

AI-Zaytoonah University of Jordan

كلية العلوم وتكفولوجيا المعلومات Faculty of Science and Information Technology



" عراقة وجودة" "Tradition and Quality"

Brief course description- Course Plan Development and Updating Procedures\ QF01/0409-3.0E Mathematics Department QF01/0409-3.0E

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Faculty	Faculty Science &		z IT	Academic Department	Mathe	matics	Number of the
Number of Majo	Number of Major 4			Date of plan approval			course plan
requirement cour	rses	1. 1				D	(2021-2022)
Course number	Cre	dit hours		Title of the course		Prerequi	isite-co-requisite
0101101	3			Calculus (1)			None
Functions types	s (po	olynomials,	rational	rational functions, piecewise functions, trigonometric functions,			
exponential and	exponential and logarithmic functions), Limits, Continuity, The derivative, Chain rule, Implicit						
differentiation, A	Applic	cations of d	erivative, Finite integration, Infinite integrati		on.		
Course number	Cre	dit hours		Title of the course		Prerequi	isite-co-requisite
0101102	0101102 3			Calculus (2)		0101101	
Inverse functions, Inverse trigonometric functions, Hyperbolic and inverse hyperbolic functions,							
L'Hopital rule, M	Ietho	ds of integr	ration, Im	proper integrals, Application	ons of int	egrals (A	rea, Volume, Arc
length, Surface a	rea),	Introduction	n to seque	ences and series.			
Course number	Cre	dit hours		Title of the course		Prerequisite-co-requisite	
0101103		3		General Mathematics			None
Basic set operati	ions,	Greatest co	ommon d	ivisor and least common	multiple,	One and	two-dimensional
graphical repres	sentat	tions, Qua	dratic fo	rmula, Complex number	rs, Funct	ions, Lir	mits, Continuity,
Derivatives, Def	initio	on of statist	ics, Statis	tical measurements (Mea	n, Media	n, Quanti	les, Variance and
Standard deviati	ion),	Frequency	tables,	Graphical representation	of data (Histogra	ms, Bar and pie
charts).							
Course number	Cre	dit hours		Title of the course		Prerequi	isite-co-requisite
0101104		3	C	alculus (2) for Engineerin	ng		0101101
					•		
Inverse function	ns, Ir	nverse trig	onometric	c functions, Hyperbolic	and inve	erse hype	erbolic functions,
Inverse function L'Hopital rules, N	ns, Ir Metho	nverse trig ods of integ	onometric gration, In	c functions, Hyperbolic proper integrals, Applicati	and inve ons of int	erse hype tegrals (A	erbolic functions, rea, Volume, Arc
Inverse function L'Hopital rules, M length, Surface an	ns, Ir Metho rea),	ods of integ	onometric gration, Im n to seque	c functions, Hyperbolic pproper integrals, Application ences and series.	and inve ons of int	erse hype tegrals (A	rbolic functions, rea, Volume, Arc
Inverse function L'Hopital rules, N length, Surface a Course number	ns, In Metho rea), Cree	nverse trig ods of integ Introduction dit hours	onometric gration, Im n to seque	e functions, Hyperbolic proper integrals, Application ences and series. Title of the course	and inve ons of int	erse hype tegrals (A Prerequi	erbolic functions, rea, Volume, Arc isite-co-requisite
Inverse function L'Hopital rules, M length, Surface an Course number 0101112	ns, In Metho rea), Creo	nverse trig ods of integ Introduction dit hours 3	onometric gration, Im n to seque Fo	c functions, Hyperbolic proper integrals, Application ences and series. Title of the course pundations of Mathematic	and inve ons of int cs	erse hype tegrals (A Prerequi	erbolic functions, rea, Volume, Arc isite-co-requisite None
Inverse function L'Hopital rules, N length, Surface a Course number 0101112 Introduction to L	ns, In Methorea), Creo Logic	nverse trig ods of integ Introduction dit hours 3 al Symbols	onometric gration, Im n to seque Fo , Connect	c functions, Hyperbolic proper integrals, Application ences and series. Title of the course pundations of Mathematic tives, Tautologies and con	and inve ons of int cs tradiction	rrse hype tegrals (A Prerequi s, Quanti	erbolic functions, rea, Volume, Arc isite-co-requisite None fiers, Methods of
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Brief course description- Course Plan Development and Updating Procedures\ Mathematics Department QF01/0409-3.0E

Course number Credit hours		Title of the course	Prerequisite-co-requisite		
0101202	3	Advanced Calculus	0101201		
Line and surfac	e integrals, Jac	obian determinant, Change of variables,	Green's theorem, Curl and		
divergence of a v	vector field, Div	ergence theorem.			

Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101212	3	Number Theory	0101112			
Properties of integer numbers, Division algorithm, Greatest common divisor, Least common multiple, Prime numbers, Fundamental theorem of arithmetic, Diophantine equations, Congruence, Linear congruence, Chinese remainder theorem, Fermat's theorem, Euler's theorem and Wilson's theorem.						
Course number	Credit hours Title of the course Prerequisite-co-requisite					
0101221	3	Linear Algebra (1)	None			
Matrices and ope	Matrices and operations on matrices, Determinants, Inverse of matrix using adjoint, matrices form of					
linear systems and solving linear systems, Eigenvalues and eigenvectors, Characteristic polynomial, Vectors in 2-space or 3-space, Dot product, Cross product, Vector space, Subspaces, Linearly						
Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101231	3	Euclidean Geometry	0101112			
Postulates The o	congruent conce	ent Isosceles triangles Equilateral triangles	Other cases of congruent			
triangles The r	arallel concept	The Euclidean narallel nostulate Parall	elograms Quadrilaterals			
Similarity conce	nt The basic s	imilarity theorems Pythagoras theorem The	$r_{\rm area}$ nostulate $\Delta r_{\rm area}$ of			
polygons, Equiva	alence of polygo	ns, Circles.	area postulate, Area of			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101251	3	Real Analysis (1)	0101101+0101112			
Properties of real numbers, Inequalities, Completeness property of R, Suprema and infima, Sequences of						
real numbers, Su	ibsequences, Co	ntinuous functions, Uniform continuity, Lipc	chitz functions, Open and			
closed sets, Com	pact sets, Heine-	Borel theorem.				
Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101272	3	Numerical Analysis (1)	0101101+0101221			
Introduction to representation of numbers, Errors and their sources, Numerical solution of nonlinear						
equations with one variable (the bisection, the fixed- point, Newton-Raphson and the secant methods), Multiplicity, the modified Newton's method, Synthetic division, Approximating functions by Taylor polynomials, Interpolation (Lagrange's formula, and Newton's finite divided differences formula), Numerical methods to solve systems of linear equation: direct methods (Cramer's Method, inverse method, Gauss elimination method) and iterative methods (Jacobi method and Gauss-Seidel method).						
Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101273	3	Ordinary Differential Equations (1)	0101102			
Differential equations of first-order, Methods for solving linear differential equations of higher order, Methods for solving Cauchy – Euler equations, Laplace transformations.						
Course number	Credit hours	Title of the course	Prerequisite-co-requisite			
0101322	3	Linear Algebra (2)	0101221			
General vector space, Row space, Column space and Null space, Rank and nullity, Eigenvalues and eigenvectors, Similar matrices and diagonalization, Inner products, Inner products generated by matrices, Angle and orthogonality in inner product spaces, Orthonormal bases, Gram–Schmidt process, QR – decomposition, Diagonalization and quadratic forms, General linear transformations, Kernel and						



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range, Inverse linear transformations.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101323	3	Abstract Algebra (1)	0101212		
Groups and subg	groups, Cyclic	groups, Permutation groups, Homomorphisms	of groups, Isomorphism's		
of groups, Direc	t product of g	roups, Cosets and Lagrange's theorem, Norr	nal subgroups and factor		
groups, The first	t isomorphism †	theorem.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101341	3	Probability theory	0101201		
Expectations and variance, Moments and moment generating function, Exponential, Normal joint					
distributions, Joi	nt moment, Co	nditional distributions, Independence of rando	m variables, Functions of		
random variable	s, Transformati	ion technique one variable, Transformation te	echnique several variable,		
Moment-generat	ing function tec	chnique, Sampling distribution.	-		
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101347	3	Introduction to financial Mathematics	None		
The theory of si	mple interest:	present value and discount, debt settlement, d	iscounting of commercial		
papers, amortiza	tion of short-te	rm loans and addressing the theory of compound	nd interest: the basic laws		
of applying con	npound interes	t, calculating the period and rate, present	value and discount, debt		
settlement, paym	ents, amortizat	ion of loans.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101351	3	Complex Analysis	0101251		
Complex numb	ers, Algebraic	properties, Cartesian coordinates, The tr	iangle Inequality, Polar		
coordinates, Pov	ver and roots,	Functions of a complex variable, Limits, Con	ntinuity, Derivatives, The		
Cauchy-Rieman	n equations, A	Analytic functions, Harmonic functions, Th	e exponential functions,		
Trigonometric fu	inctions, Brancl	hes of Logz, Complex exponent, Contours, Lin	ne integrals, The Cauchy-		
Goursat theorem	, Cauchy integr	al formula, Derivative of analytic functions.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101353	3	Real analysis (2)	0101251		
Derivatives, Der	ivative rules, C	hain rule, Local extrema, Monotonic function	s, Rolle's theorem, Mean-		
value theorem, Generalized mean-value theorem, Taylor's theorem. Riemann integral and its properties,					
Upper and lower sums, Integration by parts, Fundamental theorems of calculus, Bounded functions,					
Pointwise and uniform convergence of sequences and series of functions, Power series.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101361	3	Methods of Teaching Mathematics	Dept. Approval		
This course int	roduces studer	nts to a variety of modern methods for t	eaching mathematics by		
distinguishing between the behaviorist teaching methodologies and the more recent constructivist					
methods of teaching. In addition, this class familiarizes students with the standards of the NCTM. It also					
develops students' abilities to prepare lesson plans and compose valid exams.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101363	3	History of Mathematics	None		
Development of	the arithmetica	, Logistic of natural numbers, Mechanical aid	s to calculation, Artificial		
numbers, Geometry, Algebra, Trigonometry, Measures, The calculus history.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101370	3	Graph Theory	0101112		
Some counting t	echniques such	as the principle of inclusion and exclusion,	Graphs, Paths, Trees and		
networks and useful algorithms on networks such as shortest path algorithm, Minimal spanning tree					



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algorithm and flow algorithms in networks.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101372	3	Mathematical Modeling (1)	0112120		
Programing and	Programing and coding for solving mathematics problems. Introductions to Matlab and its use for				
matrices, Plottin	g, Integration	and differentiation, Curves and If conditions	, Optimizing and solving		
system of polyno	omials.				
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101374	3	Partial Differential Equations	0101273		
Partial differenti	al equations of	f the first-order, Nonlinear pde's of the first-	-order, Linear pde's with		
constant coeffici	ents, Linear pde	e's with variable coefficients, wave, heat, and L	aplace equations.		
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101376	3	Linear Programming & Game Theory	0101221		
Introducing the	linear optimiza	tion theory and its applications, Modeling o	f real world problems as		
linear programs,	Basic theory o	f linear programming, Simplex algorithm, Tw	o phase method, Duality,		
Dual simplex n	nethod, Post o	ptimality analysis, Transportation and assig	nment problems, Simple		
network models,	Linear integer	programming, Basic game theory, 2-player ga	mes, Mini-max solutions,		
Zero sum games	Nash equilibriu	im.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101377	3	Numerical Analysis (2)	0101272		
Introducing the s	students to mor	e numerical methods as well as teaching how	to do some error analysis.		
These methods	include finite	difference methods for numerical differentia	tion the trapezoidal rule,		
Simpson's rule a	nd Gaussian qu	adrature for numerical integration and Euler's,	Taylor series and Runge-		
Kutta formulas f	or solving diffe	rential equations.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101424	3	Abstract Algebra (2)	0101323		
Rings, Subrings	, Integral doma	ain, Factor ring and ideals, Ring homomorp	hisms, Polynomial rings,		
Factorization of	Factorization of polynomial, Reducibility and irreducibility tests, Divisibility in integral domain,				
Principal ideal de	omains and uni	que factorization domains, Algebra extension o	of fields.		
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101432	3	Topology	0101251		
Topological spaces, Open and closed sets, Interior points, Boundary points, Limit points, Closure sets,					
Subspace topology, Bases and subbases, Continuous functions, Homeomorphisms, Hausdroff space,					
Separation axioms, Connected space, Compact spaces, Metric spaces, The metrizability.					
0101433	3	Differential Geometry	0101201		
Plane and spac	e curves, Rep	arametrization by arc length, Curvature, T	orsion, Frenet formulas,		
Osculating plane, normal plane, Rectifying plane, Bertrand curves, Surfaces in three dimensions,					
Smooth surfaces, The first fundamental form, length of curves on surfaces, Surface area, The Gauss					
map, The second fundamental form, Gauss formula, The normal and geodesic curvatures, Principal					
curvatures, Mean and Gauss curvatures, Geodesics and applications.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		
0101442	3	Mathematical Statistics	0101341		
Sampling distrib	ution, Estimati	on theory, Method of moments, Method of m	aximum likelihood, Point		
estimation, Unbiased estimators, Consistency, Efficiency, Sufficiency, Completeness, Cramer Rao					
theorem. UMVUE, Interval estimation and hypothesis testing about the parameters.					
Course number	Credit hours	Title of the course	Prerequisite-co-requisite		



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0101443 3 0101341 **Applied Statistics** Elements of testing hypotheses, Statistical inference about one and two populations parameters, Simple and multiple regression, Correlation coefficient, The analysis of variance of one and two-factor experiments, The Latin squares, Chi square test for homogeneity, Independences and goodness of fit, Using SPSS programing. Course number Credit hours Title of the course Prerequisite-co-requisite 0101452 3 **Functional Analysis** 0101251 Metric spaces, Normed linear spaces, Inner product spaces, Banach spaces, Hilbert spaces, Linear operators, Bounded and continuous linear operators on these spaces. Credit hours Course number Title of the course Prerequisite-co-requisite 0101455 **Special Functions** 0101273 3 Frobinius method, Gamma and beta functions, Legendre polynomials functions and polynomials, Bessel's equation. Course number Credit hours Title of the course Prerequisite-co-requisite Practical Education in Teaching 0101462 3 0101361 **Mathematics** This course follows the strategy of microteaching in order to develop students' abilities at class management; consequently, each student will be allowed to perform practical demonstrations of teaching mathematics in class. Afterwards, students will engage in dialogues and discussions regarding their practical presentations of mathematics lessons. Overall, this class develops students' strategies in teaching mathematics and conducting real assessment, as well as the practical application of such strategies in class. Course number Credit hours Title of the course Prerequisite-co-requisite 0101464 **Research Seminar in Mathematics Dept.** Approval 1 Introducing students to the methods of writing a scientific report by submitting a report at the end of the semester on a specific scientific topic. Course number | Credit hours Title of the course Prerequisite-co-requisite **Mathematical Modeling (2)** 0101471 None 3 This course is an introduction to mathematical modeling using tools from various parts of mathematics to describe and explore real-world data and phenomena. A variety of modeling techniques will be discussed with examples taken from linear programming, Graph theory, Differential and methods of solving matrices, Using of Matlab will take a part of this course. Finally, we study the expansion of polynomials by different methods. Course number Credit hours Title of the course Prerequisite-co-requisite 0101475 **Applied Mathematics** 0101374 3 Boundary value problems (Sturm- Liouville problem), Series solutions of ordinary differential equations, Fourier series, Fourier coefficients, Convergence of Fourier series, Sine and Cosine series, Fourier integration, Solutions of wave, Laplace and heat equations by Fourier series, Fourier solutions of the boundary value problems. Course number Credit hours Title of the course Prerequisite-co-requisite 0101477 **Selected Topics in mathematics Dept.** Approval 3 Study of selected areas in mathematics. Designed for special needs of students.

Approved by department	Date of approval	
council		



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