



Course Specification

Course Name: Mathematics - 1

Course Code: MA111

I. Basic Course Information

Major or minor element of program: General

Department offering the course: Faculty

Academic level: 100 Level

Semester in which course is offered: First (fall) Semester

Course pre-requisite(s): N/A

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial *	Practical *	Total
2.5	1.5	0.0	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: September 2014

II. Overall Aims of Course

Mathematics is one of the primary foundations of computer science. Computer science depends on mathematics for many of its fundamental definitions, axioms, theorems, and proof techniques. In addition, mathematics provides a language for working with ideas relevant to computer science, specific tools for analysis and verification, and a theoretical framework for understanding important computing ideas. For example, functional programming and problem solving draw directly upon the mathematical concepts and notations for functions; algorithmic analysis depends heavily on the mathematical topics of counting, permutations and combinations, and probability; discussions of concurrency and deadlock draw heavily from graph theory; and both program verification and computability build upon formal logic and deduction. Thus, it is critical for computer science programs to include enough mathematics so that students understand the theoretical underpinnings of the discipline.

N.B.

Basic mathematical concepts should be introduced early within a student's course work, and later courses should use these concepts regularly. While different colleges and universities will need to adjust their prerequisite structure to reflect local needs and opportunities, it is important for upper-level computer science courses to make use of the mathematical content developed in earlier courses. This dependency, moreover, should be reflected in the formal prerequisite structure.



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III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
K12,K14	I5	P8	G4,G6,G9

IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

- K.1 Describe and define mathematical models that explain and express physical phenomenon, chemical reaction, and even commercial, social, and political relations.
- K.2 Recognize, indicate and discuss the rate of growth/decay of any relation.
- K.3 Classify, and convert relations from one domain to another to reproduce new adequate form that clearly match a solution.
- K.4 Summarize procedures, processes and to describe a mathematical result in everyday terms.

b. Intellectual/Cognitive Skills

- I.1 Distinguish the importance of the different terms in a given relation.
- I.2 Construct algebraic tools that create well developed accurate solutions.
- I.3 Analyze the problem, plan for the solution, develop the solution(s), and justify the solution(s).
- I.4 Predict and estimate the error in approximate/numerical solution.
- I.5 Manage and compile the effects of quantities that can never be directly evaluated.
- I.6 Formulate proofs and construct counter examples.

c. Practical/Professional Skills

- P.1 Employ computational rules to execute solutions and to compute the accuracy of the results.
- P.2 Practice how to apply and manipulate carefully the physical or/and geometric conditions on a set of variables to sketch the locus of these variables.
- P.3 Prepare and sketch clear illustrative graphs that demonstrate and measure the behavior of complicated relations with time or/and location(s).
- P.4 Sketch flowcharts or/and apply Pseudo code to modify computer program(s) that execute the solution(s) of the manipulated problem(s).

d. General and Transferable Skills

- G.1 Demonstrate independent critical thinking and problem solving skills.
- G.2 Acquire communications skills, e.g. Lead and motivate individuals.
- G.3 Work in stressful environment and within constraints.
- G.4 Manage tasks and resources.



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V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Trigonometry	1	K1	I4		
2-	Plane Geometry	1	K3	I1,I5	P2,P3	
3-	Algebra	2	K4	I1,I4		G1,G2
4-	The Function	3	K2	I2	P2,P3	
5-	The Derivative	2	K2	I6		
6-	Theorems and Applications of the Derivatives	2	K1	I3,I6	P1	G4
7-	Integral Calculus and Applications	2	K1	I3,I6	P1,P4	G3
	Net Teaching Weeks	13				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	Trigonometry: Concepts & Applications.	2.5	2.5	
2	Plane Geometry: Equations and Properties of The Conic Sections: Line-Pair; The Circle; The Parabola; The Ellipse; The Hyperbola.	4	2.5	1.5
3	Algebra: Binomial Theorem; Partial fractions;	4	2.5	1.5
4	Complex Numbers	4	2.5	1.5
5	The Function: <ul style="list-style-type: none"> Domain, Range; Symmetry and Homogeneity; Modeling, Composition, Boundless, Equality, Increase and Decrease; Piecewise-definitions. Classifications; Graphs and Related Properties; Inverse Functions: Trigonometric. 	4	2.5	1.5
6	<ul style="list-style-type: none"> In determinant Forms; Limits; Continuity. 	4	2.5	1.5
7	Mid-Term Exam			
8	The Natural number, The Exponential and Logarithmic Functions; the Generalized Exponential Function; Hyperbolic Functions and their Inverse.	4	2.5	1.5
9	The Derivative: Concepts; Techniques of differentiation.	4	2.5	1.5
10	Derivatives of elementary Functions.	4	2.5	1.5



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11	Theorems of the Derivatives.	4	2.5	1.5
12	Applications of the Derivatives.	4	2.5	1.5
13	Integral Calculus: Basic Concepts: Ant derivative; Table of Standard Integration and Related Theorems.	4	2.5	1.5
14	Integral Calculus Applications.	4	2.5	1.5
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	✓	K1,K2,K3,K4			
Tutorials	✓	K1,K2,K3,K4			
Computer lab Sessions					
Practical lab Work					
Reading Materials	✓		I3,I4	P1	G3,G4
Web-site Searches					
Research & Reporting					
Problem Solving / Problem-based Learning	✓		I1	P1,P2	G1
Projects					
Independent Work	✓		I2,I5,I6	P3,P4	G2
Group Work					
Case Studies					
Presentations					
Simulation Analysis					
Others (Specify):					



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	✓	K1,K2,K3,K4	I4	P3	G1	25%	7
Final Exam	✓	K1,K2,K3,K4	I4,I5,I6		G4	60%	15
Quizzes	✓		I1,I2,I3	P1,P2,P4	G2,G3	15%	9,12
Course Work							
Report Writing							
Case Study Analysis							
Oral Presentations							
Practical							
Group Project							
Individual Project							
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> David J. Ellenbogen and Marvin L. Bittinger, Calculus And Its Applications, Addison-Wesley, USA, 2007 James Stewart, Calculus, Brooks/Cole Pub Co, USA, 2007 Margaret L. Lial, Raymond N. Greenwell & Nathan P. Ritchey, Calculus with Applications, Addison Wesley; USA, 2004
Course notes	<ul style="list-style-type: none"> Lecture notes (By: Dr Ibrahim Elbatal)
Recommended books	<ul style="list-style-type: none"> None
Periodicals, Web sites, etc ...	<ul style="list-style-type: none"> None

X. Facilities required for teaching and learning

List the facilities required

- Appropriate teaching accommodations
- Teaching aids (white-board, flip-chart, markers, data show)
- Materials

Course coordinator: Assoc. Prof. Ibrahim El Batal

Head of Department: Prof. Imane Aly Saroit

Vice Dean for Education and Student affairs

Date:September 2014