous equations with constant coefficients (20 hours). Part B – Partial Derivatives and Differentiability: Partial derivatives of multivariable functions, differentiability, and their properties, enabling students to study and analyze the behavior of multivariable functions (20 hours). Part C – Directional Derivatives, Gradient, and Multiple Integrals: Understanding the gradient vector and directional derivatives; double and triple integrals and their applications in calculating areas, volumes, centers of mass, and moments of inertia (20 hours).			

Module 17

Code	Course/Module Title	ECTS	Semester
STAT205	Data Base	4	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	37
Description			
The module develops students' ability to interact with future systems. One of the principal objectives of database design is to plan databases so that modifications and improvements can be made without changing application programs or reorganizing files. Data are designed to be free from redundancy and capable of retrieval, modification, and addition without problems caused by duplication. The module also addresses reducing the overall cost of storage requirements and the physical and logical organization of data so that expected queries can be answered with appropriate speed, as well as unplanned queries or the production of non-routine reports.			

Module 18

Code	Course/Module Title	ECTS	Semester
UOM2050	Crimes of the Baath Regime in Iraq	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
The module addresses the concept and classifications of crime, with emphasis on crimes committed by the Baath Party regime in Iraq and their classification according to their nature and consequences. It includes the study of international, political, and social crimes; crimes of authority and government; psychological crimes; and crimes associated with violations of freedom of religion and belief, together with the resulting violations of human rights and societal values. The module aims to familiarize students with the nature of these crimes and their humanitarian, social, and political consequences, and to promote awareness of the importance of protecting human rights and consolidating the principles of justice and respect for freedoms.			

Module 19

Code	Course/Module Title	ECTS	Semester
UOM2012	Arabic Language 2	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
This semester focuses on Arabic speech and its categories, the signs associated with each category, and language skills that develop linguistic appreciation, improve learners' style, and overcome common errors among speakers and writers through primary and secondary grammatical case markers. It also covers the Arabic verb in terms of soundness and weakness, transitivity and intransitivity, and tense, together with further related details addressed during the semester.			

Module 20

Code	Course/Module Title	ECTS	Semester
STAT206	Probability II	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	2	78	72
Description			
The module develops students' problem-solving skills through the study of discrete and continuous random variables and their properties. It develops students' ability to study probability mass functions for discrete random variables and probability density functions for continuous random variables and their properties. It also develops their skills in determining cumulative distribution functions for discrete and continuous random variables and distinguishing them from probability mass and density functions. In addition, students learn to use generating functions in probability problems and recognize common discrete and continuous probability distributions. The module provides a strong foundation for advanced study in probability and its applications and is essential for understanding many applied fields.			

Module 21

Code	Course/Module Title	ECTS	Semester
STAT207	Sampling Theory II	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	2	78	72
Description			
Stratification and stratified random sampling; concept of a stratified random sample; drawing a stratified random sample; importance of stratified sampling (12 hours). Population parameters for strata; sample statistics within strata; estimation of population parameters using stratified random sampling (12 hours). Estimation of population parameters; allocation of the sample to strata; proportional allocation; optimum allocation; determination of stratum boundaries and the appropriate number of strata (12 hours). Ratio and regression estimation in stratified random sampling; determination of sample size (12 hours). Drawing a systematic sample; estimation of population characteristics; variance of estimates; efficiency of systematic sampling (12 hours). Two-stage sampling and its estimation methods; difference method of estimation; construction of estimators of the population total (12 hours).			

Module 22

Code	Course/Module Title	ECTS	Semester
STAT208	Numerical Analysis II	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Part A – Numerical Differentiation: Forward, backward, and central difference methods for numerical derivatives of functions, as well as numerical derivatives of interpolation functions (16 hours). Part B – Numerical Integration: Approximation of definite integrals using the trapezoidal rule, Simpson’s rule, Romberg integration, and Gaussian quadrature; brief treatment of double integrals and integration of interpolation functions (24 hours). Part C – Numerical Solutions of Ordinary Differential Equations: Euler’s method, Runge–Kutta methods, and numerical solutions of second-order ordinary differential equations (12 hours). Part D – Numerical Solutions of Partial Differential Equations: Finite-difference methods for elliptic, hyperbolic, and parabolic equations, and finite-element methods for solving partial differential equations (8 hours).			

Module 23

Code	Course/Module Title	ECTS	Semester
STAT209	Time Series Analysis	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	3	78	72
Description			
The indicative content includes: Part A – Fundamental Concepts of Time Series: Definition and purpose of time series, types of series, mathematical models, and analysis of regular and irregular components (10 hours). Part B – Estimation of Regular and Irregular Components: Methods for measuring linear and nonlinear trends and removing their effects; measuring seasonal, cyclical, and random components and removing their effects; use of Minitab to implement methods for estimating the four components (30 hours). Part C – Box–Jenkins Models: Study of time-series stationarity, treatment of nonstationary series, determination of autocorrelation and partial autocorrelation functions for identifying model order, and stages of model building with application (20 hours).			

Module 24

Code	Course/Module Title	ECTS	Semester
STAT210	Research Methodology	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
Part A: Study of the modern scientific method and the construction of scientific theory using scientific laws; the concept, types, objectives, characteristics, and steps of scientific research. Part B: Scientific research methodologies, characteristics of a successful researcher, data-collection tools, and methods of selecting samples, including types of samples. Part C: Major criteria and foundations for selecting a study sample; reasons for selecting a sample; methods of choosing a research topic; exploratory reading, information collection and analysis; methods and rules for documenting scientific sources and references; additional rules for preparing reference lists; and documentation styles used by researchers, including APA, MLA, and Harvard.			

Module 25

Code	Course/Module Title	ECTS	Semester
UOM2032	Computer 2	3	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
1	2	48	27
Description			
The module introduces students to the fundamental concepts of programming and develops logical and algorithmic thinking and problem-solving skills. It covers basic principles of program design, writing, and organization; variables and operations; conditional and iterative statements; functions; and data structures, enabling students to acquire fundamental programming skills and apply them to solve different problems and applications.			

Module 26

Code	Course/Module Title	ECTS	Semester
UOM2022	English Language 2	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2		33	17
Description			
The module aims to develop students' basic English-language skills and enhance their ability to use English correctly and effectively. It covers vocabulary, grammar, and basic language structures while developing reading, writing, listening, and speaking skills. It also focuses on improving comprehension and expression and developing the ability to communicate and participate in dialogues and discussions through varied activities and exercises that consolidate language skills and increase confidence. The module helps students build an appropriate language foundation that enables them to continue developing their English skills and use them in academic study and different communication situations.			

Module 27

Code	Course/Module Title	ECTS	Semester
STAT301	Mathematical Statistics I	7	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	78	97
Description			
The indicative content includes: 1. Probability mass functions and density functions, with theorems, proofs, examples, and discussions. 2. Expectations, different types of moments, generating functions, properties and theorems with proofs, exercises, and homework. 3. Theoretical definitions of mode, median, harmonic mean, geometric mean, variance, mean deviation, and measures of skewness and kurtosis, with properties and examples. 4. Joint probability mass functions, joint probability density functions, cumulative and marginal distribution functions, and independence between random variables, with theorems and examples. 5. Joint moments, marginal moments, and moments of functions of random variables, with properties and examples. 6. Conditional distributions and conditional moments, with theorems and examples. 7. Joint generating functions and cumulant functions, and marginal generating functions and cumulants. 8. Covariance and simple and partial correlation coefficients, with properties, theorems, proofs, and examples.			

Module 28

Code	Course/Module Title	ECTS	Semester
STAT302	Regression Analysis I	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	3	78	72
Description			
Introduction to simple linear regression analysis. Regression assumptions; estimation of regression parameters using least squares; properties of the regression-line equation; estimation of the variance of model parameters and the expected mean response; hypothesis testing and confidence limits in regression models; equivalence between the F-test and t-test. Coefficient of determination R^2 , its maximum value, correlation coefficient and its relationship to the regression coefficient; lack-of-fit test; regression through the origin. Hypothesis tests concerning the correlation coefficient; maximum-likelihood estimation; matrix approach to simple linear regression. Violations of regression-model assumptions; difference between correlation and regression.			

Module 29

Code	Course/Module Title	ECTS	Semester
STAT303	Operation Research	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
The indicative content includes: Part 1: Definition of operations research; formulation and solution of linear-programming models; graphical solution; simplex method; Big-M technique; and dual simplex method (16 hours). Part 2: Sensitivity analysis (9 hours). Part 3: Balancing the transportation problem, finding an initial basic feasible solution, and testing optimality (16 hours). Part 4: Network analysis to minimize total project cost and total project duration. Part 5: Game theory; optimal solutions for two-person zero-sum games; and solution of mixed-strategy games (13 hours).			

Module 30

Code	Course/Module Title	ECTS	Semester
STAT304	Data Mining	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Data mining: definition and introduction. Fundamentals of data types. Histogram, scatter plot, box plot, quantiles, and probability plot. Mining time-series data: definition and introduction, data transformations, and Box–Cox transformation. Time-series models: definition and introduction. Distance measures and similarity measures. Clustering: definition and introduction, hierarchical clustering methods, and non-hierarchical clustering methods. Multiple linear regression: definition and introduction, goodness of fit, and error measures.			

Module 31

Code	Course/Module Title	ECTS	Semester
STAT305	Hypothesis Testing	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	1	48	52
Description			
The indicative content includes: 1. Types of parametric and nonparametric hypothesis tests. 2. How to identify the appropriate hypothesis for the available data. 3. Formulation of hypotheses. 4. Types of hypotheses. 5. How to decide whether to reject or fail to reject the null hypothesis. 6. Understanding the nature of the data and the distribution of the population from which the sample was drawn in order to select the appropriate statistical test and formulate suitable hypotheses.			

Module 32

Code	Course/Module Title	ECTS	Semester
STAT306	Computer Applications	3	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	12
Description			
The indicative content includes: Part A – Fundamental Concepts of Statistical Analysis: Working with software interfaces, methods of data entry, and definition and types of variables. Part B – Statistical Tests: Application of statistical tests, graphs, generation of data from statistical distributions, and time-series analysis (16 hours). Part C – Statistical Applications Using SPSS: Introduction to SPSS, comparison of means, and analysis of the linear regression model (16 hours).			

Module 33

Code	Course/Module Title	ECTS	Semester
STAT307	Mathematical Statistics II	7	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
3	3	93	82
Description			
The indicative content includes: Discrete probability distributions with their properties and applications, discussions, open-book examinations, homework, and quizzes. Important continuous probability distributions: statistical properties, relationships among distributions and their applications, distributions of linear and nonlinear functions of random variables, moment-generating functions, cumulative distribution functions, and transformation techniques, including discussions, quizzes, and open-book examinations. Distributions of nonlinear functions of independent random variables. Transformation technique for discrete random variables. Sampling distributions: chi-square (χ^2), t, and F distributions, their properties, relationships, and applications. Order statistics with different distributions, properties, and applications. Central Limit Theorem, its importance and applications.			

Module 34

Code	Course/Module Title	ECTS	Semester
STAT308	Regression Analysis II	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	3	78	72
Description			
The indicative content includes: Multiple linear regression; properties of estimators; analysis of variance; extra sum of squares; sequential sources of variation; use of Doolittle's method; testing the best linear regression equation; dummy variables; simple nonlinear regression; determination of the degree of the regression equation; multiple nonlinear regression; methods for selecting the best linear regression model; and regression analysis using SPSS.			

Module 35

Code	Course/Module Title	ECTS	Semester
STAT309	Biostatistics	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
The indicative content includes: identifying types of life tables and how to analyze their data; studying survival and life measures associated with life tables; monitoring and determining the accuracy of laboratory analyses; determining the degree of agreement between the results of two health units through pathological test results; and determining the hazard function for tracking data from a life distribution.			

Module 36

Code	Course/Module Title	ECTS	Semester
STAT310	Quality and Reliability	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Concept of quality, basic statistics and quality terminology, and Six Sigma specification limits. Statistical process control, control charts for variables, and control charts for attributes (12 hours). Reliability function, mean time to failure, hazard function, bathtub function, conditional reliability, design life and failure modes, and their relationships (8 hours). Constant failure rate (CFR), exponential reliability function, memoryless property, failure modes, failure on demand, recurrence and CFR model, and applications (12 hours). Time-dependent failure models, Weibull distribution, design median and mode, burn-in testing, failure modes, and identical Weibull process (10 hours). Derivation of characteristic functions related to the reliability of time-dependent models; derivation of system reliability for CFR and Weibull models when components are independent or independent and identically distributed. System structure function, minimal cut sets, and optimal minimal paths (10 hours).			

Module 37

Code	Course/Module Title	ECTS	Semester
STAT311	Statistical Learning	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	37
Description			
The module covers the fundamental concepts and methods of statistical learning used in prediction, classification, and data analysis. It includes statistical prediction using time-series models and linear regression; classification using logistic regression, classification and regression trees, and random forests. It also covers support vector machines for classification and regression, the nearest-neighbor algorithm, the Gaussian kernel, and artificial neural networks, with emphasis on applying these methods to prediction and classification and interpreting the results.			

Module 38

Code	Course/Module Title	ECTS	Semester
STAT312	Statistical applications	3	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	12
Description			
The module introduces students to important practical applications of statistical methods in economic, industrial, and agricultural fields. It covers index numbers, their types, methods of calculation, and their use in measuring changes in prices, quantities, and values over time. It also includes industrial statistics and the application of statistical methods to production processes, quality control, and industrial-data analysis, as well as agricultural statistics and the use of statistical methods in collecting, organizing, and analyzing agricultural data and studying production, productivity, and the factors affecting them. The module develops students' ability to select the appropriate statistical method, apply it, and interpret its results in different practical problems.			

Module 39

Code	Course/Module Title	ECTS	Semester
STAT401	Stochastic Processes I	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
The indicative content includes: Part A – Fundamental Concepts of the Probability Generating Function: The probability generating function, its properties, and its use in studying distributions of discrete random variables. Part B – Introduction to Stochastic Processes: The Stochastic Processes module is designed to provide students with a comprehensive understanding of the modeling and analysis of stochastic processes. Part C – Markov Chains and the Transition Probability Matrix: Markov chains are widely used to model systems exhibiting a specific probabilistic property known as the Markov property. The objective is to capture system dynamics accurately, whereby the future state depends only on the current state and is independent of previous states, given the current state. Through the study of Markov chains, students seek to understand and analyze the behavior and evolution of such systems over time.			

Module 40

Code	Course/Module Title	ECTS	Semester
STAT402	Statistical Inference I	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
The indicative content includes: construction of confidence intervals for the mean, difference between two means, variance, ratio of two variances, and proportions, with applications, discussions, open-book examinations, assignments, and quizzes; hypothesis testing for the mean, difference between two means, variance, ratio of two variances, and proportions, with applications, discussions, open-book examinations, assignments, and quizzes; types of errors, Type I and Type II errors and their calculation, with applications; construction of the critical region, with practical application; calculation of the power function of a statistical test and determination of the most powerful critical region, with applications; and sequential testing of a statistical hypothesis, with practical application.			

Module 41

Code	Course/Module Title	ECTS	Semester
STAT403	Multivariate Analysis I	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
The indicative content includes: fundamental concepts; eigenvalues and eigenvectors and their properties; quadratic forms; multivariate normal distribution; bivariate normal distribution (11 hours). Linearity in multivariate analysis and marginal distributions; distribution of a linear combination of normal variables (11 hours); conditional distribution and moment-generating function (10 hours). Maximum-likelihood estimation of parameters and sufficient statistics (11 hours). Multivariate regression (8 hours). Estimation of multivariate linear regression parameters by least squares and by maximum likelihood.			

Module 42

Code	Course/Module Title	ECTS	Semester
STAT404	Computational Statistics	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
Part A – Computational Statistics Using R: Constructing basic statements in R, specifying formulas in R, graphics in R, and using packages (15 hours). Part B – Probability, Statistics, and Simulation: Probability density function, cumulative distribution function, introduction to simulation, simulation of discrete-event systems, random-number generation, randomness testing, uniformity test, and independence test (15 hours). Part C – Random-Variable Generation: Generation of random variables from continuous distributions and discrete distributions (15 hours). Part D – Monte Carlo and Bootstrap: Monte Carlo integration, Monte Carlo methods in inference, the bootstrap method, bootstrap estimation of standard error, bootstrap estimation of bias, and the standard normal bootstrap confidence interval (15 hours).			

Module 43

Code	Course/Module Title	ECTS	Semester
STAT405	Design and Analysis of Experiments I	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	1	48	52
Description			
The module introduces students to the general concepts and principles of the design and analysis of experiments and explains the importance of proper experimental planning, identification of factors and experimental units, and sources of variation. It covers the Completely Randomized Design, Randomized Complete Block Design, and Latin Square Design, including specification of statistical models and construction of analysis-of-variance tables for each design. It also covers multiple-comparison tests among means and their application in interpreting differences among treatments, with emphasis on selecting the appropriate design, analyzing results, and interpreting them in practical and research applications.			

Module 44

Code	Course/Module Title	ECTS	Semester
STAT406	Statistical modeling	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	1	48	52
Description			
The module addresses problems that regression models may encounter when fundamental assumptions are violated and the resulting effects on parameter estimation and estimator properties. It covers heteroscedasticity, multicollinearity, and autocorrelation, as well as residual analysis and detection of unusual values in the data. It also covers estimation and remedial methods used to address these problems, including weighted regression, ridge regression, principal component regression, and robust regression, with emphasis on selecting the appropriate method and interpreting results in practical applications.			

Module 45

Code	Course/Module Title	ECTS	Semester
STAT407	Stochastic Processes II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
The indicative content includes: Part A – Classification of Markov Chain States: Classification of states as recurrent/transient, periodic/apperiodic, communicating classes, absorbing states, and related categories. Part B – Poisson Process and Its Properties: Learning how to model events that occur randomly over time using the Poisson process. Part C – Applications of Stochastic Processes: Applying stochastic processes to the modeling and analysis of random phenomena in different fields.			

Module 46

Code	Course/Module Title	ECTS	Semester
STAT408	Statistical Inference II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	87
Description			
The indicative content includes: fundamental concepts of statistical inference (one week); unbiasedness of estimators (one week); consistency (one week); sufficiency (four weeks); efficiency (two weeks); minimum-variance unbiased estimator (two weeks); estimation theory (point-estimation methods), maximum-likelihood method, and method of moments (four weeks).			

Module 47

Code	Course/Module Title	ECTS	Semester
STAT409	Multivariate Analysis II	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	2	63	62
Description			
The module introduces students to advanced methods of multivariate statistical analysis and develops their ability to analyze data involving several interrelated variables simultaneously. It covers multivariate methods including principal component analysis, factor analysis, discriminant analysis, cluster analysis, canonical correlation, and other related methods. It emphasizes selecting the appropriate statistical method, interpreting results, and applying these methods to the processing and analysis of multivariate data in practical and research applications.			

Module 48

Code	Course/Module Title	ECTS	Semester
STAT410	Non-parametric Statistics	7	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	3	93	82
Description			
Introduction to nonparametric statistics. Formulation of the null and alternative hypotheses. Calculation of the test statistic. Ranking data. Testing data for normality. Calculation of the one-sample Kolmogorov–Smirnov test. Calculation of the Wilcoxon signed-rank test statistic. Calculation of the Sign Test.			

Module 49

Code	Course/Module Title	ECTS	Semester
STAT411	Design and Analysis of Experiments II	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
2	1	48	52
Description			
The module introduces students to a number of advanced experimental designs and methods for their statistical analysis. It covers the Graeco-Latin Square Design and its use in controlling sources of variation; split-plot designs, organization of experimental factors, and analysis of their effects; and factorial analysis of experiments, including the study of main effects and interactions among factors. It emphasizes selecting the appropriate experimental design, constructing analysis-of-variance tables, testing hypotheses, and interpreting results in ways that contribute to solving applied and research problems.			

Module 50

Code	Course/Module Title	ECTS	Semester
STAT412	Project	2	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/sem)
	2	33	17
Description			
The Project module is a distinctive component of the higher-education curriculum and is intended to provide students with an opportunity to apply their knowledge and skills in a practical environment. It normally occurs at the end of the programme and represents the culmination of the academic learning experience. The module is designed to enable students to integrate and apply the knowledge, skills, and competencies acquired throughout their studies. It provides an opportunity to undertake a substantial project, individually or in groups, under the supervision of a faculty member or an industry mentor.			

Contact

Program Manager:

Muzahem mohammed yahya Al-Hashimi| Ph.D. in Statistics |

Assistant Prof. Email: muzahim_aLhashime@uomosul.edu.iq

Mobile no.: 07702081370

Program Coordinator:

Wisam Wadullah Saleem | Ph.D. in Statistics |

Lecturer. Email: Wisam-stat@uomosul.edu.iq

Mobile no.: 07702077440