MATH 282 – Calculus

Curricular Area	**Civil, Mechanical ,Petroleum and Electrical & Computer Engineering**
Type of Course	Mandatory
Catalogue Description	Hyperbolic functions- Implicit and Logarithmic differentiation - Derivatives of higher order – Parametric differentiation- Leibniz theorem - Mean value theorem - Curvature -Partial differentiation and applications - Taylor expansion - Methods of integration - Improper integrals- Multiple integrals
Prerequisites by Courses	None
Prerequisites by Topics	College Mathematics
Instructors	Eng. Heba El-Halabi Engineering Building – Department of Electrical Engineering Office G 113 (Phone 3408)
Lectures	**Sec 1** (Tuesday 8:00-9:30, Thursday 8:00-9:30) **Sec 2** (Tuesday 9:30-11:00, Thursday 9:30-11:00) **Sec 3** (Monday 8:00-9:30, Wednesday 8:00-9:30) **Sec 4** (Monday 2:00-3:30, Wednesday 2:00-3:30)
Office Hours	**Eng. Heba El-Halabi** Monday 11:00-12:00, Tuesday 11:00-12:00, Wednesday 11:00-12:00,Thursday 11:00-12:00
Load	3 credits; 3 Lecture-sessions/week – 50 min per session
Textbook	Thomas' Calculus, George Thomas, Maurice Weir, Joel Hass. 12th edition, 2010 or newest version, Global Edition, Addison-Wesley Publishing Company (Imprint of Pearson)
Reference Books	Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition, 2011 or newest version, John Wiley & sons, Inc.Albert Malvino, Electronics Principles, 6th Edition, Career Education, 1998.

Topics

Subjects covered	*50 min. lectures*
Hyperbolic functions	3
Implicit and Logarithmic differentiation, derivatives of higher order, Parametric differentiation, Leibniz theorem, Curvature, Mean value Theorem.	9
Partial differentiation and applications	6
Taylor expansion	4
Methods of integration	12
Improper integrals	3
Multiple integrals	8
Total	45

Intended Learning Outcomes

Learning Outcomes Correlation with	Program Outcomes	Program Objectives
Identify Hyperbolic functions	A	2
Use the product, quotient and chain rules to differentiate various types of functions	A	2
Determine the derivatives of a function using logarithmic, implicit and parametric differentiations	A	2
Identify Leibniz theorem and determine the higher order derivatives	A	2
Recognize the partial derivatives of a function of two variables, and apply them to find the critical points.	A	2
Classify the critical points as minimum, maximum and saddle points using the first derivative test	A	2
Apply Taylor and Maclaurin series to obtain the expansion of various functions	A	2
Evaluate indefinite integrals using anti-derivative of a function	A	2
Interpret the basic techniques of integration and evaluate definite and indefinite integrals using parts, substitution and partial fractions	A	2
Define and compute the improper integrals	A	2
Evaluate double integrals over general regions	A	2

Learning Outcomes Assessment Tools	Exams	HW s	Lab Reports	Project	Course Survey
Identify Hyperbolic functions	☒	☒			☒
Use the product, quotient and chain rules to differentiate various types of functions	☒	☒			☒
Determine the derivatives of a function using logarithmic, implicit and parametric differentiations	☒	☒			☒
Identify Leibniz theorem and determine the higher order derivatives	☒	☒			☒
Recognize the partial derivatives of a function of two variables, and apply them to find the critical points.	☒	☒			☒
Classify the critical points as minimum, maximum and saddle points using the first derivative test	☒	☒			☒
Apply Taylor and Maclaurin series to obtain the expansion of various functions	☒	☒			☒
Evaluate indefinite integrals using anti-derivative of a function	☒	☒			☒
Interpret the basic techniques of integration and evaluate definite and indefinite integrals using parts, substitution and partial fractions	☒	☒			☒
Define and compute the improper integrals	☒	☒			☒
Evaluate double integrals over general regions	☒	☒			☒

Assessment:

Assessment:	Dates	Weighing
Class work, assignments and reports	Weekly	10%
2 Quizzes	6^{th} & 12^{th} week	50%
Final Exam	To be set later by BAU registrar	40%

Attendance:

As set by BAU regulations, and specified in Student Manual, students who miss more than one-fifth of the sessions of any course in the first ten weeks of the semester will be required to withdraw from the course with a grade of "WF".

Course Description

Topics	**Week [1]**	Hyperbolic Functions • Definitions and Identities • Derivatives of hyperbolic functions • Inverse hyperbolic functions
	Week [2]	Implicit and Logarithmic differentiations Parametric differentiation
	Week [3]	Derivatives of higher orders
	Week [4]	Leibniz theorem Curvature Mean value Theorem
	Week [5]	Partial differentiation
	Week [6]	Applications of Partial Differentiation • Critical points • Classifications of critical points **Quiz 1**
	Week [7-8]	Taylor and Maclaurin Series Method of Integrations: • Integration as inverse process
	Week [9-10]	Method of Integrations: • Integration by substitutions • By parts • Using partial fractions
	Week [11]	Method of Integrations: • Trigonometric substitutions Trigonometric Integrals
	Week [12]	**Quiz 2** Definite integrals Improper Integrals
	Week [13-14]	Multiple Integrals • Double integrals • Area by double integrals • Double integrals as volumes • Double integrals in polar form • Reversing the order of integration
	Week [15]	Course project: Engineering applications of Calculus