



**College Arts and Sciences**  
**Department of Mathematics**

**Study Plan of the Bachelor's Degree**  
**In: Mathematics**  
**Academic Year: 2025-2026**

Study Plan Credit hours(.....)

Type of Program: **Blended/ Online**

Major Type:

Humanities

Scientific/Technical

Science Medical

Teaching Type	Percentage of study plan hours/number	Actual Ratio
Complete Online E-Learning	20% - 10% Maximum	20%
Blended learning (for scientific majors)	50% - 30% Maximum	47.5%
Face-to-face learning (for scientific majors)	30% Minimum	32.5%

Note: The learning types of the courses are disseminated at all academic levels in the program



### Department Vision

Entrepreneurship and distinction in the quality of teaching and learning, scientific research and community service at local and regional levels.

### Department Mission

Preparing qualified and distinguished graduates to meet the needs of the local and regional community, by local and international quality criteria.

### Program Mission

Preparing qualified and distinguished graduates to meet the needs of the local and regional community, through qualified cadres capable of keeping pace with local and international criteria by the e-learning integration criteria.

### Educational Program Objectives

1. Preparing professionals in mathematics equipped with mathematical knowledge and scientific skills.
2. Assisting students to deal with mathematical problems and find solutions.
3. Disseminating a mathematics culture as a free critical, and analytical ideology in the university and community.
4. Enhancing the scientific attitudes of students and fostering interest in graduate studies.

### Educational Program Outcomes

1. A systematic understanding of theories, knowledge, and skills acquired in mathematics and statistics, as well as recent scientific advancements in this field.
2. Mastery of mathematical and statistical skills and tools to solve problems.
3. Demonstrating specialized and conceptual skills in mathematics and statistics.
4. The ability to organize and manage specialized projects in mathematics and statistics effectively
5. The ability to transform real-life situations into mathematical and statistical concepts and methods, applying personal and creative skills across different life domains.



### Plan Contents

The study plan for a bachelor's degree consists of a major in Mathematics. Of **(132)** credit hours disseminated as follows:

Sequence	Classification	Credit Hours	Percent %
1st	University Requirements	27	20.45%
2nd	College Requirements	18	13.64%
3rd	Program Requirements	78	59.10%
4th	Ancillary Requirements	6	4.54%
5th	Free subject	3	2.27%
6th	Remedial Requirements	0	0%
Total		132	100%

### Coding System Approved by the University

5	0	2	1.2.3	Semester	year	
College Code	Major Code		Knowledge domain	Course Level		Sequence

### Knowledge Domain

Domain Code	Knowledge Domain	Credited Hours of Study Plan
1	Foundation of Mathematics, Algebra, Geometry, Logic, Topology	30
2	Analysis and Calculus	42
3	Statistics and Probability	9

**First: University Requirements: (27) Credit Hours****A. Compulsory Requirements: (18) Credit Hours**

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
x			50511104	Communication Skills - Arabic Language (I)	3	50511111
x			50511105	Communication Skills - English Language (I)	3	50511112
x			50511206	National Education	3	-
x			50511308	Military Sciences	3	-
x			50511305	Innovation and Entrepreneurship	3	-
x			50511205	Life Skills and Social Responsibility and Leadership	3	-
x			50541209	Volunteering and Community Development	0	
<b>Total</b>					<b>18</b>	

\* Credit Hours 18

**B. Elective Requirements: (9) Credit Hours from the following list:**

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
x			50541103	Computer Skills	3	50511113
x			50541309	Digital Culture	3	50511113
x			50521106	Communication Skills 2 (Arabic Language)	3	50511104
x			50521107	Communication Skills 2 (English Language)	3	50511105
x			50521203	Principles of Psychology	3	-
x			50521204	Human Rights	3	-
x			50531101	Islamic Culture	3	-
x			50531205	Quds and Hashemite Custodianship	3	-



Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
x			50541204	Environment and development	3	-
x			50541308	Foreign Language	3	-
x			50541206	Health and Community	3	-
x			50541208	An Introduction to Sustainable Development	3	-
x			50541211	An Introduction to Artificial Intelligence	3	-
			<b>Total</b>		<b>9</b>	

\* Credit Hours 9

## Second: College Requirements: (18) Credit Hours

### A. Compulsory Requirements: (18) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
	x		50211101	Fundamentals of Mathematics	3	-
	x		50521101	Calculus (1)	3	-
	x		50221202	Calculus (2)	3	50521101
	x		50531100	Principle of Statistics and Probability	3	-
		x	50551103	General Chemistry	3	-
	x		50551101	General Physics (I)	3	-
			<b>Total</b>		<b>18</b>	

\* Credit Hours 18



### Third: Program Requirements (78) Credit Hours

#### A. Compulsory Requirements: (69) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		X	50211203	Logic and Set Theory	3	3	-	50521101
	X		50212104	Linear Algebra (I)	3	3	-	50521101
		X	50222104	Calculus (3)	3	3	-	50221202
		X	50212208	Number Theory	3	3	-	50211203
		X	50223113	Mathematical Analysis (I)	3	3	-	50211203
	X		50223217	Mathematical Analysis (2)	3	3	-	50223113
		X	50224118	Complex Analysis (I)	3	3	-	50222104
		X	50213214	Topology (I)	3	3	-	50223113
		X	50214116	Topology (2)	3	3	-	50213214
	X		50213110	Modern Euclidean Geometry	3	3	-	50211203
		X	50214115	Modern Algebra (I)	3	3	-	50212208
	X		50214216	Modern Algebra (2)	3	3	-	50214115
	X		50214217	Graph Theory	3	3	-	50211203
		X	50222209	Ordinary Differential Equations (I)	3	3	-	50221202
	X		50223112	Ordinary Differential Equations (2)	3	3	-	50222209
		X	50223216	Partial Differential Equations (I)	3	3	-	50222209



Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	X		50223111	Numerical Analysis (1)	3	3	-	21101550
	X		50224219	Numerical Analysis (2)	3	3	-	50223111 and 50222209
	X		50223214	Mathematical Modeling	3	3	-	50222209
	X		50222105	Fundamentals of Applied Mathematics	3	3	-	50221202
	X		50232102	Probability Theory	3	3	-	50531100
		X	50232204	Mathematical Statistics	3	3	-	50232102
	X		50224119	Teaching Methods of Mathematics	2	2		Pass 90 hours
		X	50224222	A Research in Mathematics	1	1		Pass 111 hours
<b>Total</b>					<b>69</b>	<b>69</b>		

\* Credit Hours 69

### B. Elective Requirements: (9) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		X	50222207	Advanced Calculus	3	3	-	50222104
		X	50213212	Non-Euclidean Geometry	3	3	-	50213110
		X	50232203	Applied Statistics	3	3	-	50531100
		X	50222103	Special Functions	3	3	-	50221202



Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		X	50224220	Partial Differential Equations (2)	3	3	-	50223216
		X	50224221	Complex Analysis (2)	3	3	-	50224118
		X	50223215	Applications of Modern Technology and Artificial Intelligence in Mathematics	3	3	-	-
		X	50222208	Introduction to Fuzzy Logic	3	3	-	50211203
	X		50222206	Financial Mathematics	3	3	-	50221202
	X		50213111	Matrix Analysis	3	3	-	50212209
		X	50223110	Transformations and Integral Equations	3	3	-	50221202
	X		50213213	Special Topics in Mathematics	3	3	-	pass 75 hours
	X		50212206	Game Theory and Linear Programming	3	3	-	50212104
	X		50212209	Linear Algebra (2)	3	3	-	50212104
		X	50221102	History of mathematics	3	3	-	-
			<b>Total</b>		<b>9</b>	<b>9</b>		

\* Credit Hours 9

**Fourth: Ancillary Requirements ( 6 ) Credit Hours:**

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requirement
Online E-Learning	Blended	Face-to-Face						
	X		50551201	General Physics (2)	3	3	-	50551101
	X		40741101	Fundamentals of Information Technology	3	3	-	-
			<b>Total</b>		<b>6</b>	<b>6</b>		

\* Credit Hours 6

**Fifth :Free course (3) Credit Hours:**

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requirement
Online E-Learning	Blended	Face-to-Face						
			<b>Total</b>	<b>3</b>	<b>3</b>			

\* Credit Hours 3

**Sixth: Remedial Requirements: 3 courses with (0) credit hours.**

Teaching type			Course Number	Course Title	Credited Hours*	Theoretical	Practical	Pre-Requirement
Online E-Learning	Blended	Face-to-Face						
X			50511111	Remedial Course in Arabic	0	3	-	-
X			50511112	Remedial Course in English	0	3	-	-
X			50511113	Remedial Course in Computer Science	0	3	-	-
			<b>Total</b>		<b>0</b>	<b>9</b>		

\* Credit Hours 0



## Guidance plan

## First Year

## First Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
5021101	Fundamentals of Mathematics	Blended	3	-	-
5052101	Calculus (I)	Blended	3	-	-
5053100	Principle of Statistics and Probability	Blended	3	-	-
	University Requirement	Online E-Learning	3	-	-
	University Requirement	Online E-Learning	3	-	-
50541209	Volunteering and Community Development	Online E-Learning	0	-	-
<b>Total</b>			<b>15</b>		

## Second Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50221202	Calculus (2)	Blended	3	Calculus (I)	-
50211203	Logic and Set Theory	Face-to-Face	3	Calculus (I)	-
40741101	Fundamentals of Information Technology	Blended	3	-	-
50551103	General Chemistry	Face-to-Face	3	-	-
	University Requirement	Online E-Learning	3	-	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>			<b>18</b>		

\* Credit Hours 33



## Second Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50222104	Calculus (3)	Face-to-Face	3	Calculus (2)	-
50212104	Linear Algebra (1)	Blended	3	Calculus (1)	-
50232102	Probability Theory	Face-to-Face	3	Principle of Statistics and Probability	-
50222105	Fundamentals of Applied Mathematics	Face-to-Face	3	Calculus (2)	-
50551101	General Physics (1)	Blended	3	-	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>			<b>18</b>		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50222209	Ordinary Differential Equations I	Face-to-Face	3	Calculus (2)	-
50212208	Number Theory	Face-to-Face	3	Logic and Set Theory	-
50232204	Mathematical Statistics	Face-to-Face	3	Probability Theory	-
50551201	General Physics (2)	Blended	3	General Physics (1)	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>			<b>15</b>		

\* Credit Hours 33



## Third Year

## First Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50223113	Mathematical Analysis (I)	Face-to-Face	3	Logic and Set Theory	-
50213110	Modern Euclidean Geometry	Face-to-Face	3	Logic and Set Theory	-
50223111	Numerical Analysis (I)	Blended	3	Calculus (I)	-
50223112	Ordinary Differential Equations (2)	Blended	3	Ordinary Differential Equations (I)	-
	Elective Department Requirements		3	-	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>			18		

## Second Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50223214	Mathematical Modeling	Blended	3	Ordinary differential Equations (I)	-
50223216	Partial Differential Equations (I)	Face-to-Face	3	Ordinary Differential Equations (I)	-
50213214	Topology (I)	Face-to-Face	3	Mathematical Analysis (I)	-
50223217	Mathematical Analysis (2)	Face-to-Face	3	Mathematical Analysis (I)	-



Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
	Elective Department Requirements		3	-	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>		18			

\* Credit Hours 36



## Fourth Year

## First Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50224118	Complex Analysis (I)	Face-to-Face	3	Calculus (3)	-
50214115	Modern Algebra (I)	Face-to-Face	3	Number Theory	-
50214116	Topology (2)	Face-to-Face	3	Topology (I)	-
50224119	Teaching Methods of Mathematics	Face-to-Face	2	Pass 90 hours	-
	Free Requirements		3	-	-
	University Requirement	Online E-Learning	3	-	-
<b>Total</b>			17		

## Second Semester

Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50214216	Modern Algebra (2)	Blended	3	Modern Algebra (I)	-
50214217	Graph Theory	Blended	3	Logic and Set Theory	-
50224219	Numerical Analysis (2)	Blended	3	Numerical Analysis (I) and Ordinary Differential Equations (I)	-
50224222	A Research in Mathematics	Face-to-Face	1	Pass III hours	-
	Elective Department Requirements		3	-	-
<b>Total</b>			13		

\* Credit Hours 30



Courses Tree

Courses Tree

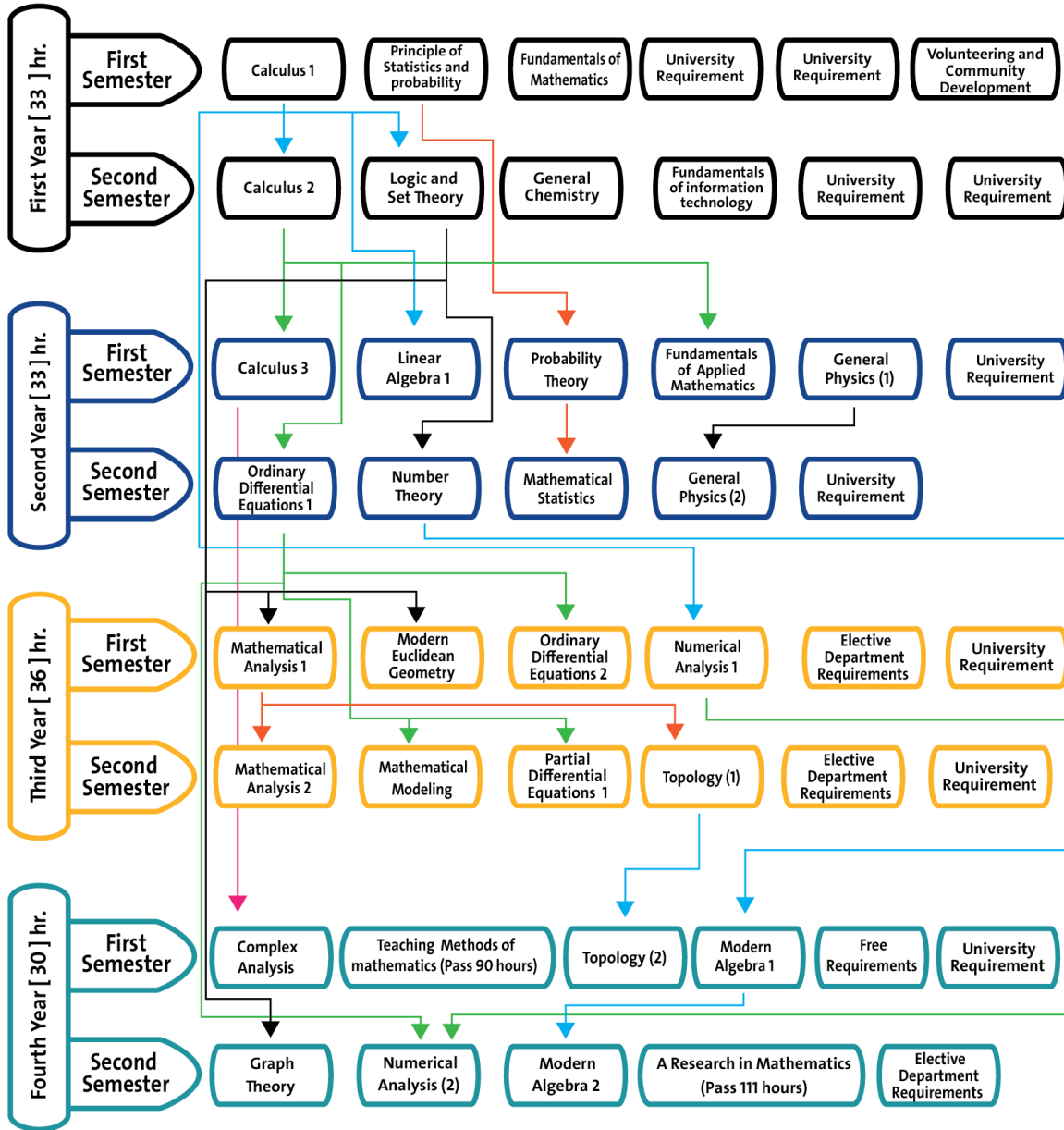
Faculty: Arts and Sciences

Major: Mathematics

Program: Bachelor

Department: Mathematics

Issue Date: 2024/2025





## Course Description

**(5021101), Fundamentals of Mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: (Non), type of learning: Blended**

Real number system, exponents and roots, polynomials, inequalities, the Cartesian plane, equations, functions, functions drawing, linear and slope functions, quadratic and drawing connections, combination of functions, inverse functions, relative and drawing relationships, partial fractions, exponential and logarithmic functions, exponential and logarithmic equations, Unit circle, measure of angles, trigonometric functions and their drawing, inverse trigonometric functions.

**(5052101), Calculus (I), (T: 3, P: 0) Credit hrs., Prerequisite: (Non), type of learning: Blended**

Limits and continuity of functions at a point and on interval, derivatives, techniques of differentiation, chain rule, implicit differentiation, Derivatives of exponential functions, derivatives of logarithmic functions, derivatives of trigonometric functions, equations of the tangent and normal, L'Hospital theorem, extreme values of functions, increasing and decreasing, concavity, maximum and minimum values, graphs of functions, integration, techniques of integration.

**(5022102), Calculus (2), (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (I) (5052101), type of learning: Blended**

Techniques of integration, integration by substitution, integration by parts, trigonometric integrals, trigonometric substitutions, integration by partial fractions, area of a surface, volumes of revolution, length of a plane curve, improper integrals, polar coordinates, Series and sequences, convergence and divergence, absolute convergence and conditional convergence, alternating series, power series, Taylor and Maclurine series, differentiation and integration of power series.

**(50222104), Calculus (3), (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (5022102), type of learning: Face-to-Face**

Three dimensional space and vectors, cylindrical surfaces, quadric surfaces, vectors, dot product and cross product, functions of two variables: limits and continuity, differentiability, partial derivatives, integrations: double integrals in rectangular coordinates, double integrals in polar coordinates, triple integrals in rectangular and cylindrical coordinates, multiple integrals.

**(50222207), Advanced Calculus, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (3) (50222104), type of learning: Face-to-Face**

Multiple Integrals: double Integrals, triple Integrals, double and triple integrals over general regions, double and triple integrals in polar coordinates, triple integrals in cylindrical coordinates, surface area, area and volume revisited. Line integrals: vector fields, line integrals of vector fields, fundamental theorem for line integrals, Green's theorem, Stokes theorem.

**(5021103), Logic and Set Theory, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (I) (5052101), type of learning: Face-to-Face**



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.

**(50212104), Linear Algebra (I), (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (I) (50521101) , type of learning: Blended**

Matrices and matrix operations, transpose and inverse of a matrix, determinants and their properties, vector spaces and subspaces, linearly independent and linearly dependent, row space and column space, null space of a matrix, inner product space, system of linear equations, methods of solving system of linear equations.

**(50212209), Linear Algebra (2), (T: 3, P: 0) Credit hrs., Prerequisite: Linear Algebra (I) (50212104) , type of learning: Blended**

Vector Spaces, quotient spaces, linear independence and bases, dual spaces, inner product spaces, matrix of a linear transformation, matrix representation, change of basis and similarity, forms of linear transformations.

**(50212208), Number Theory, (T: 3, P: 0) Credit hrs., Prerequisite: Logic and Set Theory (50211203) , type of learning: Face-to-Face**

Division algorithm, divisibility, greatest common divisor and least common multiple, prime numbers and their distribution, Diophantine equations, fundamental theorem of arithmetic, linear congruence equations, tests of divisibility, remainder theorem, application of number theory.

**(50213110), Modern Euclidean Geometry, (T: 3, P: 0) Credit hrs., Prerequisite: Logic and Set Theory (50211203) , type of learning: Face-to-Face**

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 Cheva and Menelous, Erdős theorem, circles, central and inscribed angles, cyclic quadrilaterals, Simson's line, nine point circle, lines and planes in space.

**(50213212), Non-Euclidean Geometry, (T: 3, P: 0) Credit hrs., Prerequisite: Modern Euclidean Geometry (50213110) , type of learning: Face-to-Face**

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.

**(50214115), Modern Algebra (I), (T: 3, P: 0) Credit hrs., Prerequisite: Number Theory (50212208) , type of learning: Face-to-Face**

Groups and subgroups, cyclic groups, permutation groups, isomorphism of groups, direct product of groups, cosets, and Lagrange's theorem, normal subgroups and factor groups, homomorphism of groups, the first isomorphism theorems.



**(50214216), Modern Algebra (2), (T: 3, P: 0) Credit hrs., Prerequisite: Modern Algebra (I) (50214115) , type of learning: Blended**

Rings, subrings, integral domains, factor rings and ideals. Ring homomorphism; polynomial rings, factorization of polynomials, reducibility and irreducibility tests, divisibility in integral domains, principal ideal domains and unique factorization domains.

**(50213214), Topology (I), (T: 3, P: 0) Credit hrs., Prerequisite: Mathematical Analysis (I) (50223113) , type of learning: Face-to-Face**

Topological spaces, open sets; boundary, interior; accumulation point, topologies induced by functions, subspace topology, bases and subbases, finite products, continuous functions, open and closed functions homeomorphisms, separation axioms and  $T_0, T_1, T_2$  topological spaces.

**(50214116), Topology (2), (T: 3, P: 0) Credit hrs., Prerequisite: Topology (I) (50213214) , type of learning: Face-to-Face**

Separation axioms  $T_3, T_4$  and some examples and theorems related to them, countability Axioms, 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.

**(50223113), Mathematical Analysis (I), (T: 3, P: 0) Credit hrs., Prerequisite: Logic and Set Theory (50211203) , type of learning: Face-to-Face**

The completeness property of  $R$ , The Archimedean principle in  $R$ , limit of a sequence, convergent sequences, monotone and bounded sequences, Cauchy sequences, subsequences and limit points, Bolzano--Weierstrass theorem, open sets, closed sets, bounded sets and compact sets in  $R$ , limits of real valued functions, definition of limits by neighborhoods, definition of limits by sequences, continuous functions on  $R$ , sequence definition and neighborhood 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. Rolle's Theorem, Mean value theorem, Generalized Mean value theorem. Taylor Theorem with remainder. L' Hospital's rule.

**(50223217), Mathematical Analysis (2), (T: 3, P: 0) Credit hrs., Prerequisite: Mathematical Analysis (I) (50223113) , type of learning: Face-to-Face**

Functions of bounded variation on  $[a, b]$ , continuous functions of bounded variation. Riemann integral ,the definition, existence of Riemann integral, basic properties of Riemann integral, classes of Riemann integrable functions (step functions, continuous functions, monotone functions), Mean value theorems for Riemann integral. Fundamental theorem of calculus. The Riemann-Stieltjes integral: the definition, basic properties of R-S integral, integration by parts, continuous functions and the R-S integral. Monotone functions and the R-S integral. Mean value theorems for R-S integral, the fundamental theorem for R-S integral, linear transformations on  $R^n$  and their matrix representation (fast revision), functions from  $R^n$  to  $R^m$  (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 (the second). Inverse and implicit mapping theorems (statements). Taylor series in two variables.



**(50224118), Complex Analysis (I), (T:3, P:0) Credit hrs., Prerequisite: Calculus (3) (50222104) , type of learning: Face-to-Face**

Complex numbers; analytic functions; functions of complex variables, exponential and logarithmic functions, trigonometric and hyperbolic functions; harmonic functions, the maximum principle, definite integrals, Cauchy theorem, Cauchy integral formula; sequences and series, convergence of series and sequences, Taylor series, Maclaurin series, zeros of analytic functions: singularity, principle parts; residues; poles; residue theorem.

**(50224221), Complex Analysis (2), (T: 3, P: 0) Credit hrs., Prerequisite: Complex Analysis (I) (50224118) , type of learning: Face-to-Face**

Residue theorem, Residues at poles, evaluation of improper integrals, definite integrals involving sines and cosines, integrals a long branch cut, argument principal, Rouche's Theorem, linear transformation, the transformation  $w = \frac{1}{z}$ , Mobius transformation, the transformations:  $\sin z, \cos z, \sinh z, \cosh z, z^2, z^{1/2}$ , Conformal mapping, harmonic conjugate, transformation of harmonic conjugate.

**(50214217), Graph Theory, (T: 3, P: 0) Credit hrs., Prerequisite: Logic and Set Theory (50211203) , type of learning: Blended**

Fundamental concepts of graphs and digraphs, trees, matchings, factorizations, connectivity, networks, graph colorings, planar graphs, Eulerian and Hamiltonian graphs, etc.

**(50222209), Ordinary Differential Equations (I), (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (50221202) , type of learning: Face-to-Face**

Solutions of first order differential equations with applications, solutions of second order differential equations with applications, systems of differential equations, series solutions, Laplace transform.

**(50223112), Ordinary Differential Equations (2), (T: 3, P: 0) Credit hrs., Prerequisite: Ordinary Differential Equations (I) (50222209) , type of learning: Blended**

Existence and uniqueness theory to ordinary differential equations, systems ordinary equations, Frobenius method to solve ordinary differential equations, Stability Theory to nonlinear ordinary differential equations, etc.

**(50223216), Partial Differential Equations (I), (T: 3, P: 0) Credit hrs., Prerequisite: Ordinary Differential Equations (I) (50222209) , type of learning: Face-to-Face**

Introduction to partial differential equations (PDEs), Second order equations and classification into canonical forms (Parabolic, Elliptic and hyperbolic), Sturm-Liouville boundary-value problems, Fourier series, Separation of variables for linear homogeneous PDEs, the heat equations, Wave equations, Laplace's equation and potential equation in a disk, Fourier transforms for finding solution of PDEs, Fourier sine and cosine transforms for finding solution of PDEs, Finite Fourier transforms for finding solution of PDEs.

**(50224220), Partial Differential Equations (2), (T: 3, P: 0) Credit hrs., Prerequisite: Partial Differential Equations (I) (50223216) , type of learning: Face-to-Face**



Lagrange's method for linear partial differential equation of the first order, Cauchy problems, Complete integrals of nonlinear partial differential equations of first order, four standard forms, Charpit's method, Monge's method. Higher order linear partial differential equations with constant coefficients.

**(50223111), Numerical Analysis (1), (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (1) (50521101) , type of learning: Blended**

Elementary introduction to numerical analysis, linear and nonlinear equations, numerical methods for linear problems which do not contain exact solutions or too difficult to solve analytically, error analysis, solutions of nonlinear problems: Fixed-point iteration, Taylor polynomial, Bisection method, Newton-Raphson method, etc.

**(50224219), Numerical Analysis (2), (T: 3, P: 0) Credit hrs., Prerequisite: Numerical Analysis (1) (50223111) and Ordinary Differential Equations (1) (50222209) , type of learning: Blended**

Review of properties and the numerical methods, advance methods for solving nonlinear equations, representation of numbers and analysis of errors, solution of systems of linear equations: Lagrange polynomials, Newton polynomials, etc., numerical differentiation, numerical integration.

**(50222105), Fundamentals of Applied Mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (50221202) , type of learning: Face-to-Face**

Taylor and power series, Fourier sine and cosine series, discrete Fourier transform, continuous Fourier transform, Laplace series, Laplace transform, Z-transform, applications.

**(50223214), Mathematical Modeling, (T: 3, P: 0) Credit hrs., Prerequisite: Ordinary Differential Equations (1) (50222209) , type of learning: Blended**

Compartmental models, growth and decay of a single population, interacting populations, phase plane, linear and non-linear analysis, extended population models, act.

**(50222103), Special functions, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (50221202) , type of learning: Blended**

Error and complementary error functions, Gamma function, Beta functions, relation between Gamma and Beta functions, applications, Bessel functions, Bessel's differential equation, Euler function, Legendre function, etc.

**(50531100), Principle of Statistics and Probability, (T: 3, P: 0) Credit hrs., Prerequisite: (Non) , type of learning: Blended**

Describing Statistical Data by tables, graphs and numerical Measures, Measures of Central Tendency and Deviation, counting methods, The Variance, binomial and Normal distribution, probabilities Laws, Random Variables, Sampling distributions, testing of statistical hypotheses for two populations, correlation and regression, correlation coefficient.

**(50232102), Probability Theory, (T: 3, P: 0) Credit hrs., Prerequisite: Principle of Statistics and Probability (50531100) , type of learning: Face-to-Face**



Random variables, statistical distributions, randomized experiments, principles of probability, conditional probability, Bayes theorem, expected value of a discrete random variable, probability distributions, inferential statistics, null and alternative hypothesis, test function, power of the test, etc.

**(50232203), Applied Statistics, (T: 3, P: 0) Credit hrs., Prerequisite: Principle of Statistics and Probability (50531100) , type of learning: Face-to-Face**

Estimation (Point and Interval), Elements of Testing Hypotheses (one-Tail Test, Two-Tail Test), Statistical Inference about one and two Populations Parameters.

**(50232204), Mathematical Statistics, (T: 3, P: 0) Credit hrs., Prerequisite: Probability Theory (50232102) , type of learning: Face-to-Face**

basic probability theory, discrete, continuous, and mixed random variables, expected values, moments, univariate probability distributions including the hypergeometric distribution, Bernoulli and binomial distributions, geometric and negative binomial distributions, Poisson distribution, discrete and continuous uniform distributions, exponential and gamma distributions, chi-square distributions, and normal distributions, joint probability distributions including the multivariate hypergeometric distribution, multinomial distribution, and bivariate normal distribution, covariance and correlation, and conditional probability distributions.

**(50224119), Teaching Methods of mathematics, (T: 2, P: 0) Credit hrs., Prerequisite: pass 90 hours, type of learning: Face-to-Face**

This course deals with the teaching process to implement the curriculum in terms of the concept of teaching, its foundations and tasks, traditional teaching methods (lecture, discussion, induction, measurement, etc.) and modern teaching methods (project-solving method, problem-solving method, deduction method, brainstorming method, Program-learning method, role-playing method, and e-learning method)

**(50224222), A Research in Mathematics, (T: 1, P: 0) Credit hrs., Prerequisite: pass III hours, type of learning: Face-to-Face**

This course aims to introduce the student to the nature of scientific research in mathematics, its fields, approaches and scientific procedures.

**(50222208), Introduction to Fuzzy Logic, (T: 3, P: 0) Credit hrs., Prerequisite: Logic and Set Theory (50211203) , type of learning: Face-to-Face**

Fuzzy sets, from crisp sets to fuzzy sets, basic concepts and definitions, fuzzy Arithmetic, fuzzy numbers, Arithmetic operations on intervals, Arithmetic operations on fuzzy numbers, Addition – Subtraction – Multiplication– Division fuzzy equations, fuzzy operations, t-norms, t-conorms, aggregation operations, fuzzy arithmetic, fuzzy numbers, linguistic variables, fuzzy relations, fuzzy equivalence, fuzzy relational equations, fuzzy measures, possibility theory, Dempster-Shafer theory of evidence, fuzzy logic, multi-valued logic, fuzzy qualifiers.

**(50223215), Applications of Modern Technology and Artificial Intelligence in Mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: (non), type of learning: Blended**



This course aims to introduce students to modern technology techniques and how to apply them in the field of mathematics. The course focuses on reviewing artificial intelligence tools and techniques that can be used to solve complex mathematical problems, improve calculations, and develop mathematical models that help in decision-making.

**(50212206), Linear Programming and Game Theory, (T: 3, P: 0) Credit hrs. Prerequisite: Linear Algebra (I) (50212104) , type of learning: Blended**

Linear programming introduces the student to a specific mathematical model: the linear programming model. This model has a wide range of applications, and is of interest to practitioners in operations research, statistics, economics management and psychology. This, and the fact that good algorithms can solve huge linear programs, is the reason for the success of this model. The theory of the course treats the simplex algorithm, duality theory, and sensitivity analysis. The theory is accompanied by practical examples that illustrate the power of the model, and teach the student the skill of modelling. After completing this course student will have obtained knowledge of the existing algorithms for linear programming. Students will be able to detect when a problem be solved via linear programming, and model it accordingly. Furthermore, student will be able to perform sensitivity analysis.

**(50222206), Financial Mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (50221202) , type of learning: Blended**

Mathematical and statistical methods for calculating compound interest, uncorrelated financial flow, financial values of insurance contracts, analysis and evaluation of annual aid, documents, loans, other guarantees, curves and immunities, financial rate models, actuarial applications.

**(50213213). Special Topics in Mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: pass 75 hours, type of learning: Blended**

In this course, a topic in mathematics is given whose content is not found in the courses offered by the department.

**(50213111), Matrix Analysis, (T: 3, P: 0) Credit hrs., Prerequisite: Linear Algebra (2) (50212209) , type of learning: Blended**

Similarity and canonical forms, special classes of matrices, the singular value decomposition, determinant and trace inequalities, the min-max principle, norms of vectors and matrices, the Lower order of Hermitian matrices, Kronecker product of matrices.

**(50223110), Transformations and Integral Equations, (T: 3, P: 0) Credit hrs., Prerequisite: Calculus (2) (50221202) , type of learning: Face-to-Face**

Fourier transforms, Laplace transforms, Millen transformations, discrete integral and differential equations, approximation methods in solving integral and integral equations to solve the initial value problem the boundary value, solving equations and Laplace integrals.

**(40741101), Fundamentals of Information Technology, (T: 3, P: 0) Credit hrs., Prerequisite: (Non) , type of learning: Blended**





Knowledge of the terminology, information systems environment, processes, and components associated with information technology, information Systems concepts, components, tools, and applications. It will provide an introductory understanding of computer hardware, numbering system and knowledge of how data is prepared for computer, instruction processed at a basic machine level, and software (operating systems, database, and web development and applications). It also introduces the networking, Internet, and the basics of the information security, web searching, in addition to algorithms and problem solving, the course includes complete a practical project or research by the students.

**(50551101), General Physics (1), (T: 3, P: 0) Credit hrs., Prerequisite: (Non) , type of learning: Blended**  
Motion in One Dimension, Vectors, Motion in Two Dimensions, The Laws of Motion, Circular Motion and Other Applications of Newton's Laws, Work and Kinetic Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Rotation of a Rigid Object About a Fixed Axis, Rolling Motion and Angular Momentum.

**(50551201), General Physics (2), (T: 3, P: 0) Credit hrs., Prerequisite: General Physics (1) (50551101) , type of learning: Blended**  
This course is a continuation of University Physics I. Topics include mechanics of materials, basic thermodynamics, fundamentals of electricity and magnetism.

**(50551103), General Chemistry, (T: 3, P: 0) Credit hrs., Prerequisite: (Non) , type of learning: Face-to-Face**  
This course covers the following topics: Scientific Measurements; The Component of Matter; Stoichiometry of Formulas and Equations; Three Major Classes of Chemical Reactions; Gases and the Kinetic-Molecular Theory; Equilibrium - The Extent of Chemical Reactions; Kinetics- Rates and Mechanisms of Chemical Reactions.

**(50221102), History of mathematics, (T: 3, P: 0) Credit hrs., Prerequisite: (Non) , type of learning: Face-to-Face**  
A Brief Overview of Indian, Babylonian, and Egyptian Mathematics and Their Calculations, Development of the Number System by Western and Muslim Scholars, Mathematics in the Arab-Islamic Civilization, and an Introduction to Selected Mathematicians and Their Works, Such as Pythagoras, Euclid, Al-Khwarizmi, Omar Khayyam, and Others, Along with Selected Texts.