



Course Specification

Course Name: Mathematics – 4

Course Code: MA315

I. Basic Course Information

Major or minor element of program: General
Department offering the course: Decision Support Department

Academic level: 300 Level
Semester in which course is offered: First (fall) Semester
Course pre-requisite(s): [Mathematics – 3]

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

This course introduces fundamental mathematical methods and analysis in advanced calculus. It will help students to understand the basic concepts, fundamental theory and some applications of multi-variable calculus. It trains students in the ability to think quantitatively and analyze problems critically.

III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K12,K14]	[I5]	[P8]	[G1,G2,G6,G7]



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

- K.1 Define Special functions.
- K.2 Recognize Partial differential equations.
- K.3 Discuss Numerical analysis.
- K.4 Explain Complex variables.
- K.5 Recognize some applications.

b. Intellectual/Cognitive Skills

- I.1 Use special functions in programming to solve problems.
- I.2 Use partial differential equations in programming to solve problems.
- I.3 Use numerical analysis in programming to solve problems.
- I.4 Use complex variables in programming to solve problems.

c. Practical/Professional Skills

- P.1 Use of IT for data processing and communication.
- P.2 Solve partial differential equations.
- P.3 Use numerical analysis in solving programming problems.

d. General and Transferable Skills

- G.1 Use computer software to simplify and evaluate expressions containing complex numbers.
- G.2 Communication skills, needed in solving group assignments.
- G.3 Team leading, team-work, and project management.
- G.4 Self-learning and writing skills.

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-	Introduction	2			P1	G4
2-	Special functions	2	K1	I1		
3-	Partial differential equations	3	K2	I2	P2	
4-	Numerical analysis	2	K3	I3	P3	
5-	Complex variables	2	K4	I4		G1
6-	Some applications	2	K5			G2,G3
	Net Teaching Weeks	13				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	Introduction	2.5	2.5	
2		4	2.5	1.5
3	Special functions	4	2.5	1.5
4		4	2.5	1.5
5	Partial differential equations	4	2.5	1.5
6		4	2.5	1.5
7	Midterm Exam			
8	Partial differential equations	4	2.5	1.5
9	Numerical analysis	4	2.5	1.5
10		4	2.5	1.5
11	Complex variables	4	2.5	1.5
12		4	2.5	1.5
13	Some applications	4	2.5	1.5
14		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	✓	All			
Tutorials	✓		All		All
Computer lab Sessions	✓			All	
Practical lab Work					
Reading Materials					
Web-site Searches					
Research & Reporting					
Problem Solving / Problem-based Learning					
Projects					
Independent Work					
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	✓	All	All			15%	7
Final Exam	✓	All	All			60%	15
Quizzes							
Course Work	✓			All		10%	12
Report Writing							
Case Study Analysis							
Oral Presentations							
Practical							
Group Project	✓				All	15%	11
Individual Project							
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> James Ward Brown & Ruel V. Churchill, Complex Variables and Applications, : McGraw-Hill, USA, 2003 Richard L. Burden & J. Douglas Faires, Numerical Analysis , Brooks Cole, USA, 2004 Richard Askey , George E. Andrews & Ranjan Roy, Special Functions, Cambridge Univ. Pr., London, 2001 J. Stoer R. Bulirsch, Introduction to Numerical Analysis, Second Edition, Springer- Verlag, USA, 1993 K.T. Tang, Mathematical Methods for Engineers and Scientists 1: Complex Analysis, Determinants and Matrices, Springer-Verlag, Germany, 2007 Vladimir I. Arnold, Lectures on Partial Differential Equations, Springer-Verlag, Germany, 2004
Course notes	<ul style="list-style-type: none"> None
Recommended books	<ul style="list-style-type: none"> S. D. Conte, Elementary Numerical Analysis: An Algorithmic Approach, McGraw- Hill Book Company, USA, 1980 J. H. Curtiss, Introduction to functions of a complex variable, Marcel Dekker Inc., USA, 1978 A. David Wunsch, Complex Variables with Applications, Pearson Education Inc, USA, 2005 Edward B. Saff & Arthur David Snider, Fundamentals of Complex Analysis with Applications to Engineering, Science, and Mathematics, Prentice Hall, USA, 2002 Friedrich Sauvigny, Partial Differential Equations 1: Foundations and



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	<p>Integral Representations, Springer, Germany, 2006</p> <ul style="list-style-type: none">• Kenneth Lange, Numerical Analysis for Statisticians, Springer-Verlag, New York, 1999• Murray Spiegel, Schaum's Outline of Complex Variables, McGraw Hill, USA, 1968• Pavel Solin, Partial Differential Equations and the Finite Element Method, JOHN WILEY & SONS, INC., 2006• Pavel Solin, Partial Differential Equations and the Finite Element Method, JOHN WILEY & SONS, INC., 2006• Y. C. Pao, Engineering Analysis: Interactive Methods and Programs with FORTRAN, QuickBASIC, MATLAB, and Mathematica, CRC Press, New York, 2001• Steven T. Karris, Numerical Analysis Using MATLAB and Spreadsheets, Second Edition, Orchard Publications, USA, 2004• K.T. Tang, Mathematical Methods for Engineers and Scientists 3: Fourier Analysis, Partial Differential Equations and Variational Methods, Springer-Verlag, Berlin, 2007• Theodore W. Gamelin, Complex Analysis, Springer; USA, 2003• Volker Scheidemann, Introduction to Complex Analysis in Several Variables, Birkhauser Verlag, Germany, 2005
<p>Periodicals, Web sites, etc ...</p>	<ul style="list-style-type: none">• http://en.wikipedia.org/wiki/Numerical_analysis• http://math.fullerton.edu/mathews/numerical.html• http://functions.wolfram.com/• http://en.wikipedia.org/wiki/Special_functions• http://en.wikipedia.org/wiki/Partial_differential_equation• http://math.ucsd.edu/~driver/231-02-03/lecture_notes.htm• http://mathworld.wolfram.com/PartialDifferentialEquation.html• http://www.math.gatech.edu/~cain/winter99/complex.html• http://en.wikipedia.org/wiki/Complex_analysis

X. Facilities required for teaching and learning

List the facilities required

- Appropriate teaching accommodation
- Teaching aids
- Materials
- Calculator
- Computer labs
- Computers

Course coordinator: Prof. Abdul Hady Nabih

Head of Department: Prof. Imane Aly Saroit
Vice Dean for Education and Student affairs

Date: September 2014