

Brief course description- Course Plan Development and Updating Procedures\ Mathematics Department	QF01/0409-3.0E
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Faculty	Science & IT	Academic Department	Mathematics	Number of the course plan (2018-2019)
Number of Major requirement courses	36	Date of plan approval		

This form is just for the major requirement courses

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101101	3	Calculus (1)	None

Look in the Basic Sciences Plan

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101102	3	Calculus (2)	0101101

Inverse functions, Exponential, Logarithmic, Trigonometric functions and Inverse Trigonometric Hyperbolic and Inverse Hyperbolic Functions (Their Derivatives And Integrations), Methods Of Integration, Improper Integrals, Applications Of Integrals (Area, Volume, Arc Length, Surface Area), Introduction to sequence And Series.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101104	3	Calculus (2) for Engineering Students	0101101

Inverse functions, Exponential, Logarithmic, Trigonometric functions and Inverse Trigonometric Hyperbolic and Inverse Hyperbolic Functions (Their Derivatives And Integrations), Methods Of Integration, Improper Integrals, Applications Of Integrals (Area, Volume, Arc Length, Surface Area), Introduction to sequence And Series.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101140	3	Statistics and Probability	None

Introduction to Statistics, populations and samples, Frequency distributions, Measures of central tendency, Measures of dispersion, Measures of skewness and kurtosis, correlation and regression, principles of probability, Rules of probability, Bayes, Theorem. The Randon, Varialdes, discrete and continuous distributions.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101201	3	Calculus (3)	0101102

Topics of this course include the concepts of 3-dimentional space, vectors, lines and planes. Functions of two or more variables, partial derivatives and multiple integrals.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101205	3	Calculus (3) for Engineering Students	0101104

Topics of this course include the concepts of 3-dimentional space, vectors, lines and planes. Functions of two or more variables, partial derivatives and multiple integrals.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101112	3	Foundations of Mathematics	None

Logic, (Introduction to logical symbols, The common sentential connectives), Sets, Sets Operations, Family of Sets, Cartesian Product on Sets, Relations, Equivalence Relations, Order Relations, Functions,

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Operations on Functions, Inverse Functions, Binary Operations on Sets, Finite And Infinite Sets, countable Sets.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101212</b>	<b>3</b>	<b>Number Theory</b>	<b>0101112</b>
Properties of Integer Numbers, Division Algorithm, Greatest Common Divisor, Least Common Multiple, Prime Numbers, Fundamental Theorem Of Arithmetic, Congruence, Linear Congruence, Chinese Remainder Theorem, Fermat's Theorem, Welson's Theorem and Diophantine Equations.			
<b>0101221</b>	<b>3</b>	<b>Linear Algebra (1)</b>	<b>0101101</b>
Matrices And Operation On Matrices, Determinants, Matrix Form of Linear Systems, Euclidean Vector Space, Subspaces, Dimension, Rank, Linear Transformations From $\mathbb{R}^n$ To $\mathbb{R}^m$ , Eigenvalues And Eigenvectors, Characteristic Polynomial.			
<b>0101231</b>	<b>3</b>	<b>(Euclidean Geometry)</b>	<b>None</b>
Introduction to Euclidean geometry – The axiomatic method, line segments and rays, Angles, Triangles and polygons, The congruent postulate of triangles, Isosceles triangles, Equilateral triangles, Other cases of congruent triangles, The parallel concept, The Euclidean parallel postulate, Parallelograms, Quadrilaterals, Some properties of triangles, Similar triangles and polygons, The basic similarity theorems, Pythagoras theorem, The area postulate, Area and equivalent polygons, Ceva's theorem, Equivalence of polygons, Circles, Arcs of circles, Inscribed and central angles, Tangents of a circle, Four sides circular polygon, Intersecting of two circles, Volumes, Definition of prism, Pyramid, Cylinder, Cone· Volumes of prism, pyramid, cylinder and cone, Surface area of prism, pyramid, cylinder and cone.			
<b>0101251</b>	<b>3</b>	<b>Real Analysis (1)</b>	<b>0101102+ 0101112</b>
Properties of real numbers, Inequalities, completeness property of $\mathbb{R}$ , Suprema and infima, Sequences of real numbers, subsequences, Continuous functions, Uniform continuity, Lipchitz functions, Open and closed sets, Compact sets, Heine-Borel theorem.			
<b>0101272</b>	<b>3</b>	<b>Numerical Analysis (1)</b>	<b>0101101</b>
Introduction to representation of numbers; Errors and their sources; Numerical solution of nonlinear equations (the bisection, the fixed- point, Newton-Raphson and the secant methods); Multiplicity and 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).			
<b>0101273</b>	<b>3</b>	<b>Ordinary Differential Equations (1)</b>	<b>0101102 or 0101104</b>
A first course in Ordinary Differential Equations. Topics include differential equations of the First-order, Methods of solution. Linear Differential Equations of first-order, Methods of solution, linear			

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Differential Equations of Higher Order and Cauchy – Euler Equation. Methods of solution. Laplace Transform, using Laplace transforms to solve Initial-value problems.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101322</b>	<b>3</b>	<b>Linear Algebra (2)</b>	<b>0101221</b>
General Vector Space, Row Space, Column Space and Null Space, Rank and Nullity, Change of Basis, Eigenvalues and Eigenvectors, Similar Matrices and Diagonalization, Orthogonal Diagonalization, the Diagonalization of Symmetric Matrices, General Linear Transformations, Kernel and Range, Inverse Linear Transformations, Matrices of General Linear Transformations, Quadratic Forms, Diagonalization of Quadratic Forms, Classification of Quadratic Forms, Curves and Surfaces.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101323</b>	<b>3</b>	<b>Abstract Algebra (1)</b>	<b>0101212</b>
Groups and Subgroups, Cyclic Groups, Permutation Groups, Homomorphisms Of Groups, Isomorphism's of Groups, Direct Product of Groups, Cosets and Lagrange's Theorem, Normal Subgroups and Factor Groups, The First Isomorphism Theorem.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101341</b>	<b>3</b>	<b>Probability theory</b>	<b>0101140+0101201</b>
Introduction, Sample Spaces, Events, The Probability Of An Event, Some Rule Of Probability, Conditional Probability, Independent Events, Baye's Theorem, Probability Distribution, Continuous Random Variable, Probability Denisty Function, Multivariate Distributions, Marginal Distributions, Conditional Distributions, The Expected Value Of A Random Variable, Moment, Moment Generating Functions, The Discrete Uniform Distribution, The Binomial, Poisson, Normal Distributions. Distribution of functions of random variables..			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101343</b>	<b>3</b>	<b>Applied Probability</b>	<b>0101341</b>
Revision of some probability distributions; Queuing Theory (Description of queuing models, the Poisson process, Birth-Death processes, single server queue and some modifications); Reliability Theory (Failure laws and failure rate, reliability of series and parallel systems); Quality control (control charts, acceptance sampling, single sampling plan, other sampling plans); Information theory and coding (Uncertainty, information measures and entropies, the first coding theorem discrete channels and the second coding theorem).			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101352</b>	<b>3</b>	<b>Complex Analysis (1)</b>	<b>0101251+0101201</b>
Complex Numbers, Definitions, Algebraic Properties, Cartesian Coordinates, The Triangle Inequality, Polar Coordinates, Power And Roots, Functions Of A Complex Variable, Limits, Continuity, Derivatives, The Cauchy-Rieman Equations, The Cauchy Rieman Equations In Polar Form, Analytic Functions, Harmonic Functions, The Exponential Functions, Trigonometric Functions, Properties Of Trigonometric Functions, Hyperbolic Functions, Properties, Branches Of Logz, Complex Exponent, Inverse Trigonometric Functions, Contours, Line Integrals, The Cauchy-Goursat Theorem. Cauchy Integral Formula, derivative of Analytic Functions.			

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Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101361</b>	<b>3</b>	<b>Methods of Teaching Mathematics</b>	<b>Dept. Approval</b>
This course introduces students to a variety of modern methods for teaching 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
<b>0101370</b>	<b>3</b>	<b>Graph Theory</b>	<b>0101112</b>
The course covers basic theory and applications of graph theory. Topics that will be studied include some counting techniques 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 algorithm and flow algorithms in networks.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101372</b>	<b>3</b>	<b>Mathematical Modeling (1)</b>	<b>0112120</b>
This course is an introduction to the powerful computer software application program MATLAB ( <b>Matrix Laboratory</b> ) for solving mathematics problems. The topics to be covered in this course are: The MATLAB Workspace; Variables and Data Types; Vectors and Arrays; Script Files; Functions; Plotting; Curve Fitting; 2D and 3D Graphing; Control Structures: Conditional Statements and Loops; Some Advanced Programming in MATLAB.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101374</b>	<b>3</b>	<b>Partial Differential Equations</b>	<b>0101273</b>
Basic Concepts, Linear Partial Differential Equations of the First Order, Non Linear Partial Differential Equation of the First Order, Second Order Partial Differential Equations, Classification Of Partial Differential Equations, Heat, Wave And Laplace Equations, Solutions Of Initial Value Problems In Partial Differential Equations.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101424</b>	<b>3</b>	<b>Abstract Algebra (2)</b>	<b>0101323</b>
Rings, Subrings, Integral Domain, Factor Ring and Ideals. Ring Homomorphisms, Polynomial Rings, Factorization Of Polynomial, Reducibility and Irreducibility Tests, Divisibility in Integral Domain, Principal Ideal Domains and Unique Factorization Domains, Algebra Extension of Fields.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101432</b>	<b>3</b>	<b>Topology</b>	<b>1 0101251</b>
Topological Spaces, Open and Closed Sets, Interior Points, Boundary Points, Limit Points, Closure Sets, Subspace Topology, Bases and Subbases, Continuous Functions, Homeomorphisms, Hausdorff Space, Separation Axioms, The metrizable, Connected Space, Compact Spaces, Metric Spaces.			

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Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101442</b>	<b>3</b>	<b>Mathematical Statistics</b>	<b>0101341</b>
The Uniform Distribution, The Gamma; Exponential And Chi-Square Distribution, The Beta Distribution, The Normal Approximation To The Binomial Distribution, Distribution Function Technique, Transformation Technique (One Variable, Two Variables), Moment-Generating Function Technique, The Distribution Of The Mean: Finite Populations, The T-Distribution, The F-Distribution, Point Estimators, Unbiased Estimate, Consistent Estimators, Sufficient Estimators, The Method Of Moments, The Method Of Maximum Likelihood, Confidence Intervals For: Means, Difference Between Means, Proportions, Difference Between Proportions, Variance, Ratio Between Variances, Testing Statistical Hypothesis, Tests Concerning Means; Differences Between Means, Variances, Proportions.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101443</b>	<b>3</b>	<b>Applied Statistics</b>	<b>0101442</b>
Exploratory Data Analysis, Sampling Distributions, Chi-Squared Tests, Analysis of Variance, Linear Regression, Non-Parametric Tests.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101353</b>	<b>3</b>	<b>Real analysis (2)</b>	<b>0101251</b>
Derivatives, Derivative rules, chain rule, Local extrema, Monotonic functions, Rolle's theorem, Mean-value theorem, Generalized mean-value theorem, Intermediate value (Darboux theorem), Taylor's theorem, Functions of bounded variation, Total variation, Total variation, as a function, Riemann integral, Riemann-Stieltjes integrals, Integration by parts, change of variables, step functions, Euler's summation formula, upper and lower sums, Riemann's condition, Existence of Riemann – stieltjes integral, pointwise and uniform convergence of sequences and series of functions, power series.			
<b>0101452</b>	<b>3</b>	<b>Functional Analysis</b>	<b>0101353</b>
In Progress			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101455</b>	<b>3</b>	<b>Special Functions</b>	<b>0101273</b>
Frobenius Method, Fourier And Laplace Transformations, Gamma And Beta Functions, Relation Between Gamma And Beta Functions, Bessel Functions, Legendre, Hermit, Laguerre, Jacobi And Chebychev Polynomials.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101462</b>	<b>3</b>	<b>Practical Education in Teaching Mathematics</b>	<b>0101361</b>
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.			

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Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101471</b>	<b>3</b>	<b>Mathematical Modeling (2)</b>	<b>0101372</b>
<p>This course is an introduction to mathematical modeling using tools from various parts of mathematics to describe and explore real-world data and phenomena. The topics to be covered in this course are: Steps of the modeling process; Plotting data; Fitting curves to data; Least squares method; Polynomial approximation (interpolation and extrapolation); Modeling using linear programs; Integer programming; Modeling using graphs and networks; Modeling with differential equations. (Although including uncertainty and randomness in models is an important aspect of modeling, but probabilistic or statistical models will not be covered in this course since there is not enough time, and statistics courses are available). We will support our discussion with the computing tool MATLAB when time permits.</p>			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101377</b>	<b>3</b>	<b>Numerical Analysis (2)</b>	<b>0101272</b>
<p>As a second course in numerical analysis, this course is designed to introduce the student to more numerical methods as well as to teach the student how to do some error analysis. These methods include finite difference methods for numerical differentiation; the trapezoidal rule, Simpson's rule and Gaussian quadrature for numerical integration and Euler's, Taylor series and Runge-Kutta formulas for solving differential equations.</p>			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101376</b>	<b>3</b>	<b>Linear Programming &amp; Game Theory</b>	<b>0101221</b>
<p>This course aims at introducing students into linear optimization theory and its applications. Topics that will be studied are Linear programming problems, basic theory, simplex algorithm, two phase method, duality, dual simplex method, post optimality analysis, transportation and assignment problems, simple network models, matrix game theory.</p>			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101475</b>	<b>3</b>	<b>Applied Mathematics</b>	<b>0101374</b>
<p>Reviews Of Ordinary Differential Equations and their solution methods , Boundary Value Problems (Sturm- Liouville Problem), Series solutions of ordinary Differential Equations, Fourier Series, Fourier Coefficients, Convergence Of Fourier Series, Applications, Sine And Cosine Series, Fourier Integration, Solutions Of Wave, Laplace and Heat Equations By Fourier Series, Fourier Solutions Of The Boundary Value Problems.</p>			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
<b>0101477</b>	<b>3</b>	<b>Selected Topics in mathematics</b>	-----
Department Approval			

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Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0101482	1	Research Seminar in Mathematics	-----
Department Approval			

	تاريخ الاعتماد;	د. أمجد محمود زريقات	اعتمدت من قبل رئيس القسم
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