



University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Computing and Information Technology
Program: Computer Science / Information Systems / Software Engineering

Form No. (12)
Course Specification

1- Course Data

Course Code: BA102	Course Title: Calculus 2	Academic Year/Level: Year 1 / Semester 2
Specialization: Basic Sciences	No. of Instructional Units: 2 hrs lecture 2 hrs section	Lecture:

2- Course Aim	This course provides the differentiation of indefinite integrals and table of famous integrals. The topics of interest include: simple rules of integration & the fundamental theorem of calculus, fundamental theorem of calculus and integration by parts, integration of rational function, integration of trigonometric powers, trigonometric substitution, and integration of quad forms, the reduction formulas and definite integration. Application of integration: Area and volume, length of curve, average of function, numerical integration, matrix Algebra. And solution of systems of linear equations.
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3- Intended Learning Outcome:

a- Knowledge and Understanding	Students will be able to demonstrate knowledge of: K12. Understand the essential mathematics relevant to computer science. K14. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. (Equivalent to K12 in the IS dept & K13 in the SE dept) <ul style="list-style-type: none">• Define the indefinite integration as an infinite sum.• List of famous integrals.• Identify basic rules for integration.• Explain the formula of integration by parts.• Recognize the method of integration by parts.• Describe the partial fractions for a given rational function.• Express an integral containing a rational function into integrals of the partial fractions of this rational function.• Discuss integrals containing trigonometric powers.• Underline the method of trigonometric substitution.• Discuss reduction formulae for an integrals containing a trig function to any power.• Define definite integration and its geometrical meaning.• Locate a technique to apply integral methods to find areas and volumes.
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	<ul style="list-style-type: none"> • Explain methods to find the average and length for a given function. • Discuss a numerical method to solve definite integrations. • List the concepts of matrix algebra. • Express a system of linear equations into its matrix form. • Recognize a method, using matrix algebra, to solve a system of linear equations. • Discuss the eigen values and eigenvectors for a given matrix. • Underline the meaning of eigen values and eigenvectors. • Explain how to use Cayley – Hamilton theorem to find the inverse of a matrix.
b- Intellectual Skills	<p><u>By the end of the course, the student acquires high skills and an ability to understand:</u></p> <p>I2. Realize the concepts, principles, theories and practices behind computing and information as an academic discipline.</p> <ul style="list-style-type: none"> • Apply the table of famous integrals to solve direct integral problems. • Employ basic rules for integration to solve integral problems. • Distinguish problems which are solvable by integration by parts. • Differentiate the partial fractions for a given rational function. • Use the partial fraction method to solve integral problems. • Analyze and distinguish the suitable case of trigonometric power to solve integral problems. • Apply the method of trigonometric substitution to solve integral problems. • Interpret reduction formulae for an integrals containing a trig function to any power. • Employ integrals methods to calculate areas and volumes. • Compare analytical and numerical solutions of a given integral problem. • Practice some problems using matrix operations. • Operate matrix algebra to determine the equation of the second-degree polynomial, which passes through given points. • Debate the eigen values and eigenvectors for a given matrix. • Apply Cayley – Hamilton theorem to solve a system of linear equations.
c- Professional Skills	<p><u>By the end of the course the student will have the ability to:</u></p> <p>P8. Handle a mass of diverse data, assess risk and draw conclusions.</p> <ul style="list-style-type: none"> • Use calculus to compute, graph, model, and solve problems. • Apply tools and techniques for the design and development of applications. • Test the convergence of infinite series. • Use integration and partial fractions in many applications in applied sciences. • Ability to use techniques of linear algebra in solving and handling practical problems
d- General Skills	<p>Students will be able to:</p> <p>G1. Demonstrate the ability to make use of a range of learning resources and to manage one's own learning.</p> <p>G3. Show the use of information-retrieval.</p> <p>G5. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.</p> <ul style="list-style-type: none"> • Enhance the use numeracy, calculation and statistical methods. <p>Develop Creativity, imagination skills, and analytic ability.</p>

4- Course Content	#	CLO
	1	Integrate different types of functions using various methods (Integrating by substitution, integration by parts).
	2	Understand and use the applications of integration (Area & volume, average of a function, length of a curve).
	3	Solve system of linear equations using Matrices, and determinants.
5- Teaching and Learning Methods	Lectures, sections, Individual study & self-learning.	
6- Teaching and Learning Methods for Students with Special Needs	<ul style="list-style-type: none"> • Students with special needs are requested to contact the college representative for special needs (currently Dr Hoda Mamdouh in room C504) • Consulting with lecturer during office hours. • Consulting with teaching assistant during office hours. • Private Sessions for redelivering the lecture contents. • For handicapped accessibility, please refer to program specification. 	
7- Student Assessment:		
a- Procedures used:	Exams and assignments	
b- Schedule:	Week 7 exam Week 12 exam assignments Week 16 Final exam	
c- Weighing of Assessment:	7 th week exam 30% 12 th week exam 20% assignment 10% Final exam 40%	
8- List of References:		
a- Course Notes	From the Moodle on www.aast.edu	
b- Required Books (Textbooks)	Sherman K.Stein, Anthony Barcellos, <i>Calculus & Analytic Geometry</i> , 2002 5 th edition, McGraw-Hill Higher Education, 2002.	
c- Recommended Books		
d- Periodicals, Web Sites, ..., etc.		

Course Instructor: Dr Ahmed Yehia

Head of Department: Dr Samah Senbel

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