



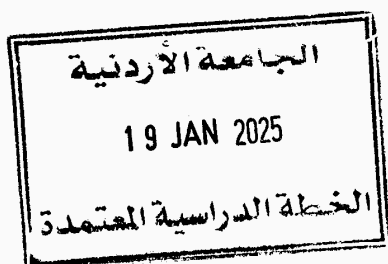
Form: Study Plan- Bachelors	Form Number	EXC-01-03-02A
	Issue Number and Date	2/3/24/2022/2963 2022/12/05
	Number and Date of Revision or Modification	15/10/2023
	Deans Council Approval Decision Number	265/2024/24/3/2
	The Date of the Deans Council Approval Decision	2024/1/23
	Number of Pages	27

1.	School	Science
2.	Department	Mathematics
3.	Program title (Arabic)	بكالوريوس الرياضيات
4.	Program title (English)	B.Sc. Mathematics

5. Components of Curriculum:

The curriculum for the bachelor's degree in Mathematics consists of (135) credit hours distributed as follows

Number	Type of requirement	Type of learning	credit hours
First	University Requirements	Online and blended	27
Second	School Requirements	Face to face, blended, and online	21
Third	Specialty Requirements	Face to face, blended, and online	87
Fourth	Courses offered by other faculties/schools and departments	Face to face, blended, and online	0
Total			135





6. Numbering System:

A- Department number

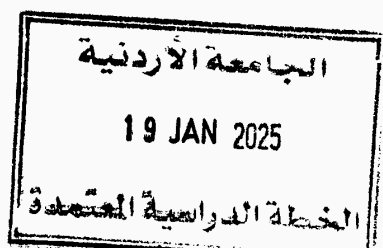
Department	Number
Mathematics	1
Physics	2
Chemistry	3
Biological Sciences	4
Geology	5
Medical Sciences	6

B- Course number

Domain number	Domain title	Domain number	Domain title
0	Calculus and General Mathematics	5	Foundation of Mathematics
1	Analysis	6	Geometry and Topology
2	Differential Equations	7	Applied mathematics and Actuarial Science
3	Statistics and Probability	8	Teaching mathematics and History of Mathematics
4	Algebra	9	Seminar and Research

C- Course number consists of 7 digits

School		Department		Level	Serial number	
0	3	0	1	2	4	1
		3	1	3	4	1
		4	1	3	3	2



**First: University Requirements:****Preparation Program Requirements**

All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program

(0 - 15 Credit Hours)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Community service	0700150	0		
2	Computer skills placement test	1902098	0		
3	Basics of computing	1932099	3	1902098	
4	Arabic Language (level 1)	3201001	3	3211098	
5	Arabic Language (level 2)	3201002	3	3201001	
6	English language (level 1)	3202001	3	3212098	
7	English language (level 2)	3202002	3	3202001	
8	Arabic placement test	3211098	0		
9	English placement test	3212098	0		

Compulsory Requirements**(18 Credit Hours)**

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military sciences	2220100	3		
2	English language (level 3)	3202003	3	3202002	
3	National culture	3400100	3		
4	Ethics and Social Responsibility	3420100	3		
5	Entrepreneurship, Innovation, and Leadership	3420101	3		
6	Communication and Soft Skills (in English language)	3420103	3	3202003 or 3202103	

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**Electives (9 Credit Hours)**

Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.

(First Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Environmental culture and development	0310102	3		blended
2	Islamic culture	0400102	3		blended
3	Legal culture	1000102	3		Face to face
4	Physical fitness culture	1100100	3		blended
5	Introduction to philosophy and critical thinking	3400103	3		online
6	Tourism culture	3400111	3		blended

(Second Group) (3 credits hour)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Islam and contemporary issues	0400101	3		blended
2	Social media	1900101	3		blended
3	Appreciation of arts	2000100	3		blended
4	Foreign language	2200103	3		blended
5	Arab-Islamic civilization	2300101	3		blended
6	Jordan: history and civilization	2300102	3		blended
7	Special subject	3400106	3		blended
8	Great books	3400107	3		blended
9	Jerusalem	3400108	3		blended

Electives (3) credits hour**(Third Group)**

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Specialized Topics in Digital 19 JAN 2025	1900104	3	1900103	

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**Second:** School courses: distributed as follows:

- A. Obligatory school courses: (21) credit hours.
B. Elective school courses: (None) credit hours.

- A. Obligatory school courses: (21) credit hours:

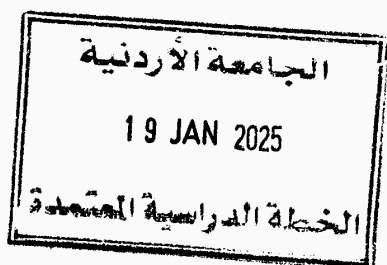
Course Number	Course Title	Type of learning (face-to-face blended online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301101	Calculus-1	face-to-face	3	-	3	-
0301131	Principles of Statistics	online	3	-	3	-
0302101	General Physics-1	face-to-face	3	-	3	-
0303101	General Chemistry-1	face-to-face	3	-	3	-
0304101	General Biology-1	face-to-face	3	-	3	-
0305101	General Geology-1	face-to-face	3	-	3	-
1900103	Modern Digital Skills	blended	3	-	3	1932099

- B. Elective school courses: (0) credit hours:

Course Number	Course Title	Type of learning (face-to-face blended online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		

Third: Specialty courses: (87) credit hours distributed as follows:

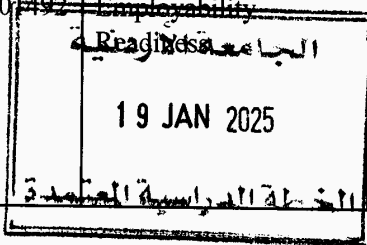
- B. Obligatory specialty courses: (69) credit hours.
C. Elective specialty courses: (18) credit hours.





B. Obligatory specialty courses: (69) credit hours:

Course Number	Course Title	Type of learning (face-to-face blended online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301102	Calculus II	face-to-face	3		3	0301101
0301201	Calculus III	face-to-face	3		3	0301102
0301211	Principles of Mathematics	face-to-face	3		3	0301102
0301213	Real Analysis I	face-to-face	3		3	0301211
0301221	Ordinary Differential Equations I	blended	3		3	0301102
0301241	Linear Algebra I	face-to-face	3		3	0301101
0331261	Modern Euclidean Geometry	face-to-face	3		3	0301211
0301273	Mathematics Lab	blended	2		2	0301201
0331301	Advanced Calculus	face-to-face	3		3	0301201
0301313	Real Analysis II	face-to-face	3		3	0301213
0331321	Partial Differential Equations I	face-to-face	3		3	0301221
0341332	Statistical Techniques	face-to-face	3		3	0301131
0301333	Probability Theory	face-to-face	3		3	0301201
0331341	Modern Algebra I	face-to-face	3		3	0301211
0301342	Number Theory	face-to-face	3		3	0301211
0301361	General Topology I	face-to-face	3		3	0301213
0331412	Complex Analysis	face-to-face	3		3	0301213
0331431	Mathematical Statistics	face-to-face	3		3	0301333
0301441	Linear Algebra II	face-to-face	3		3	0301241
0331442	Modern Algebra II	face-to-face	3		3	0331341
0301472	Numerical Methods	blended	3		3	0331321
0301492	Employability	face-to-face	6		6	0331261+ 0301273+ 0301342+ Completing at least 90 credits





0301498	Graduate Project	blended	1		1	0301273+ Completing at least 90 credits
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C. Elective specialty courses: (18) credit hours:

Course Number	Course Title	Type of learning (face-to-face blended online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301274	Mathematics for Finance	face-to-face	3		3	0301102
0331334	Stochastic Processes	face-to-face	3		3	0301333
0341336	Design and Analysis of Experiments	blended	3		3	0301332
0301338	Applied Probability	online	3		3	0301333
0301371	Mathematical Optimization	face-to-face	3		3	0301241
0301374	Theory of Algorithms	blended	3		3	0301211
0301376	Risk Theory	face-to-face	3		3	0301333
0331413	Basics in Functional Analysis	face-to-face	3		3	0301213
0301414	Mathematical Analysis	face-to-face	3		3	0301313
0331421	Ordinary Differential Equations II	blended	3		3	0301221
0331422	Partial Differential Equations II	face-to-face	3		3	0301221
0301424	Special Functions	face-to-face	3		3	0331321
0331432	Time Series	face-to-face	3		3	0301333
0331443	Combinatorial Analysis	face-to-face	3		3	0301241
0301445	Graph Theory	face-to-face	3		3	0301241
0301446	Cryptography Theory	online	3		3	0301342
0301451	Foundations of Mathematics	face-to-face	3		3	0301213
0331451	Non-Euclidean Geometry	face-to-face	3		3	0331261

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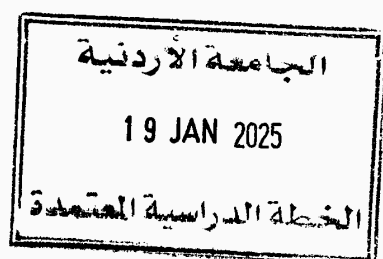


0331462	General Topology II	face-to-face	3		3	0301361
0301471	Methods of Applied Mathematics	face-to-face	3		3	0331412
0301481	History of Mathematics	blended	3		3	0331301
0302331	Electricity and Magnetism	face-to-face	3		3	0331321 or 0332282

Fourth: Courses offered by other faculties/schools and departments (None).

Fifth: New Courses Offered to Other Departments

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0331103	Mathematics for Business Administration and Social Sciences	3		3	None
0301107	Calculus II for Chemistry students	2		2	0301101
0301132	Biostatistics for the Health Sciences	3		3	None
0301202	Engineering Mathematics I	3		3	0301201
0341221	Ordinary Differential Equations for Chemistry Students.	2		2	0301107
0331302	Engineering Mathematics II	3		3	0301201
0301241	Linear Algebra I	3		3	0301101





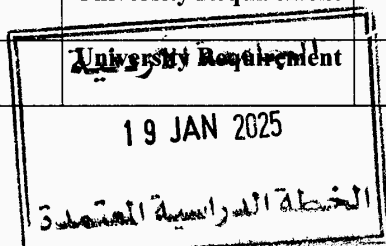
Sixth: Advisory Study Plan

(First) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0301101	Calculus I	3	0301102	Calculus II	3
0301131	Principles of Statistics	3	0301241	Linear Algebra I	3
	College Requirement	3		College Requirement	3
	College Requirement	3		College Requirement	3
	University Requirement	3		University Requirement	3
Total		15	Total		15

(Second) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0301201	Calculus III	3	0331261	Modern Euclidean Geometry	3
0301211	Principles of Mathematics	3	0301273	Mathematics Lab	2
0301221	Ordinary Differential Equations I	3	0301213	Real Analysis I	3
	College Requirement	3		Elective Specialization Requirement	3
	University Requirement	3		University Requirement	3
	University Requirement	3		University Requirement	3





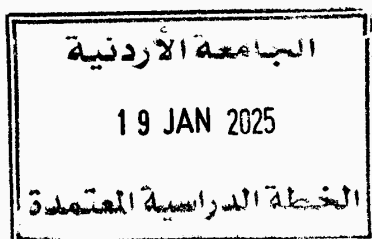
Total	18	Total	17
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(Third) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0331301	Advanced Calculus	3	0301361	General Topology I	3
0301313	Real Analysis II	3	0341332	Statistical Techniques	3
0331321	Partial Differential Equations I	3	0301342	Number Theory	3
0301333	Probability Theory	3	0331341	Modern Algebra I	3
	Elective Specialization Requirement	3		Elective Specialization Requirement	3
	University Requirement	3		University Requirement	3
Total		18	Total		18

(Third) Year

(Summer) Semester		
Course Number	Course Title	Credit Hours
0301492	Employability Readiness	6



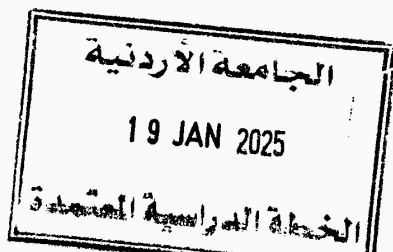


(Fourth) Year

(First) Semester			(Second) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0331412	Complex Analysis	3	0301441	Linear Algebra II	3
0331431	Mathematical Statistics	3	0301472	Numerical Methods	3
0331442	Modern Algebra II	3	0301498	Graduate Project	3
	Elective Specialization Requirement	3		Elective Specialization Requirement	1
				University Requirement	3
	Elective Specialization Requirement	3			
Total		15	Total		13

Transition Plan

Old Plan			New Plan		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0331212	Real Analysis	3	0301213	Real Analysis I	3
0301311	Mathematical Analysis I	3	0301313	Real Analysis II	3
0301411	Mathematical Analysis II	3	0301414	Mathematical Analysis	3
			0301492	Employability Readiness	6



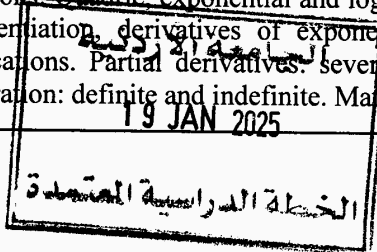


Course Description

Course Number	Course Title: Calculus I	Face to face	Credit Hours
0301101			
Prerequisite: (None)			3
Course Description Functions: domain, operations on functions, graphs of functions; trigonometric functions; limits: meaning of a limit, computational techniques, limits at infinity, infinite limits; continuity; limits and continuity of trigonometric functions; the derivative: techniques of differentiation, derivatives of trigonometric functions; the chain rule; implicit differentiation; differentials; Roll's Theorem; the mean value theorem; L'Hopital's rule; increasing and decreasing functions; concavity; maximum and minimum values of a function; graphs of functions including rational functions; antiderivatives; the indefinite integral; the definite integral; the fundamental theorem of calculus ;transcendental functions: inverse functions, logarithmic and exponential functions; derivatives and integrals; limits (the indeterminate forms); hyperbolic functions; inverse trigonometric functions.			

Course Number	Course Title: Calculus II	Face to face	Credit Hours
0301102			
Prerequisite: (0301101)			3
Course Description Techniques of integration; application of definite integral: volumes, length of a plane curve, area of a surface of revolution polar coordinates, graphs in polar coordinates, area in polar coordinates; infinite series: sequences, infinite series, convergence tests, absolute convergence, conditional convergence; alternating series; power series: Taylor and Maclurine series, differentiation and integration of power series, representing functions using power series.			

Course Number	Title: Mathematics for Business Administration and Social Sciences	Face to face	Credit Hours
0301103			
Prerequisite: (None)			3
Course Description Linear functions: Graphs, solving system of linear functions. Economic applications. Non-linear functions: Quadric, exponential and logarithmic, economic applications. Differentiation: Rules for differentiation, derivatives of exponential and logarithmic functions, optimization, economic applications. Partial derivatives: several variable functions, optimization, Lagrange multipliers. Integration: definite and indefinite. Matrices: Basic properties, inverses, Cramer's rule.			

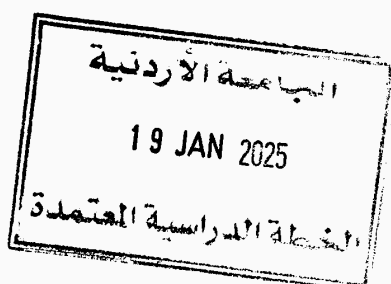




Course Number	Course Title: Calculus II for Chemistry Students	Face to face	Credit Hours
0301105			
Prerequisite: (0301101)			2
Course Description Integration by parts; trigonometric integrals; trigonometric substitutions; integration of rational functions by partial fractions; strategy of integrations; improper integrals; areas between two curves; sequences; series; alternating series; absolute convergence and the ratio and root tests; strategy for testing series; power series; representations of functions as power series; Taylor and Maclaurine series; polar coordinates.			

Course Number	Course Title: Principles of Statistics	Online	Credit Hours
0301131			
Prerequisite: (None)			3
Course Description Describing statistical data by tables, graphs and numerical measures, Chebychev's inequality and the empirical rule, counting methods, combinations, permutations, elements of probability and random variables, the binomial, the Poisson, and the normal distributions, sampling distributions, elements of testing hypotheses, statistical inference about one and two populations parameters.			

Course Number	Course Title: Biostatistics for the Health Sciences	Face to face	Credit Hours
0301132			
Prerequisite: (None)			3
Course Description This course emphasizes on the nature and characteristics of the most commonly used statistical techniques (descriptive statistics, t-test, Chi-Square, and elementary hypothesis testing), and their applicability to specific health care problems within the context of medicine. Students develop skills and knowledge in the use of computing software and to reinforce learning through course work and assignments, including the analysis of data.			

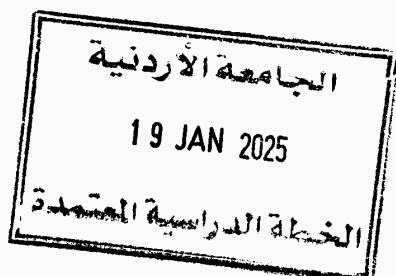




Course Number	Course Title: Calculus III	Face to face	Credit Hours
0301201			
Prerequisite: (0301102)			3
Course Description Three dimensional space rectangular coordinates in 3-space; vectors: dot product, cross product, parametric equations of lines. planes in 3-spaces; vector -valued functions: calculus of vector valued functions, arc length, curvature, functions of two or more variable: domain, limits, and continuity; partial derivatives; differentiability; total differentials; the chain rule; the gradient; directional derivatives; tangent planes; normal lines; maxima and minima of functions of two variables; Lagrange multipliers; multiple integrals: double integral, double integrals in polar coordinates; triple integrals; triple integrals in cylindrical and spherical coordinates.			

Course Number	Course Title: Engineering Mathematics I	Face to face	Credit Hours
0301202			
Prerequisite: (0301201)			3
Course Description Ordinary differential equations, linear differential equations of second and higher order, systems of differential equations, series solutions of differential equations, orthogonal functions, Laplace transforms, linear systems of equations, matrices and determinants.			

Course Number	Course Title: Principles of Mathematics	Face to face	Credit Hours
0301211			
Prerequisite: (0301102)			3
Course Description Logic: axioms and theorems, negations, quantifiers. Algebra of sets: union, intersection, symmetric difference, difference, complement. Functions: domain and range, different classes of functions including 1-1 and onto, graph of a function. Relations on sets: equivalence relations and equivalence classes, partial order relation, total order relation. Cardinality of sets: finite sets, countable sets, uncountable sets.			

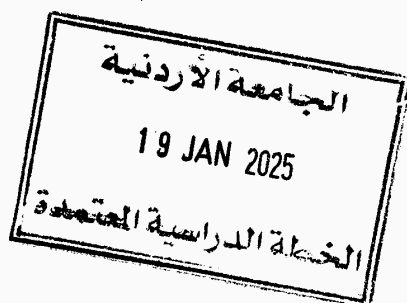




Course Number 0301213	Course Title: Real Analysis I	Face to face	Credit Hours
Prerequisite: (0301211)			3
Course Description The completeness property of \mathbb{R} . The Archimedean principle in \mathbb{R} . Limit of a sequence. Convergent sequences. Monotone and bounded sequences. Cauchy sequences. Subsequences and limit points. \liminf and \limsup of sequences of real numbers. Open sets, closed sets, bounded sets and compact sets in \mathbb{R} . Limits of real valued functions. Definition of limits by neighbourhoods. Definition of limits by sequences. Continuous functions on \mathbb{R} . Sequence definition and neighbourhood definition of continuity. Boundedness of continuous functions on compact intervals. The extreme value theorem. The intermediate value theorem. Uniformly continuous functions. The sequential criterion for uniform continuity. The derivative of functions. Rolles Theorem. Mean value theorem. Taylor Theorem with remainder. L' Hospital's rule. The Riemann Stieitjes Integral. Fundamental Theorem of Calculus.			

Course Number 0301221	Course Title: Ordinary Differential Equations I	Blended	Credit Hours
Prerequisite: (0301102)			3
Solutions of differential equations (first order, second order, and higher orders) with applications to mechanics and physics, series solutions, Laplace transform method.			

Course Number 0301241	Course Title: Linear Algebra I	Face to face	Credit Hours
Prerequisite: (0301101)			3
Course Description Systems of linear equations; matrices and matrix operations; Gaussian elimination; elementary matrices and a method for finding A^{-1} ; determinants, General vector spaces; subspaces; basis; dimension; row space; column space; null space of a matrix; rank and nullity; inner product spaces; eigenvalues and diagonalization; linear transformations.			





Course Number	Course Title: Modern Euclidean Geometry	Face to face	Credit Hours
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Prerequisite: (0301211)

3

Course Description

Axiomatic systems: consistency, independence and completeness, finite projective geometry, paradoxes of Euclidean geometry, the postulates of connection, the measurement of distance, ruler postulate, order relations, plane-separation postulate, space-separation theorem, Pasch theorem, further properties of angles, triangles, congruence postulate, parallel postulate, similarity, Pythagorean theorem, theorems of Ceva and Menelous, Erdős theorem, circles, central and inscribed angles, cyclic quadrilaterals, Simson's line, nine point circle, lines and planes in space.

Course Number	Course Title: Mathematics Lab	Blended	Credit Hours
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Prerequisite: (0301201)

2

Course Description

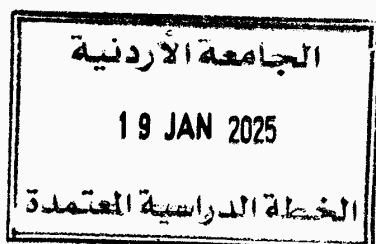
A mathematical software is used in a computer lab to illustrate selected mathematical concepts, explore some mathematical facts, build algorithms for problem solving cases, do numerical and analytical computations, do simulation studies and plot graphs. The selected topics can cover a range of mathematical topics from basic algebra and trigonometry, calculus, probability and statistics. The course starts with training on using the package and ends with writing computer programs to solve some specific mathematical problems.

Course Number	Course Title: Mathematics for Finance	Face to face	Credit Hours
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Prerequisite: (0301102)

3

Mathematical and Statistical techniques in compound interest, discounted cash flow, valuation of cash flows of insurance contracts, analysis and valuation of annuities, bonds, loans and other securities. Yield curves and immunization. Stochastic interest rate models. Actuarial applications.

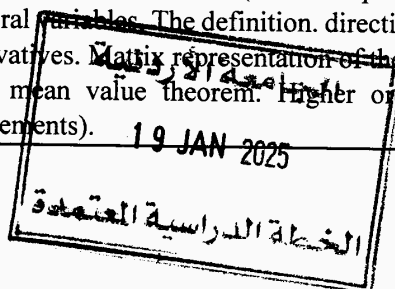




Course Number	Course Title: Advanced Calculus	Face to face	Credit Hours
0301301			
Prerequisite: (0301201)			3
Course Description Vector differential calculus: gradient, divergence, curl, curvilinear coordinates; vector integral calculus: line integral, surface integral volume integral, Green's theorem, Stoke's theorem, divergence theorem; implicit and inverse function theorems; Leibnitz theorem; calculus of variations (functionals of one variable).			

Course Number	Course Title: Engineering Mathematics II	Face to face	Credit Hours
0301302			
Prerequisite: (0301202)			3
Course Description Vector differential calculus, line and surface integrals, integral theorems, Fourier series, Fourier integrals, Fourier transforms, partial differential equations.			

Course Number	Course Title: Real Analysis II	Face to face	Credit Hours
0301313			
Prerequisite: (0301213)			3
Course Description Series of real numbers: the definition and the algebraic properties. Convergence: the definition and the basic properties. Absolute and conditional convergence. Tests of absolute convergence (Ratio, nth root and comparison tests). Rearrangements of series. Abel test. Dirichlet test. Sequences of functions, the definition and examples. Pointwise convergence. Uniform convergence. Uniform convergence and continuity on $[a,b]$. Uniform convergence and integrability on $[a,b]$. Uniform convergence of sequences of derivatives. Dini's Theorem. Uniform convergence and interchange limit theorems. Series of functions: definition and basic properties. Pointwise and uniform convergence of series of functions. Weierstrass M-test. Uniformly convergent series of continuous functions. Uniformly convergent series of integrable functions. Interchange of summation and integration. The space $C[a,b]$, the definition, metric and algebraic properties: The Weierstrass approximation theorem. Linear transformations on \mathbb{R}^n and their matrix representation (fast revision). Functions from \mathbb{R}^n to \mathbb{R}^m (basic setup and examples). The derivative of vector valued functions of several variables. The definition. directional derivatives. Differentiability implies continuity. Partial derivatives. Matrix representation of the derivative. The gradient and its properties. The chain rule. The mean value theorem. Higher order derivatives. Inverse and implicit mapping theorems (statements).			





Course Number	Course Title: Partial Differential Equations I	Face to face	Credit Hours
0301321			
Prerequisite: (0301221)			3
Course Description Classification; some physical models (heat, wave, Laplace equations); separation of variables; Sturm-Liouville BVP; Fourier series, integrals and transforms; Homogeneous and nonhomogeneous problems, Infinite domain problems, BVP involving rectangular and circular regions; BVP involving cylindrical and spherical regions.			

Course Number	Course Title: Statistical Techniques	Face to face	Credit Hours
0341332			
Prerequisite: (0301131)			3
Course Description Simple and multiple regression, correlation coefficient, the analysis of variance of one and two-factor experiments, Chi square test for homogeneity, independences, and goodness of fit, non-parametric statistics: the sign test, Wilcoxon rank sum test, Wilcoxon signed rank test, and Mann-Whitney test, Spearman correlation coefficient.			

Course Number	Course Title: Probability Theory	Face to face	Credit Hours
0301333			
Prerequisite: (0301201)			3
Course Description Distributions of random variables, conditional probability and stochastic independence, some special distributions (discrete and continuous distributions), univariate, bivariate and multivariate distributions, distributions of functions of random variables (distribution function method, moment generating function method, and the Jacobian transformation method), limiting distributions.			

Course Number	Course Title: Stochastic Processes	Face to face	Credit Hours
0331334			
Prerequisite: (0301333)			3
Course Description Markov chains, transition probability, classification of states, branching and queueing chains, stationary distributions, Markov chain, Markov pure jump processes, second order processes, mean and covariance functions, Gaussian process and Wiener process.			

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Course Number	Course Title: Design and Analysis of Experiments	Blended	Credit Hours
0341336			
Prerequisite: (0301332)			3
Course Description Randomization, blocking and replication, one way completely randomized design for fixed/random effects experiments, analysis of variance, comparison of multiple treatment means and the generalized type I error rate, orthogonal contrasts, simple linear regression and the analysis of covariance, hierarchical (nested) designs. randomized complete and incomplete block designs, latin square and cross.			

Course Number	Course Title: Applied Probability	Online	Credit Hours
0301338			
Prerequisite: (0301333)			3
Course Description Revision of probability distributions and statistical inference, queueing theory (Poisson process, birth-death processes), reliability theory (life distributions, composite systems, repairable systems), quality control and acceptance sampling, information theory and coding.			

Course Number	Course Title: Modern Algebra I	Face to face	Credit Hours
0331341			
Prerequisite: (0301211)			3
Course Description Groups and subgroups; cyclic groups; permutation groups; isomorphisms of groups; direct product of groups; cosets, and Lagrange theorem; normal subgroups and factor groups; homomorphisms of groups; the first isomorphism theorems.			

Course Number	Course Title: Number Theory	Face to face	Credit Hours
0301341			
Prerequisite: (0301211)			3
Course Description Division algorithm; divisibility; greatest common divisor and least common multiple; Diophantine equations; prime numbers and their distribution; fundamental theorem of arithmetic; congruence; linear congruence equations; Chinese remainder theorem; tests of divisibility. Fermat little theorem; Wilson's theorem; Euler Theorem, Number Theoretic functions.			

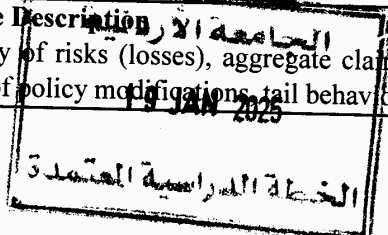


Course Number	Course Title: General Topology I	Face to face	Credit Hours
0301361			
Prerequisite: (0301213)			3
Course Description Topological spaces, open sets, boundary, interior, accumulation points, topologies induced by functions, subspace topology, bases and subbases, finite products, continuous functions, open and closed functions homeomorphisms, separation axioms, countability axioms, metric spaces, connectedness and compactness.			

Course Number	Course Title: Mathematical Optimization	Face to face	Credit Hours
0301371			
Prerequisite: (0301241)			3
Course Description Formulation of linear optimization problems, the graphical method, geometry of linear programming, the simplex method for linear optimization, duality in linear programming, integer programming formulation, the Gomory cutting-plane method, gradient methods for nonlinear optimization, the steepest descent method.			

Course Number	Course Title: Theory of Algorithms	Blended	Credit Hours
0301374			
Prerequisite: (0301211)			3
Course Description Definition of an algorithm, analysis of algorithms, asymptotic analysis, Big Oh, Omega and Theta notations, recurrence equations, recursive and nonrecursive algorithms, the concept of worst, best, and average case performance analysis, the complexity class NP-complete, applications on matrix algorithms, searching and sorting algorithms, Euclid's algorithm; introduction to graphs; elementary graph algorithms.			

Course Number	Course Title: Risk Theory	Face to face	Credit Hours
0301376			
Prerequisite: (0301333)			3
Course Description Severity of risks (losses), aggregate claims, convolutions and mixtures models for loss severity, effect of policy modifications, tail behavior, compound Poisson models, ruin probability, Brownian			



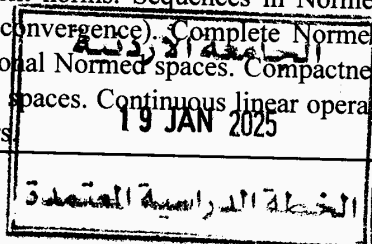


motion for risk process, policy limits, policy deductibles, combined policy limit, various premium principle.

Course Number	Course Title: Mathematical Analysis	Face to face	Credit Hours
0301414			
Prerequisite: (0301313)			3
Course Description Liminf and limsup of sequences of real numbers. Series of real numbers: the algebraic properties and convergence. Review of tests of convergence. Advanced tests of convergence. Infinite product and its relation to infinite series. Sequences of functions. Uniform convergence. Uniform convergence and integrability on $[a,b]$. Series of functions: definition and basic properties. Pointwise and uniform convergence of series of functions. Weierstrass M-test. Uniformly convergent series of continuous functions. The space $C[a,b]$: definition, metric and algebraic properties. The Weierstrass approximation theorem. Improper integral.			

Course Number	Course Title: Complex Analysis	Face to face	Credit Hours
0331412			
Prerequisite: (0301213)			3
Course Description Complex numbers and the complex plane. Functions of complex variable. Analytic functions. Harmonic functions. Elementary functions (exponential, logarithmic, trigonometric, etc). Contours and contour integration. Important theorems on integration like the Cauchy-Goursat theorem on Simply and multiply connected regions, the Cauchy integral formula, Morera's Theorem,...etc. Sequences and series of complex numbers. Taylor series and Laurent series. Residues and Residue theorem. Improper integrals of the form $\int_0^\infty f(z)dz$.			

Course Number	Course Title: Basics in Functional Analysis	Face to face	Credit Hours
0301413			
Prerequisite: (0301213)			3
Course Description Norms on vector spaces. Examples of norms. Relation between norm and metric on vector spaces. Equivalent norms. Sequences in Normed spaces. Convergence of sequences in Normed spaces (strong convergence). Complete Normed spaces. Examples of complete Normed spaces. Finite dimensional Normed spaces. Compactness of the unit ball in Normed spaces. Linear operators on Normed spaces. Continuous linear operators. Bounded linear operators. Norms on Bounded linear operators.			





Course Number	Course Title: Ordinary Differential Equations II	Blended	Credit Hours
0331421			
Prerequisite: (0301221)			3
Course Description Linear ordinary differential equations; Homogeneous and non-homogeneous linear systems with constant coefficients; non-linear differential equations and stability.			

Course Number	Course Title: Partial Differential Equations II	Face to face	Credit Hours
0331422			
Prerequisite: (0301221)			3
Course Description First order differential equation in two independent variables; semilinear and quasilinear equations; first order non-linear equations; second order linear equations; canonical forms; Green's function method; transforms method.			

Course Number	Course Title: Special Functions	Face to face	Credit Hours
0301424			
Prerequisite: (0301221)			3
Course Description Series solutions of differential equations, Gamma and Beta functions, Legendre polynomials and functions, Bessel functions, Hermite and Laguerre polynomials, Chebyshev polynomials, hypergeometric functions, other special functions.			

Course Number	Course Title: Mathematical Statistics	Face to face	Credit Hours
0331431			
Prerequisite: (0301333)			3
Course Description Method of estimation including non-Bayesian and Bayes estimation, confidence intervals, pivotal statistics, sufficient statistics and their properties, complete statistics exponential family, Fisher information and the Rao-Cramer inequality, most powerful (MP) test, uniformly MP test, likelihood ratio tests, sequential test.			

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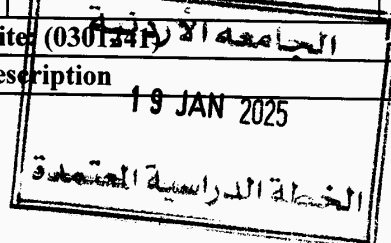


Course Number	Course Title: Time Series	Face to face	Credit Hours
0331432			
Prerequisite: (0301333)			3
Course Description Descriptive techniques, types of variations: trend, cycle and seasonal fluctuations, autocorrelation, probability models for time series, stationary processes; autocorrelation function, estimation in time domain, fitting an autoregressive process, fitting a moving average process, forecasting, box and Jenkin's methods, stationary processes in the frequency domain, spectral analysis.			

Course Number	Course Title: Linear Algebra II	Face to face	Credit Hours
0301441			
Prerequisite: (0301241)			3
Course Description spaces; subspaces; linear independence and bases; linear transformations; eigenvalues, eigenvectors and determinants of linear transformations; matrix representation; change of basis and similarity; invariant subspaces; canonical forms of linear transformations; diagonal form; triangular form; nilpotent Vector transformations; Jordan form; companion matrices; commutators; the trace functional and Jacobson's lemma; normal transformations and the spectral theorem.			

Course Number	Course Title: Modern Algebra II	Face to face	Credit Hours
0301442			
Prerequisite: (0301341)			3
Course Description Rings, subrings, integral domains, factor rings and ideals. Ring homomorphisms; polynomial rings; factorization of polynomials; reducibility and irreducibility tests; divisibility in integral domains; principal ideal domains and unique factorization domains. Euclidean domains.			

Course Number	Course Title: Combinatorial Analysis	Face to face	Credit Hours
0331433			
Prerequisite: (0301241)			3
Course Description			



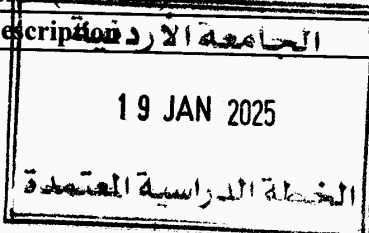


Principles of enumeration; finite difference calculus; generating function; principles of inclusion and exclusion; introduction to the theory of graphs; circuits and graph coloring; trees, Eulerian and Hamiltonian Graphs.

Course Number	Course Title: Graph Theory	Face to face	Credit Hours
0301445			
Prerequisite: (0301241)			3
Course Description Definition of graphs multigraphs and digraphs. Examples on graphs multigraphs and digraphs. Important type of graphs such as: Complete Graphs, Null Graphs, Paths, Cycles, Wheels, Bipartite Graphs, Complete Bipartite Graphs, Hypercubes and Trees. Operations on graphs such as: Complement of a graph, Union of two graphs, Join of two graphs, Cartesian product of two graphs. Subgraphs and Induced Subgraphs. Isomorphisms, Adjacency and Incidence Matrices. Connected Graphs, Eulerian Graphs, and Hamiltonian Graphs. Planar Graph and Crossing number. Domination number, Clique number, Chromatic number, and Independence number. Matchings and Hall's marriage theorem. Applications such as: Network Flow Problem, Four Color Problem, Traveling Salesman Problem, and Minimum Connector Problem.			

Course Number	Course Title: Cryptography Theory	Online	Credit Hours
0301446			
Prerequisite: (0301342)			3
Course Description Classical Cryptosystems such as: Shift ciphers, Affine ciphers, The Vigen`ere cipher, Substitution ciphers, The Playfair cipher, ADFGX cipher, and Block ciphers. One time pad, Pseudo-Random Bit Generation, and Linear feedback shift register. World War II ciphers such as: Enigma and Lorenz. Public key cryptosystems, The RSA, Primality testing and attack on RSA, The AlGamal Public key cryptosystem. Symmetric block cipher systems such as: DES and Rijndael. Digital Signatures such as: RSA signatures, The AlGamal signature scheme, and Hash functions. Elliptic curves and elliptic curves cryptosystems.			

Course Number	Course Title: Foundations of Mathematics	Face to face	Credit Hours
0301451			
Prerequisite: (0301211)			3
Course Description			





Introduction and paradoxes; axioms of set theory; equivalence relations and functions; partially ordered classes; lattices; well-ordered classes; the axiom of choice and related principles; Dedekind cuts; cardinals and ordinals.

Course Number	Course Title: Non-Euclidean Geometry	Face to face	Credit Hours
0331461			
Prerequisite: (0331261)			3
Course Description Study of the parallel postulate and some of its equivalent statements, hyperbolic geometry and some related theorems, elliptic geometry and some related theorems, spherical geometry.			

Course Number	Course Title: General Topology II	Face to face	Credit Hours
0331462			
Prerequisite: (0331361)			3
Course Description Separation axioms T_2 , T_3 , T_4 and some examples and theorems related to them. Compact spaces and some related theorems, Connected spaces and some related theorems. Metric spaces and some related examples and theorems. Sequences and their convergence in topological spaces.			

Course Number	Course Title: Methods of Applied Mathematics	Face to face	Credit Hours
0301471			
Prerequisite: (0331412)			3
Course Description Integral equations; integral transforms; asymptotic techniques; algebraic equations and integrals; complex analytic methods: conformal mapping and harmonic analysis.			

Course Number	Course Title: Numerical Methods	Blended	Credit Hours
0301472			
Prerequisite: (0331321)			3
Course Description Numerical analysis, numerical methods in linear algebra, numerical methods for ordinary and partial differential equations.			

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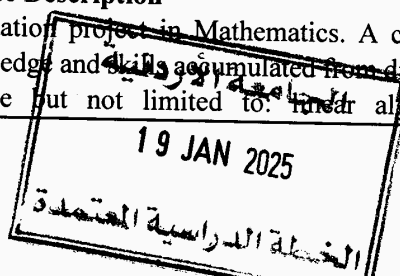
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Course Number	Course Title: History of Mathematics	Blended	Credit Hours
0301481			
Prerequisite: (0331301)			3
Course Description Evolution of some mathematical concepts, facts and algorithms in arithmetic, algebra, trigonometry, Euclidean geometry, analytic geometry and calculus through early civilizations, Egyptians, Babylonians, Greeks, Indians, Chinese, Muslims and Europeans, evolution of solutions of some conjectures and open problems.			

Course Number	Course Title: Employability Readiness	Face to face	Credit Hours
0301492			
Prerequisite: (0331261 + 0301273 + 0301342 + Completing at least 90 credit hours)			6
Course Description This course aims to equip students with essential skills to excel in overcoming academic and professional challenges they may encounter in the job market and to adapt effectively to these demands. It covers a diverse range of topics, including academic, practical, and technological skills such as mathematics teaching methods, the use of mathematical and statistical software, and tools for mathematical writing. Additionally, the course introduces students to graduate programs and their various tracks, both locally and internationally. Furthermore, it focuses on developing professional and personal skills, including writing a professional CV, preparing for job interviews, enhancing effective communication skills, and building strong teamwork abilities.			

Course Number	Course Title: Graduate Project	Blended	Credit Hours
0301498			
Prerequisite: (0301273 + Completing at least 90 credit hours)			3
Course Description Graduation project in Mathematics. A comprehensive project in which the student applies the knowledge and skills accumulated from different courses in some area of mathematics. These areas include but not limited to: linear algebra, differential equation, mathematical modelling,			





optimization and operations research, graph theory, numerical methods, computational mathematics, financial mathematics, actuarial science and statistics.

Inclusion rates in the program:

A. Courses that will be taught on the principle of full online:

Total hours that will be taught on the principle of full online in this program: (15 hour).

The percentage achieved for the subjects that will be taught on the principle of full online in this program: (11.1%)

B. Subjects to be taught on the blended learning principle:

The total number of hours that will be taught on the principle of blended learning in this program: (42 hour)

Percentage achieved for subjects that will be taught on the principle of blended learning in this program: (42.1%)

C. Face-to-face learning courses:

Number of hours of face-to-face education: (78 hour).

