جامعة دمنهور

كلية العلـوم

Course specification

University/Academy: Damanhour University

Faculty/Institute: Science

Department: Mathematics

1. course Data:		
Course code: Math 322	Course title: Functions of Complex Variables and Special Functions	Academic year/level: 2009-2010 Third year - Second term
Specialization: Mathematics and Physics	No. of instructional units: Lecture [3] tutorial [2] practical [-]	

2. course Aim	Demonstrate theoretical knowledge and have practical skills in Functions of Complex Variables and special functions. Demonstrate an ability to initiate and sustain in-depth research relevant to Functions of Complex Variables and special functions. Have an opportunity to put theory into practice via work-based learning.
3. Intended learning outcome	
a) Knowledge and understanding	a1. Describe the nature and operations of Functions of Complex Variables and special functions. a2. Identify the steps required to carry out a piece of research on a topic within Functions of Complex Variables and special functions.
b) Intellectual skills	b1. Use appropriate theories, principles and concepts relevant to Functions of Complex Variables and special functions. b2. Analyze and interpret information from a variety of sources relevant to the topics under consideration. b3. Develop a reasoned argument to the solution of familiar and unfamiliar problems relevant to

	these topics (see the contents).
c) Professional skills	c1. Plan practical activities using techniques and procedures of Functions of Complex Variables and special functions. c2. Execute a piece of independent research using numerical methods in different problems in mathematics.
d) General skills	d1. Develop appropriate effective written and oral communication skills relevant to Functions of Complex Variables and special functions. d2. Work effectively as part of a group, involving leadership, group dynamics and interpersonal skills such as listening, negotiation and persuasion relevant to mathematics. d3. Use organization skills (including task and time management) relevant to Functions of complex Variables and special functions, both individually and in a group situation. d4. Set tasks and solve problems relevant to numerical methods for solving specific problems of mathematics using ideas and techniques some of which are at the forefront of the discipline.
4. course content	Sets of Points in the Argand plane- Open and closed sets –Domain- Gamma functions.
	Rectifiable curves- Jordan curves- Regular arcs- Fractional calculus
	Continuity and Differentiability of functions of complex variable f (z) – Analytic and regular functions- Cauchy-Riemann Differential Equations- Zeta function.
	Length of Regular arcs- Beta function.
	Riemann's definition of integration of a function of complex variable over a contour and its basic properties – Legendre polynomials.
	Cauchy's Integral Formulae-Associated Legendre polynomials
	Taylor's and Laurent Series of analytic functions - Bessel's functions.
	Zeros and multiple zeros of analytic functions –

	Modified Bessle functions
	Poles and residues of analytic functions- Hermite polynomials.
	Calculation of residues - Laguerre polynomials..
	Caushy's Theorem of residues- Associated Laguerre polynomials.
	Methods of contour Integration- Hyper geometric functions.
5. Teaching and learning methods	5.1 Lectures. 5.2 Tutorials 5.3 Homework 5.4 Oral discussion
6. teaching and learning methods for students with special needs	Non
7. Student Assessment	
a. Procedures used:	Final exam
b. Schedule:	Assessment 1 Final exam Week 15
c. Weighing of Assessment:	Final exam 150 Marks (100%)
8. List of Textbooks and References:	
a. Course Notes	Course notes provided by the staff member of Math department, to be handed at the beginning

	of the semester.
b. Required Books (Textbooks)	1-R.V.Churchill & J.W.Brown, Complex variables and applications, McGraw Hill Company, 1984. 2- L. C. Andrews, Special functions of mathematics for engineers, McGraw Hill Company, 1992.
c. Recommended Books	F.W.J.Olver, Introduction to Asymptotics and special functions, Academic press, Inc, 1974.
d. Periodicals, web sites,…,etc	None

Course Instructor: Dr. Ragab Omer Abd El-Rahman

Head of Department: Prof. Dr. Mohamed Darwish

Date: / /