

## **BA 224 – Mathematics (4)**

### **C O U R S E   I N F O R M A T I O N**

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Course Title: Mathematics (4)

Code: BA 224

Contact Hours (hours/week):            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite: BA 223 – Mathematics (3)

Course Coordinator: Dr. Al Faisal Abd El Hamid

### **G R A D I N G**

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Class Performance/Attendance:            10%

Midterm # 1/Assignments – (7<sup>th</sup> Week):    30%

Midterm # 2/Assignments – (12<sup>th</sup> Week):   20%

Final Exam:                                      40%

### **C O U R S E   D E S C R I P T I O N**

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Vectors in 2D and 3D space – Vector algebra – Vector and scalar functions – Vector differential calculus – Vector integral calculus – Theorems , physical interpretation of the integral theorems – Complex algebra – Complex functions – Complex differentiation – Complex integration – Poles and zeros of analytic functions – Residue theorem , and application to real integrals.

### **T E X T   B O O K S**

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

### **C O U R S E   A I M**

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This course aims at enhancing the students’ knowledge in the subject of “Vector Differential and Integral calculus” as well as Complex Analysis and Integration needed to solve engineering problems at higher level of the under graduate engineering studies.

### **C O U R S E   O B J E C T I V E S**

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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.

### **C O U R S E   O U T L I N E**

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*Week Number 1:* Vector Algebra / Dot and cross product and Applications

*Week Number 2:* Partial Differentiation / and Derivatives of vector functions

*Week Number 3:* Gradient / Divergence/ curl/ Laplacian

*Week Number 4:* Line Integrals / line Integrals Independent of the path / Exactness

*Week Number 5:* Conservative vector fields

*Week Number 6:* Double Integrals in Cartesian and polar coordinates / Green's Theorem

*Week Number 7:* Surface Integrals / Stokes' Theorem /7<sup>th</sup> week Exam

*Week Number 8:* Triple Integrals / Divergence (Gauss' Theorem)

*Week Number 9:* Review on Integrals Theorems

*Week Number 10:* Complex numbers and functions / forms of representation

*Week Number 11:* Analytic functions/ Harmonic functions

*Week Number 12:* Line complex integrals / Cauchy's Integrals Theorem /12<sup>th</sup> week Exam

*Week Number 13:* Zeros and poles of Analytic functions/ Residues and their evaluation

*Week Number 14:* Residue Theorem / Application to Real Integral

*Week Number 15:* Introduction to Fourier Integrals and Transforms

*Week Number 16:* Final Exam.