

Faculty of Engineering & Technology

Integration with Applications and Analytical Geometry (Math 2)

Information :

Course Code : MTH 112

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Faculty of Engineering & Technology

Instructor Information :

Title	Name	Office hours
Lecturer	Ahmed Mahsoup Mohamed ElHadidi	2
Assistant Lecturer	TAREK ALI ABDALLAH TEAMA	12
Assistant Lecturer	Reham Milad Kamel Samaan	

Area Of Study :

- Demonstrate a conscious understanding of the concepts of integral calculus and analytic geometry that are essential for engineering studies.
- Develop mathematical skills for the techniques of integration to problems in physics, dynamics, and other engineering courses.
- Acquire skills for the application of integral calculus and analytic geometry in engineering problems.

Description :

Definite and Indefinite integrals. Integration of algebraic and transcendental functions. Integration of inverse functions. Fundamental Theorem of calculus. Methods of integration. Conic Sections: Parabola, Ellipse, and Hyperbola. Applications of definite integral: Area, Arc length, Surface area, and volume of the solid of revolution. Lines and planes in three dimensions. Vector equations of lines and Planes in space. Quadric Surfaces: ellipsoid, paraboloid, and hyperboloid. Applications.

Course outcomes :

a. Knowledge and Understanding: :

1 -	Describe definite and indefinite integrals of algebraic and transcendental functions, vector equations of lines and planes in three-dimensional space, conic sections, and quadric surfaces.
2 -	Recognize methods of integration, numerical integration with application to algebraic and transcendental functions and their inverses.
3 -	Identify scalar and vector equations of lines and planes in space, conic sections, Quadric Surfaces and their equations and properties.
4 -	Illustrate areas, arc lengths, surface areas, and volumes of the solid of revolution by using concepts of analytic geometry and integral calculus.

b. Intellectual Skills: :

1 -	Demonstrate knowledge of the theorems, concepts, methods, and techniques of integral calculus and analytic geometry at the intellectual level required of this course.
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2 -	Analyze engineering problems solving related to integration with application, conic sections, and vector equations of lines, planes, and Quadric Surfaces.
3 -	Organize tasks into vector equations of lines and planes in space, conic sections, quadric surfaces, and applications in engineering problems.
4 -	Apply numerical integration methods (left and right rectangular and trapezoidal rule) for the solutions engineering problems in case of failure of the rules and methods of integrations.
5 -	Use rules and methods of integration in finding Areas, volumes of revolution, and Arc lengths of parametric functions.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Indefinite and definite integrals. Properties and evaluation of definite and indefinite integrals of algebraic and transcendental functions and their inverses. Fundamental Theorem of calculus. numerical integration.	10	6	4
Techniques of integration: Integration by parts, Trigonometric substitutions.	10	6	4
Integration by partial fractions, Quadratic expressions and substitutions, Integration by reduction.	10	6	4
Conic Sections: Parabolas. Ellipses. Hyperbolas.	10	6	4
Applications of definite integral: Areas, Volumes, and Arc lengths of parametric functions.	10	6	4
Surface area, volume of solids of revolution,.	10	6	4
Lines and planes in three-dimensional space. Scalar and vector equations of lines and Planes in space.	10	6	4
Quadric Surfaces: Cone, ellipsoid, paraboloid, hyperboloid. Applications.	10	6	4

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	10.00		
Final exam	40.00		
First Mid Term Exam	20.00		
Participation and Performance	10.00		
Second Mid Term Exam	20.00		

Course Notes :

Course notes
Handouts

Recommended books :

~Earl W. Swokowski, "Calculus with Analytic Geometry, Prindle, Weber & Schmidt
~Peter V. O'Neil, "Advanced Engineering Mathematics"
~Larson, R, Edwards, B & Falvo, D 2004, Elementary linear algebra, 5th edn, Houghton Mufflin, Boston, Massachusetts.
~Stewart, J 2005, Calculus: concepts & contexts, 3rd ed., Thomson/Brooks/Cole, Australia.

Periodicals :

www.wolframalpha.com
www.sosmath.com, www.math.hmc.edu,
www.tutorial.math.lamar.edu,
www.web.mit.edu
www.web.mit.edu

Web Sites :

www.sosmath.com, www.math.hmc.edu,
www.tutorial.math.lamar.edu,
www.web.mit.edu