University of Baghdad

جامعة بغداد

Bachelor's Degree (B.Sc.)- Mathematics

بكالوريوس علوم - الرياضيات

Table of Contents

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1. Overview

This catalogue is about the courses (modules) given by the program of Mathematics to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الرياضيات للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية، على سبيل المثال، مع (6000) إجمالي ساعات حمل الطالب و240 إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
MAT1101	Calculus I	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course is dealing mainly with fundamental of calculus. It starts with introducing functions, limits and derivatives, differentiation rules, and then present some applications of differentiation.			

Module 2

Code	Course/Module Title	ECTS	Semester
MAT1102	Foundation of Mathematics I	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course is to give the students an understanding of the foundations of mathematics includes sets, logic, number bases and the structure of the number system from naturals to the reals, solving multiple step problems, and teaching to one's peers.			

Module 3

Code	Course/Module Title	ECTS	Semester
MAT1103	Finite Mathematics	5	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	62
Description			
This course presents several areas of mathematics including linear equations, functions, matrices, linear inequalities, linear programming, and game theory with applications.			

Module 4

Code	Course/Module Title	ECTS	Semester
MAT1104	Mathematical Physics I	4	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
This course is concerned with the mathematical foundations of theoretical physics such as problems in statistical mechanics and quantum field theory a.			

Module 5

Code	Course/Module Title	ECTS	Semester
UOB103	Computer Skills I	3	1
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
1	2	49	26
Description			
This course will support the students with foundation for many significant programs related to Mathematics. Practical sessions will be used to undertake practical aspects of the module.			

Module 6

Code	Course/Module Title	ECTS	Semester
UOB101	Arabic Language 1	2	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	___	33	17
Description			
Students undertaking this course will learn some important basics of Arabic grammar in order to develop their ability to write correctly and properly.			

Module 7

Code	Course/Module Title	ECTS	Semester
MAT1215	Calculus II	8	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course deals mainly with integral calculus. We cover integrals, applications of integration, techniques of integration, and further applications of integration to the sciences and engineering.			

Module 8

Code	Course/Module Title	ECTS	Semester
MAT1216	Foundations of Mathematics II	8	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
The course provides a solid foundation in algebra, geometry and trigonometry, as well as differential and integral calculus. It covers partial fractions, logarithms, detailed trigonometric functions and a broad range of calculus techniques.			

Module 9

Code	Course/Module Title	ECTS	Semester
MAT1217	Financial Mathematics	6	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
The course focus on mathematical relations for many concepts of financial and currency markets in investment and other economic activities.			

Module 10

Code	Course/Module Title	ECTS	Semester
MAT1218	Mathematical Physics II	4	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
The course is concerned with the mathematical foundations of theoretical physics such as problems in statistical mechanics and quantum field theory.			

Module 11

Code	Course/Module Title	ECTS	Semester
UOB104	Democracy and Human Rights	2	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	____	33	17
Description			
The course devoted to knowledge democratic public sphere in Iraq and the world, with a focus on the protection of human rights and human dignity.			

Module 12

Code	Course/Module Title	ECTS	Semester
UOB102	English Language I	2	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	____	33	17
Description			
Students undertaking this course will develop their skills in reading, writing, and speaking English in an intensive study situation. They will read selected English scientific texts, learn skills for understanding these texts, and develop written and spoken responses to them.			

Module 13

Code	Course/Module Title	ECTS	Semester
MAT2119	Advanced Calculus	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
4	1	78	122
Description			
This course is designed to introduce students to advanced concepts of calculus include a review of linear approximations of vector valued functions of several variables, the derivative matrix, real valued functions, multiple integrals, line integrals, surface integrals			

Module 14

Code	Course/Module Title	ECTS	Semester
MAT21110	Linear Algebra I	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course allows students to understand topics related to linear transformations, in particular eigenvalues and eigenvectors, coordinate transformations, and matrix diagonalization and its applications.			

Module 15

Code	Course/Module Title	ECTS	Semester
MAT21111	Probability and Statistics	6	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
This course aims to provide students with a thorough grounding in statistical methodology, an awareness of the scope, achievements and possibilities of using statistics, and confidence in the use of appropriate statistical and computational tools, techniques and methodologies for solving and analyzing a range of practical problems.			

Module 16

Code	Course/Module Title	ECTS	Semester
MAT21112	Graph Theory	4	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	1	48	52
Description			
This course introduces the basic concepts of graph theory, focusing primarily on finite graphs. These include numerical invariants of graphs and methods for calculating them.			

Module 17

Code	Course/Module Title	ECTS	Semester
UOB208	The Crimes of Ba'ath Regime in Iraq	2	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	___	33	17
Description			
This course introduces students to the important areas of fuzzy set theory, fuzzy logic and another important related fundamental concepts.			

Module 18

Code	Course/Module Title	ECTS	Semester
UOB206	English Language II	2	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	___	33	17
Description			
Students undertaking this course will develop their skills in reading, writing, and speaking English in an intensive study situation. They will read selected English scientific texts, learn skills for understanding these texts, and develop written and spoken responses to them.			

Module 19

Code	Course/Module Title	ECTS	Semester
MAT22114	Linear Algebra II	8	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course offers the same objects as those of Linear Algebra 1, introduced in the first semester with extension into new regions.			

Module 17

Code	Course/Module Title	ECTS	Semester
MAT22115	Methods of Solution of O.D. E	6	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
This course provides an introduction to first and higher order ordinary differential equations, methods of solution without integration are covered. Some applications of differential equations are considered, such as newton's law of cooling and motion in a gravitational field.			

Module 21

Code	Course/Module Title	ECTS	Semester
MAT22116	Mathematical Statistic I	4	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
This course offers the same objects as those of Probability and Statistic I, introduced in the first semester with extension for more variables.			

Module 22

Code	Course/Module Title	ECTS	Semester
MAT22117	Operation Researches	4	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
This course introduces the natural entry to the study of operational research, it discusses how to obtaining the most optimal solution for a problem with given constraints.			

Module 23

Code	Course/Module Title	ECTS	Semester
MAT21718	Number Theory	3	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
1	1	33	42
Description			
This course provides an introduction to the important basic topics of number theory: prime numbers, factorization, congruence and representation of numbers.			

Module 24

Code	Course/Module Title	ECTS	Semester
UoB207	Computer Skills II	3	2
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
1	2	49	26
Description			
This course will support the students with foundation for many significant programs related to Mathematics. Practical sessions will be used to undertake practical aspects of the module.			

Module 25

Code	Course/Module Title	ECTS	Semester
UOB205	Arabic Language II	2	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	___	33	17
Description			
Students undertaking this course will learn some important basics of Arabic grammar in order to develop their ability to write correctly and properly.			

Module 26

Code	Course/Module Title	ECTS	Semester
MAT31119	Mathematical Analysis I	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course gives a rigorous introduction to some of the principles of mathematical analysis that are essential in most aspects of modern mathematics. Hence, students will be able to understand and write formal mathematical sentences.			

Module 27

Code	Course/Module Title	ECTS	Semester
MAT31117	Numerical Analysis I	8	1
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	2	63	137
Description			
This course will introduce numerical approximation techniques for solving standard problems in Mathematics, and explain when and why they work. Additionally, it provides opportunities for implementing numerical techniques on a computer.			

Module 28

Code	Course/Module Title	ECTS	Semester
MAT31121	Group Theory	5	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	62
Description			
This course will study the basic structure of groups, and some types of finite subgroups.			

Module 29

Code	Course/Module Title	ECTS	Semester
MAT31122	Mathematical Statistic II	4	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
This course introduces students to the basic statistical concepts with their applications, to ensure they could understand the next related course.			

Module 30

Code	Course/Module Title	ECTS	Semester
MAT31123	Optimization	5	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	62
Description			
This course provides an introduction to the theory and practice of optimization techniques. It covers linear programming as well as nonlinear programming.			

Module 31

Code	Course/Module Title	ECTS	Semester
MAT32124	Mathematical Analysis II	8	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course is a continuation of MAT31119 Mathematical Analysis I. The objective of this module is to develop rigorously all the basic results for multi variables.			

Module 32

Code	Course/Module Title	ECTS	Semester
MAT32125	Numerical Analysis II	8	2
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	2	63	137
Description			
This course is a continuation of MAT31117 numerical analysis I. It introduces and analyzes important numerical methods for solving linear and nonlinear systems, two-point boundary value problems in such fields as quantitative finance and physics.			

Module 33

Code	Course/Module Title	ECTS	Semester
MAT32126	Ring Theory	5	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	62
Description			
This course aims to realize the importance of rings aa central objects in algebra and to study some applications.			

Module 34

Code	Course/Module Title	ECTS	Semester
MAT32127	Statistical Inference	5	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	62
Description			
This course is a continuation of MAT31122 mathematical statistic I I. It provides the student with the basic concepts of the statistic for more than one parameter.			

Module 35

Code	Course/Module Title	ECTS	Semester
MAT32128	Computation Groups	3	2
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
1	1	33	42
Description			
This course aims to survey the most significant results in the theory of arithmetic groups obtained primarily, since it deals with groups of matrices whose entries are integers.			

Module 36

Code	Course/Module Title	ECTS	Semester
UOB309	Scientific Research Methodology	1	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	___	18	7
Description			
This course prepares the student for empirical research using advanced methods and skills.			

Module 37

Code	Course/Module Title	ECTS	Semester
MAT41129	Complex Analysis I	8	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course is concerned with complex numbers and functions, their theory follows a quite different development from that of real functions, is remarkable in its directness and elegance, and leads to many useful applications.			

Module 38

Code	Course/Module Title	ECTS	Semester
MAT41133	Theory of Differential Equations	6	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
This course provides the basic concepts, and methods of solving various types of differential equations, indispensable knowledge of the underlying theory and some related applications.			

Module 39

Code	Course/Module Title	ECTS	Semester
MAT41131	General Topology I	6	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
This course deals with the basic set-theoretic definitions and constructions used in topology. It is the foundation of most other branches of topology, including differential topology, geometric topology, and algebraic topology.			

Module 40

Code	Course/Module Title	ECTS	Semester
MAT41132	Functional Analysis	4	1
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	37
Description			
This course provided the students by knowledge in spaces of functions and various related applications, this module requires the module MAT32124.			

Module 41

Code	Course/Module Title	ECTS	Semester
MAT41133	Cryptography	3	1
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	2	63	12
Description			
This course, will introduce students to the basic mathematical principles and functions that form the foundation for cryptographic and cryptanalysis methods. These principles and functions will be helpful in understanding symmetric and asymmetric many cryptographic methods.			

Module 42

Code	Course/Module Title	ECTS	Semester
MAT41034	Project I	3	1
Class (hr./w)	**Seminar**	**SSWL (hr./sem)**	**USWL (hr./sem)**
___	2	30	45
Description			
This module an inquiry or investigation conducted by undergraduate students that makes an intellectual or creative contribution to their fields.			

Module 43

Code	Course/Module Title	ECTS	Semester
MAT421135	Complex Analysis II	8	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	137
Description			
This course is a continuation of MAT41129 complex statistic I I. It provides the student with essential properties of analytic functions, several types of integrals for complex functions, series and their applications, residue theorem with applications and another consequent concepts.			

Module 44

Code	Course/Module Title	ECTS	Semester
MAT41136	General Topology II	6	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
3	1	63	87
Description			
This course is a continuation of MAT41131 general topology I. It provides the student with advanced subject related more specific topology properties.			

Module 45

Code	Course/Module Title	ECTS	Semester
MAT41137	Mathematical Modelling and Simulation	6	2
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	2	63	87
Description			
This course aims to gain the knowledge about system and its behavior so that a person can transform the physical behavior of a system into a mathematical model that can in turn transform into a efficient algorithm for simulation purpose.			

Module 46

Code	Course/Module Title	ECTS	Semester
MAT41138	Data Analysis	4	2
Class (hr./w)	**Lab.**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	2	63	37
Description			
This module is designed to provide students with an introduction to the statistical principles used in data analytics and their application using a suitable statistical package.			

Module 47

Code	Course/Module Title	ECTS	Semester
MAT41139	Methods of Solutions for P.D.E.	3	2
Class (hr./w)	**Tutorial**	**SSWL (hr./sem)**	**USWL (hr./sem)**
2	1	48	27
Description			
This course aims to give an introduction to the basic properties of PDEs and to the basic analytical techniques to solve them.			

Module 48

Code	Course/Module Title	ECTS	Semester
MAT42134	Project II	3	1
Class (hr./w)	**Seminar**	**SSWL (hr./sem)**	**USWL (hr./sem)**
____	2	33	42
Description			
This module an inquiry or investigation conducted by undergraduate students that makes an intellectual or creative contribution to their fields.			

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