Arab Academy for Science and Technology and Maritime Transport
Computer Science Curriculum
Course Syllabus

Course Code: BA201	**Course Title:** Calculus III	**Classification:** R	**Coordinator's Name:** Dr. Adel Elrfaay	**Credit:** 3
Pre-requisites: BA102	**Co-requisites:** None	**Schedule** Lecture 2 hrs. Tutorial/Lab 2 hrs.		

Course Description:
This course provides the basic definition of Laplace transform and their theorems: First shift theorem, transform of differentiation and integration, unit step function, second shift theorem and convolution theorem. Inverse of Laplace transform.
Fourier analysis: Definition of Fourier series, Fourier series of functions of period 2P, Fourier series for even and odd functions, half-Range expansions and Fourier series for harmonic functions. Then the student should also study Fourier integrals, Fourier cosine and sine transforms and Fourier transform. Also this course provides an introduction to linear programming, including its basic concepts, unconstrained optimization, and solving system of linear inequalities using the simplex method. Vector spaces are studied in an abstract setting, examining the concepts of linear independence, span, bases, subspaces, and dimension. There follows a discussion of the association between linear transformations and matrices.

Textbook:
Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley and Sons Inc.

References:
Dennis G.Zill, Micheal R. Cullen, *Advanced Engineering Mathematics*, International Thomson Publishing.

Course Objective:

Course Objective/Course Learning Outcome:	**Contribution to Program Student Outcomes:**
1. Use the Laplace transform and the theorems (first shift theorem, transform of differentiation and integration theorems, etc….) in solving differential	(SO1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. (SO3) Communicate effectively in a variety of

and integral equations. 2. Understand the Fourier analysis which includes the Fourier series and Fourier transform. 3. Know the concept of linear programming in order to solve system of linear inequalities using the Simplex method. 4. Learn some useful algorithms for linear systems 5. Realize the wide applicability of linear programming	professional contexts.
Course Outline: 1. First order ordinary differential equations: 2. Separable equations – Initial value problems- Homogeneous equations 3. Total differential and exact equations. 4. Bernoulli's equation - Revision on first order ordinary differential equations 5. Linear equations 6. Second order ordinary differential equations with constant coefficients: Fundamental set of solutions - Linear independence of solutions: Wronskian- General solution of homogeneous equations 7. Second order ordinary differential equations with constant coefficients: Non-homogeneous equations (Method of undetermined coefficients) 8. Second order ordinary differential equations with constant coefficients: The method of variation of parameters 9. Second order ordinary differential equations with variable coefficients: [Cauchy- Euler] 10. Laplace transforms: Basic definition- First shifting theorem (s-shifting)	11. Laplace transform : Derivatives of Transforms - Transform integration 12. Laplace transforms: Unit Step Function - Second Shifting Theorem (t-shifting) 13. Inverse Laplace transforms 14. Applications: Solution of ODEs using Laplace transforms Solution of R-L circuit using the 15. Fourier series: Fourier series for functions of period 2P 16. Fourier series: Fourier series for even and odd functions 17. Fourier integrals 18. Linear programming and simplex method