جـامعـة الـزيتـونــة الأردنيـة
Al-Zaytoonah University of Jordan
كلية العلوم وتكنولوجيا المعلومات
Faculty of Sciences and Information Technology

" عراقة وجودة"
"Tradition and Quality"

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

Faculty	Sciences and Information Technology	Academic Department	Mathematics	Number of the course plan (2)
Number of Major requirement courses	15	Date of plan approval		

This form is just for the major requirement courses

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101711	3	**Real Analysis**	None

Outer measure, measurable sets and Lebesgue measure. Measurable functions. Lebesgue integral, integral of a nonnegative function, general Lebesgue integral, convergence in measure. Differentiation and integration, differentiation of monotone functions. The L^P spaces, Holder and Minkowski inequalities.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101712	3	**Functional Analysis**	None

Metric spaces, compact sets in metric spaces, normed spaces, finite dimensional normed spaces, complete and separable normed spaces, Banach spaces. Inner product spaces, Hilbert spaces, orthogonal and orthonormal system, separable Hilbert spaces, and Parseval's equality, Riesz representation for linear functionals. Linear operators, bounded linear operators, continuity linear operators, algebraic dual, Hahn-Banach theorems.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101713	3	**Complex Analysis**	0101711

Analytic functions, power series, Laurent series, Mobius transformations, complex integration, Cauchy's theorem and formula, the maximum modulus principle, Schwartz lemma, singularities and classification of singularities, Riemann mapping theorem, Schwartz-Christofell formulas, harmonic functions, Dirichlet problem, Poisson's formula.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101714	3	**Mathematical Optimization**	None

Linear programming and mathematical modeling, the simplex method, duality, convexity, constrained and unconstrained nonlinear programming problems, Lagrange multipliers, Kuhn-Tucker conditions, quadratic programming.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101721	3	**Abstract Algebra (1)**	None

Isomorphism theorems of groups, group automorphism, finite direct products, finitely generated groups, groups actions, Sylow theorems, rings and ideals, prime and maximal ideals, polynomial rings and irreducibity tests, unique factorization domains, Euclidean domains.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101722	3	**Abstract Algebra (2)**	0101721

Rings and ideals, nilpotents and idempotents in rings, R-modules, products and sums of R-modules, exact sequences and split exact sequences, simple and semisimple R-modules, essential and small submodules, the ring of endomorphisms of an R-modules, projective and injective modules, regular rings, the radical and the socle of an R-module, Noetherian and Artinian R-modules.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101731	3	**Topology (1)**	None

Topological spaces, neighborhoods, bases and subbases, continuous functions, product spaces, weak topologies, quotient spaces, filters, separation axioms, regular and completely regular spaces, normal and perfectly normal spaces, Lindelof, separable spaces and second countable spaces, compact spaces, locally compact spaces, sequentially and countably compact spaces, one point compactification, paracompact spaces, connected spaces.

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Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101732	3	**Topology (2)**	0101731
Locally compact and K-Spaces, Cech complete spaces, metric and metrizable spaces, complete metric spaces and the completion theorem, Baire spaces and Baire category theorem, uniform and proximity spaces.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101741	3	**Applied Mathematics (1)**	None
Review of ODEs, existence and uniqueness of solutions for ODEs, integral transforms, and Green's function, approximation methods, non-linear ODEs and their stability.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101742	3	**Applied Mathematics (2)**	0101741
PDEs of mathematical physics, separation of variables, transform methods, eigen function expansions, Green's function, approximation methods, integral equations.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101744	3	**Advanced Numerical Analysis**	None
Data fitting (polynomial interpolation, least squares method), numerical methods for ordinary and partial differential equations (Euler , Runge-Kutta formulas, boundary value problems, finite difference methods), numerical linear Algebra (LU, Cholesky, QR and singular value decompositions), eigenvalue problem (power method, Lanczos algorithm).			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101751	3	**Mathematical Statistics**	None
Univariate and multivariate distribution theory, sufficient statistics, minimal sufficient statistics, completeness, methods of point estimation and properties of point estimators, confidence, intervals, testing hypotheses, Neman-Pearson lemma, randomized tests, uniformly most powerful test, likelihood ratio tests, minimax methods.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101752	3	**Probability Theory**	None
Kolmogorrov's axioms, random variables, distributions, expected values, conditional probability, independence, Borel-Cantelli lemma, characteristic functions and inversion formula, convergence concepts, laws of large numbers, central limit theorems.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101771	3	**Selected Topics in Mathematics**	None
Study of selected areas in mathematics. Designed for the special needs of advanced students.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101772	3	**Scientific Research Methodology**	None
The course aims to provide in-depth knowledge of research design and methodology and train the student in writing a study plan and critically reviewing scientific literature.			

Approved by department council		Date of approval	