

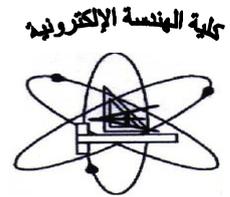
Department offering the program: Electronics and Electrical Communications Engineering
Department offering the course: Physics and Engineering Mathematics

Course Specification

1. Course Basic Information		
Code: PME 221 Department Requirement	Title: Mathematics (6)	Academic year: 2015-2016 Level (2) – Semester (2nd)
Field: Mathematics and Basic Science	Teaching hours: Lecture [3] Tutorial [2] Lab [0]	

2. Course Objectives	<ol style="list-style-type: none"> To provide students with the definitions, facts and concepts of Functions of complex variables. To teach students the principles and basics of differentiation, integration, Mappings and Power series of the functions of complex variables. To equip students with Z-Transform, The inverse Z-transform, and Z-transfer functions. To enhance students ability to demonstrate the relationship between Laplace and Z-transforms. To introduce students to applied statistics and probability.
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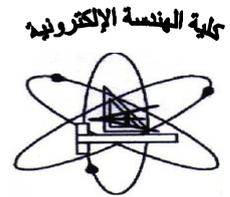
3. Intended Learning Outcomes:		Course ILOs
ARS		
A- Knowledge and Understanding	A.1. Explain concepts and theories of mathematics and science appropriate to Engineering Mathematics (6).	A1.1 Explain concepts of Functions of complex variables, Limits and continuity, harmonics and complex conjugate functions. A1.2 Explain concepts of the residue theorem Singularities, zeros and residues and Contour integration appropriate to the functions of complex variables. A1.3 Explain concepts and Properties of the Z-transform, The inverse Z-transform, Discrete linear systems, and Z-transfer functions. A1.4 Explain concepts and rules of probability, random variables, continuous and discrete probability distribution functions A1.5 Explain concepts of covariance and correlation appropriate to statistics and probability.
	A.5. Demonstrate methodologies of solving engineering problems, data collection and interpretation.	A5.1 Demonstrate methodologies of solving Limits, continuity, Harmonics and complex conjugate problems for functions of complex variables. A5.2 Demonstrate methodologies to solve differentiation and integration problems for the functions of complex variables. A5.3 Demonstrate methodologies to solve Engineering applications and difference equations problems using Z-transform, and Inverse of Z-transform. A5.4 Demonstrate methodologies to determine mathematical expectation and moment generating functions of random variables.



		A5.5 Demonstrate methodologies to determine Covariance and correlation of random variables.
B- Intellectual Skills	<p>B.2. Select appropriate solutions for engineering problems based on analytical thinking.</p> <p>B.7 Solve engineering problems, often on the basis of limited and possibly contradicting information.</p>	<p>B2.1 Select appropriate solutions for differentiation and integration for functions of complex variables problems based on analytical thinking.</p> <p>B2.2 Select appropriate solutions for difference equations problems using Z-transform, and Inverse of Z-transform.</p> <p>B2.3 Select appropriate solutions for applied statistics and probability problems based on analytical thinking.</p> <p>B7.1 Solve Mathematical expectation problems, often on the basis of limited and possibly contradicting information.</p> <p>B7.2 Solve engineering applications problems relevant to statistics and probability, often on the basis of limited and possibly contradicting information.</p>
C-Professional Skills	<p>C.1. Apply knowledge of mathematics and engineering practice integrally to solve engineering problems.</p> <p>C.12. Prepare and present technical reports.</p>	<p>C1.1 Apply knowledge of mathematics and engineering practice integrally to solve Complex differentiation, and Complex integration problems.</p> <p>C1.2 Apply knowledge of mathematics and engineering practice integrally to solve engineering problems using Power series and Residue integration.</p> <p>C1.3 Apply knowledge of Z-transforms and inverse of Z-transforms to solve difference equations problems.</p> <p>C1.4 Apply knowledge of statistics and probability to solve random variables problems.</p> <p>C1.5 Apply knowledge of statistics and probability to solve mathematical expectation, moment generating functions and joint distribution of several random variables problems.</p> <p>C12.1 Prepare and present technical reports about Engineering applications on functions of complex variables.</p> <p>C12.2 Prepare and present technical reports on Properties of the Z-transform, and the relationship between Laplace and Z-transforms.</p> <p>C12.3 Prepare and present technical reports on engineering applications relevant to random variables.</p>



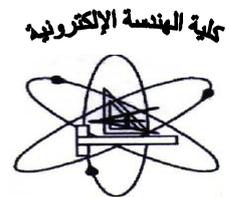
D- General Skills	<p>D.2. Work in stressful environment and within constraints.</p> <p>D.3. Communicate effectively.</p> <p>D.6. Effectively manage tasks, time, and resources.</p> <p>D.7. Search for information and engage in life-long self learning Engineering Mathematics.</p>	<p>D2.1 Work in stressful environment and within constraints during solving problems, and in exams.</p> <p>D3.1 Communicate effectively in tutorial, and lecture time with the staff member.</p> <p>D6.1 Effectively manages tasks, time, and resources while solving problems, and writing reports.</p> <p>D7.1 Search for information and engage in life-long self learning in topics related to complex variables, Z-transform, and Probability.</p>
	4. Course Contents	<p>Functions of complex variables: Definitions of the functions of complex variables – Limits and continuity of the functions of complex variables – Harmonics and complex conjugate functions of complex variables – Differentiation and Integration of the functions of complex variables – Different Mappings of the functions of complex variables. Power series of the functions of complex variables – Singularities, zeros and residues – The residue theorem – Contour integration of the functions of complex variables – Engineering applications.</p> <p>Z-Transform: Definition of the Z-transform – Properties of the Z-transform – The inverse Z-transform – Discrete linear systems – Z-transfer functions – The impulse response – The relationship between Laplace and Z-transforms. Engineering applications – Discrete-time systems and difference equations. The solutions of difference equations using Z-transforms and inverse of Z-transforms.</p> <p>Applied statistics and probability: Rules of probability – random variables – continuous and discrete probability distribution functions – mathematical expectation and moment generating functions of random variables – joint distribution of several random variables – covariance and correlation – engineering applications.</p>
5. Teaching and Learning Methods	<ul style="list-style-type: none"> • Lectures • Tutorials and Exercises • Research assignments 	
6. Teaching and Learning Methods for disable students	<ul style="list-style-type: none"> - Official low cost special classes for developing student skills, arranged by the faculty administration. - Assign a portion of the office hours for those students. - Repeat the explanation of some of the material and tutorials. 	
7. Student Assessment		
a- Assessment Methods	<ul style="list-style-type: none"> - Weekly sheet exercises at class room. - Quizzes. - Case study for more demonstration. - Midterm and final exams. 	
b- Assessment Schedule	<ul style="list-style-type: none"> - Exercise sheet - Mid-Term exam: - Quiz –1: <p style="text-align: right;">Weekly Week <u>no</u> 8 Week <u>no</u> 10</p>	



	- Final – term examination: Week <u>no</u> 16
c- Weighting of Assessment	- Mid-term examination: 20 %
	- Case study:
	- Final – term examination: 67 %
	- Class attendance and quizzes: 13 %
	Total 100 %
8. List of Text Books and References	
a- Course notes	There are lectures notes prepared in the form of a book authorized by the department
b- Text books	1. R. K. Pandey, "Applied Complex Analysis", 2010, ISBN 8183563198, Discovery Publishing House, New Delhi.
c- Recommended books	1. G. James, D. Burley, P. Dyke, J. Searl, N. Steele and N. Wright, "Advanced Modern Engineering Mathematics", Addison-wesley, 1993. 2. E. Kreyszig, "Advanced Engineering Mathematics", 8 th ed. New York: John Wiley & sons, 1999.
d- Periodicals, Web sites, etc.	www.maths.manchester.ac.uk/study/undergraduate/.../course-unit-spec/courses.cornell.edu/preview_course_nopop.php?catoid=14&coid

Course Contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Functions of complex variables: Definitions of the functions of complex variables – Limits and continuity of the functions of complex variables – Harmonics and complex conjugate functions of complex variables –	1-2	A1.1, A5.1			D2.1, D3.1, D6.1, D7.1
Differentiation and Integration of the functions of complex variables	3	A5.2	B2.1	C1.1	D2.1, D3.1, D6.1, D7.1
Different Mappings of the functions of complex variables. Power series of the functions of complex variables – Singularities, zeros and residues – The residue theorem – Contour integration of the functions of complex variables – Engineering applications.	4-5	A1.2		C1.2, C12.1	D2.1, D3.1, D6.1, D7.1
Z-Transform: Definition of the Z-transform – Properties of the Z-transform – The inverse Z-transform – Discrete linear systems – Z-transfer functions – The impulse response – The relationship between Laplace and Z-transforms.	6-7	A1.3		C12.2	D2.1, D3.1, D6.1, D7.1



Engineering applications – Discrete-time systems and difference equations. The solutions of difference equations using Z-transforms and inverse of Z-transforms.	9-10	A5.3	B2.2	C1.3	D2.1, D3.1, D6.1, D7.1
Applied statistics and probability: Rules of probability – random variables – continuous and discrete probability distribution functions	11-12	A1.4	B2.3	C1.4	D2.1, D3.1, D6.1, D7.1
Mathematical expectation and moment generating functions of random variables – joint distribution of several random variables	13	A5.4	B2.3	C1.5	D2.1, D3.1, D6.1, D7.1
Covariance and correlation – engineering applications.	14-15	A1.5, A5.5	B2.3	C12.3	D2.1, D3.1, D6.1, D7.1

Teaching and Learning Methods - ILOs Matrix

Teaching and Learning Methods	D. General & Transferable Skills	C. Professional & practical Skills	B. Intellectual Skills	A. Knowledge & Understanding
Lectures	A1, A5	B1, B2	C1	D3
Tutorials/Exercises	A1, A5	B1, B2	C1	D2,D3,D6,D7
Research assignments	A1, A5	B1, B2	C1, C12	D2,D3,D6,D7

Assessment Methods - ILOs Matrix

Assessment Methods	D. General & Transferable Skills	C. Professional & practical Skills	B. Intellectual Skills	A. Knowledge & Understanding
Weekly sheet exercises	A1, A5	B1,B2	C1	D2,D3,D6,D7
Reports	A1, A5	B1,B2	C1, C12	D2,D6,D7
Quizzes	A1, A5	B1,B2	C1	D2,D6
Midterm, and Final written exams	A1, A5	B1,B2	C1	D2,D6

Authorized from department board at 15/05/2016

Authorized from college board at 05/06/2016

Course coordinator:
Prof. Dr. Said El-Serafi

Head of Department:
Prof. Fathi El-Sayed Abd El-Samie