هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title: Calculus (حساب التفاضل)	
Course Code: MATH 105	
Program: (Cross-Listed Course)	
- Civil Engineering Program - Electrical Engineering Program - Renewable Energy Program	- Architecture Program - Interior Design Program - Cybersecurity Program
Department: (Cross-Listed Course)	
- Civil Engineering Department - Electrical Engineering Department	- Architecture Department - Cybersecurity Department
College: College of Engineering and Information Technology	
Institution: Onaizah Private Colleges	
Version: Second Version	
Last Revision Date: 2023-04-06	

Table of Contents:

A. General information about the course:

Course Identification	
1. Credit hours:	3 Credit Hours
2. Course type a. University ☐ College ☒ Department ☐ Track ☐ Others ☐ b. Required ☒ Elective ☐	
3. Level/year at which this course is offered:	Second Level / First Year
4. Course general Description This course helps introductory engineering students understand the basic facts, principles, theories, and general methods of differentials calculus with some applications.	
5. Pre-requirements for this course (if any): None	
6. Co- requirements for this course (if any): None	
7. Course Main Objective(s) The objectives of this course are to develop students' understanding of various topics in differential calculus, including the concept of differentiation for functions of one variable, calculating derivatives of different types of functions, and applying differential calculus to solving problems in the physical world.	

1. Teaching mode

No.	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

2. Contact Hours (based on the academic semester)

No.	Activity	Contact Hours
1	Lectures	30
2	Laboratory/Studio	
3	Field	
4	Tutorial	30
5	Others (specify)	
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
MATH 105.CLO.K.1	Identify the concept differentiation on the functions of one variable to define concepts, principles, and theories of electrical engineering, power engineering, and basic electronics and communications theories in relation to concepts of mathematics	K.1(الهندسة برنامج الكهربائية Electrical Engineering)	Primary: Lecture Additional: Tutorial	Formative: Homework Summative: Written Exam (MCQ or Essay / F2F or Online)
MATH 105.CLO.K.2	Identify the concept differentiation on the functions of one variable to define basic renewable energy concepts, principles, and theories related to mathematical concepts	K.1(هندسة برنامج المتجددة الطاقة Renewable Energy)	Primary: Lecture Additional: Tutorial	Formative: Quiz (Online or F2F) Summative: Written Exam (MCQ or Essay / F2F or Online)

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
MATH 105.C LO. K.3	Identify the concept differentiation on the functions of one variable to explain analytical methodologies used in cybersecurity systems	K.2(الأمن برنامج السيبرانى Cybersecurity)	Primary: Lecture Additional: Tutorial	Formative: Homework Summative: Quiz (Online or F2F)
MATH 105.C LO. K.4	Identify the concept differentiation on the functions of one variable to solve Civil Engineering problems	K.1(الهندسة برنامج المدنية Civil Engineering)	Primary: Lecture Additional: Tutorial	Formative: Essay (Individual or Group) Summative: Written Exam (MCQ or Essay / F2F or Online)
2.0	**Skills**			
MATH 105.C LO. S.1	Calculate derivatives of different types of functions for use in designing sustainable interior projects using appropriate research methods	S.2(التصميم برنامج الداخلى Interior Design)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Research Assessment (Rubric) Summative: Written Exam (MCQ or Essay / F2F or Online)
MATH 105.C LO. S.2	Apply differential to the physical world problems to produce creative interior design	S.5(التصميم برنامج الداخلى Interior Design)	Primary: Interactive Lecture \ Demonstration Additional: Discussion (or similar active	Formative: Quiz (Online or F2F) Summative: Written Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	documents and drawings		learning strategies)	(MCQ or Essay / F2F or Online)
MATH 105.C LO. S.3	Apply differential to the physical world problems to Solve complex architectural problems using computational methods	S.2(العمارة برنامج Architecture)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Research Assessment (Rubric) Summative: Written Exam (MCQ or Essay / F2F or Online)
MATH 105.C LO. S.4	Apply differential to the physical world problems to analyze complex electrical and power systems and electronic circuits	S.3(الهندسة برنامج الكهربائية Electrical Engineering)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Research Assessment (Rubric) Summative: Written Exam (MCQ or Essay / F2F or Online)
MATH 105.C LO. S.5	Apply differential to the physical world problems to analyze complex renewable energy systems	S.3(هندسة برنامج المتجددة الطاقة Renewable Energy)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Quiz (Online or F2F) Summative: Written Exam (MCQ or Essay / F2F or Online)
MATH 105.C LO. S.6	Apply differential to the physical world problems to critically analyze the behavior of cybersecurity threats and vulnerabilities	S.3(الأمن برنامج السيبرانى Cybersecurity)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Research Assessment (Rubric) Summative: Quiz (Online or F2F)

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
MATH 105.CLO.S.7	Apply differential to the physical world problems to critically analyze civil engineering problems and solutions	S.3(الهندسة برنامج المدنية Civil Engineering)	Primary: Interactive Lecture \ Demonstration Additional: Tutorial	Formative: Quiz (Online or F2F) Summative: Written Exam (MCQ or Essay / F2F or Online)
3.0	**Values, Autonomy, and Responsibility**			
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C. Course Content

No.	List of Topics	Contact Hours
1	Introduction to differential calculus.	4
2	Real numbers, Functions.	4
3	Horizontal and Vertical Asymptotes.	4
4	Limits.	4
5	Continuity.	4
6	Derivatives.	4
7	Differentials.	4
8	Chain Rule.	4
9	Implicit Differentiation.	4
10	Higher Order Derivatives.	4
11	Inverse Trigonometric Functions.	4
12	Local Extrema, Concavity.	4
13	Applications of Extrema and related rates.	4
14	Rolle's Theorem.	4
15	Mean Value Theorem.	4
Total		**60**

D. Students Assessment Activities

No.	Assessment Activities*	Assessment Timing (in Week No.)	Percentage of Total Assessment Score
1	Quiz (Online or F2F)	4^{th} – 10^{th}	10%
2	Research Assessment (Rubric)	13^{th}	5%
3	Essay (Individual or Group)	6^{th}	5%
4	Written (MCQ or Essay / F2F or Online)	9^{th} – 16^{th}	70%
5	Homework	2^{nd} – 12^{th}	10%
			100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Calculus by "Anton, Bivens and Davis", John Wiley & Sons, 10th Edition. - "Calculus" by Howard Anton, Bivens, and Stephen Davis and published by John Wiley & Sons. 10th edition, in 2012. Its ISBN-13 is 978-0470647691.
Supportive References	- Mathematics journals. - Calculus with applications by "Daniel. L. Auvil" Addison-Wesley Publishing Company.
Electronic Materials	- Course materials are uploaded to the course page on https://elearn.oc.edu.sa/ to be available for the students.
Other Learning Materials	None.

2. Required Facilities and Equipment

Items	Resources
Facilities (Classrooms, Laboratories, Exhibition Rooms, Simulation Rooms, etc.)	Lecture Room with enough space (at least 5mx7m) and supported with at least 60 seats.
Technology Equipment (Projector, Smart Board, Software)	White Board, Data Show, Overhead Projector. Desktop supported with Microsoft Office.
Other Equipment (Depending on the nature of the specialty)	None.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer	Direct (peer classroom observation according to the approved Rubric)
Effectiveness of students' assessment	Faculty/Instructor	Direct (analysis of CLOs assessment results and grade distributions)
Quality of learning resources	Students	Indirect (course evaluation survey)
The extent to which CLOs have been achieved	Faculty/Instructor	Direct (CLOs assessment and analysis of results according to CLOs targets)
	Students	Indirect (Students through course evaluation survey)
Commitment to learning and teaching strategies and assessment methods included in the program and course specifications	Peer Reviewer	Direct (Peer- classroom observation according to the approved Rubric in OC-QMS)
	Department Chair through Students Focus Groups	Indirect (Chair – survey questions to a focus group of students according to OC QMS)
Action Plan Continuity (Closing the Loop)	QAC (Quality Assurance Committee)	Direct (periodic review of course reports and submitting comments to course instructor/coordinator)
Instructor's Support to Students	Students	Indirect (course evaluation survey)

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Department of Civil Engineering Council
REFERENCE NO.	10
DATE	2023-05-23

Learning outcomes of this course, as well as CLOs/Teaching Strategies/Assessment Methods matrix have been evaluated and reviewed by multiple QC parties according to QC-QMS. You can access results of these final reviews by scanning the QR code on the right, which contains a link to the reviews on QC-E-QMS.

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