King Saud University
College of Science
Academic Affairs Vice Dean
Study Plans

Study Plan

Mathematics Department

ACTUARIAL AND FINANCIAL MATHEMATICS

2016 - 1438H

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AFM Study Plan

1st Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
CI 140	Learning, Thinking and Research Skills	-	-	3 (3+0+0)
CHS 150	Health and Fitness	-	-	1 (1+0+0)
ENG 140	English Language (1) **(E)**	-	-	8 (8+0+0)
MATH 140	Introduction to Mathematics **(E)**	-	-	2(1+1+0)
Total of Credit Hours				**14**

2nd Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
CT 140	Computer Skills **(E)**	-	-	3 (0+0+3)
MC 140	Communication Skills	-	-	2 (2+0+0)
ENG 150	English Language (2) **(E)**	ENG 140	-	8 (8+0+0)
MATH 150	Differential Calculus **(E)**	MATH 140	-	3(2+1+0)
ENT 101	Entrepreunership	-	-	1(1+0+0)
Total of Credit Hours				**17**

3rd Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
CSC 201	Computer programming	-	-	4(3+2+1)
STAT 100	Introduction to Statistics	MATH 150	-	3(2+1+0)
MATH 111	Integral Calculus **(E)**		-	4(3+1+0)
ECON 101	Principles of Microeconomics		-	3(3+0+0)
ACCT 201	Principles of Accounting and Financial Reporting	-		3(3+0+0)
Elective University requirement course			-	2 (2+0+0)
Total of Credit Hours				**19**

4th Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
STAT 105	Statistical Methods **(E)**	STAT 100	-	4(3+1+0)
STAT 215	Probability (1)	-	-	4(3+0+1)
MATH 201	Differential and Integral Calculus (E)	STAT 100 MATH 111	-	4(3+1+0)
FIN 200	Principles of Finance	-	MATH 201	3(3+0+0)
ECON 102	Principles of Macroeconomics	ECON 101	-	3(3+0+0)
Total of Credit Hours				**18**

5th Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
FIN 210	Corporate Finance	FIN 200	-	3(3+0+0)
MATH 240	Introduction to Linear Algebra	MATH 111	-	4(3+1+0)
MATH 280	Introduction to Real Analysis	MATH 201	-	4(3+1+0)
STAT 328	Statistical Packages	STAT 105	-	3(2+1+0)
ACTU 361	Mathematics of Finance (1)	MATH 201		3(2+1+0)
Elective University requirement course			-	2 (2+0+0)
Total of Credit Hours				**19**

6th Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
STAT 332	Regression Analysis	MATH 240 STAT 328	-	3(2+1+0)
ACTU 362	Actuarial mathematics (1)	STAT 215 ACTU 361	-	3(3+0+0)
MATH 380	Stochastic processes	STAT 215 MATH 280	-	4(3+1+0)
ACTU 461	Mathematics of Finance (2)	ACTU 361		4(3+1+0)
Elective Course			-	1 or 3 or 4
Total of Credit Hours				**15 - 18**

7th Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
ACTU 363	Actuarial mathematics lab (1)	-	-	1(0+0+1)
ACTU 464	Risk theory	MATH 380 ACTU 362	-	3(3+0+0)
ACTU 462	Actuarial mathematics (2)	ACTU 362	-	3(3+0+0)
STAT 436	Time Series and Forecasting	STAT 332	-	3(2+1+0)
Elective University requirement course			-	2 (2+0+0)
Elective Course			-	1 or 3 or 4
Total of Credit Hours				**13 - 16**

8th Semester				
Course Code	**Course Title**	**Pre-Req.**	**Co-Req.**	**Credits (Lect. - Exre. – Pract.)**
ACTU 465	Credibility theory	ACTU 464	-	3(3+0+0)
ACTU 466	Loss distributions	ACTU 464 STAT 436	-	3(2+1+0)
OPER 441	Modeling and Simulation	STAT 215	-	4(3+1+0)
ACTU 499	Field Training	ACTU 462	-	3(1+0+2)
Elective University requirement course			-	2 (2+0+0)
Elective Course			-	1 or 3 or 4
Total of Credit Hours				**15 - 18**

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(Lect - Exer – Pract) = (Lecture – Exercise – Practical)

List of the Elective Courses of the University Requirements
(Student elects 8 credit hours)

Course Code	Course Title	Pre-requisite	Credits (Lect. – Exer. - Pract.)
IC 100	Studies in the Biography of the Prophet	-	2 (2+0+0)
IC 101	Introduction of Islamic Culture	-	2 (2+0+0)
IC 102	Islam and Building up the Society	-	2 (2+0+0)
IC 103	Economic System in Islam	-	2 (2+0+0)
IC 104	Political system in Islam	-	2 (2+0+1)
IC 105	Human Rights	-	2 (2+0+0)
IC 106	Islamic Jurisprudence	-	2 (2+0+0)
IC 107	Ethics of Occupation	-	2 (2+0+0)
IC 108	Contemporary Issues	-	2 (2+0+0)
IC 109	Woman and Her Developmental Role	-	2 (2+0+0)

List of the Elective Courses ***(Student elects 8 credit hours)***

Course Code	Course Title	Pre-requisite	Credits (Lect - Exer- Pract)
MATH 225	Introduction to differential equations	MATH 201	4 (3+1+0)
MATH 251	Optimization techniques	MATH 252 MATH 280	3 (3+0+0)
MATH 422	Partial differential equations	MATH 225	4 (3+1+0)
MATH 450	Numerical methods	MATH 225 MATH 240	4 (3+1+0)
STAT 223	Theory of Statistics (1)	STAT 215	3 (2+1+0)
ACTU 364	Actuarial Mathematics Lab (2)	Department Agreement	1 (0+0+1)
ACTU 467	Pension mathematics	ACTU 462	3 (3+0+0)
ACTU 468	Quantitative methods in finance	MATH 380	4 (3+1+0)
FIN 220	Investment Essentials	FIN 200	3(3+0+0)
FIN 240	Principles of Risk & Insurance		3(3+0+0)
ECON 201	Microeconomics analysis	ECON 102	3(3+0+0)
CSC 202	Computer Programming using MATLAB	CSC 201	3(2+1+0)

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Short Courses Description

I- Compulsory courses *from* the Department [credit hours (Lect. – Exer. – Pract).]

MATH 111 : Integral Calculus (E)	**4(3+1+0)**
Definition of definite integral and its properties, the anti-derivative, indefinite integral and the fundamental theorem of calculus. Change of variables. Integrals of natural and general exponential functions. Integrals of natural and general logarithmic functions. Derivatives and integrals of hyperbolic and inverse-hyperbolic functions. Techniques of integration: by parts, trigonometric substitutions, completing the square, integrals of rational functions, miscellaneous substitutions. Indeterminate forms, improper Integrals. Applications of integration: area, solids of revolution, arc length and surface of revolution, linear Motion, work, momentum and center of mass. Numerical integration. Polar coordinates, relation between polar and Cartesian coordinates, graphs of polar curves, area in polar coordinates. Parametric equations.	

MATH 150 : Differential Calculus (E)	**3(3+0+0)**
The concept of limit, computation of limits, continuity and its consequences, limits involving infinity, formal definition of limit, the concept of derivative, computation of derivatives (power rule, higher order derivatives, acceleration), the product and quotient rules, the chain rule, derivatives of exponential and logarithmic functions, implicit differentiation and inverse trigonometric functions, the mean value theorem, indeterminate forms and L'Hopital's rule, maximum and minimum values, increasing and decreasing functions, concavity and the second derivative test, optimization, related rates.	

MATH 201 : Differential and Integral Calculus (E)	**4(3+1+0)**
Cartesian, cylindrical and spherical coordinate systems. Functions of two and three variables, limits and continuity, partial derivatives, the chain rule, extrema of functions of two variables, Lagrange multipliers. Double integrals, moments and center of mass, double integrals in polar coordinates, triple integrals, applications of triple integrals, triple integrals in cylindrical and spherical coordinates, surface area. Sequences, infinite series, convergence tests, representation of functions by power series, Taylor and Maclaurin series, the binomial series.	

MATH 352 : Numerical Analysis (1)	**4(3+1+0)**
Numerical methods for nonlinear equations. Error and convergence, analysis. Direct & iterative methods for linear systems. Error analysis & iterative methods convergence. Interpolation & approximation, error analysis. Numerical differentiation & numerical integration & their error analysis.	

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II- Compulsory courses *from outside* the Department [credit hours (Lect. – Exer. – Pract.)]

STAT 100: Introduction to Statistics	**3(2+1+0)**
Descriptive statistics - Measures of central tendency - Measures of dispersion - Basic probability concepts - Conditional probability, Expectation - Variance - Bayes law - Random variables - Probability distribution - Binomial distribution - Poisson distribution - Hyper geometric distribution - Normal distribution – Applications by Excel	

STAT 105: Statistical Methods	**4(3+1+0)**
Some Statistical distributions - Sampling distributions - Central limit theorem - Chebychev's inequality - Interval estimation - Testing hypotheses (two populations case) - Introduction to experimental designs (CRD and RBD)- Analysis of variance (one and two ways) - Regression analysis (simple) - Correlation (Pearson and Spearman) - Chi square test and its applications - Some nonparametric tests.	

III- Elective courses *from* the Department [credit hours (Lect. – Exer. – Pract.)]

MATH 225 : Introduction to Differential Equations (E)	**4(3+1+0)**
Classification of Differential equations and their origins. Methods of solution of first order differential equations, orthogonal trajectories. Linear equations with constant coefficients and variable coefficients. Linear systems of equations, power series solutions of linear differential equation of the second order with polynomial coefficients, Laplace transform and the convolution. Fourier's series.	

***mportant Note*: The student must review the department concerned for decisions that taught outside the college (Compulsory and Elective).**