

## **BA224- Mathematics (4)**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr Al Faisal Abdel Hameed

### **TEXT BOOK:**

Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9<sup>th</sup> edition , 2006 .

### **COURSE DESCRIPTION:**

This course gives a comprehensive study on the 2D and 3D vectors : algebra, differential and integral calculus , and the physical interpretation of the integral theorems. The course also gives a study on the complex functions, its differentiation and integration, the residue theorems and its application to real integrals.

### **PREREQUISITE:**

BA 223

### **RELATION OF COURSE TO PROGRAM:**

Required

### **COURSE INSTRUCTION OUTCOMES:**

The student gains knowledge on vector differential calculus, vector integral calculus, complex analytic functions and complex integration.

### **TOPICS COVERED:**

Vector Algebra / Dot and cross product and Applications - Partial Differentiation / and Derivatives of vector functions - Gradient / Divergence/ curl/ Laplacian - Line Integrals / line Integrals Independent of the path / Exactness - Conservative vector fields - Double Integrals in Cartesian and polar coordinates / Green's Theorem - Surface Integrals / Stokes' Theorem - Triple Integrals / Divergence (Gauss' Theorem) - Review on Integrals Theorems - Complex numbers and functions / forms of representation - Analytic functions/ Harmonic functions - Line complex integrals / Cauchy's Integrals Theorem - Zeros and poles of Analytic functions/ Residues and their evaluation - Residue Theorem / Application to Real Integral - Introduction to Fourier Integrals and Transforms

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional Component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Engineering Design</b>
✓			

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course Outcomes</b>
<b>a.</b>	An ability to apply knowledge of mathematics, science, and engineering.	✓
<b>b.</b>	An ability to design and conduct experiments, analyze and interpret data.	
<b>c.</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	
<b>d.</b>	An ability to function on multi-disciplinary teams.	
<b>e.</b>	An ability to identify, formulate, and solve engineering problems.	✓
<b>f.</b>	An understanding of professional and ethical responsibility.	
<b>g.</b>	An ability to communicate effectively.	
<b>h.</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	
<b>i.</b>	A recognition of the need for, and an ability to engage in life-long learning.	
<b>j.</b>	A knowledge of contemporary issues within and outside the electrical engineering profession.	
<b>k.</b>	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	