Course	MATH 105 - Calculus I
Credit Hours	**3 Credit Hours (2+2 Contact Hours)**
Semester	**Spring 2022/2023, Section 62**
Class Location and Meeting Time:	**Tuesday and Thursday 8:00-9:40AM. Room C6 004**

Instructor Information	**Prof. Nafaa Chbili د. نافع الشبيلي**	
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Course Coordinator	Prof. Muhammed Syam	
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Course description	Elementary functions, limits, continuity, limits involving infinity, tangent lines, derivative of elementary functions, differentiation rules, chain rule, implicit differentiation, linear approximation, L'Hôpital rule. Graph sketching (extrema, intervals of monotonicity, concavity), optimization. Anti-derivatives, definite integrals, Fundamental Theorem of Calculus, integration by substitution, area between curves, improper integrals.
Pre-requisite	None
Text Book	James Stewart, Calculus Early Transcendentals, 9th edition, Brook/Cole (CENGAGE Learning)
Course Objectives	1. Explain the main concepts of Calculus, namely: Limits, continuity, differentiation and integration. 2. Teach the students the various techniques to understand the concepts of (1) above verbally, algebraically, graphically and numerically. 3. Help the students to understand and use the various rules and theorems associated with the topics of part (1) above, such as Roll's theorem, L'Hôpital's rule, and fundamental theorem of calculus. 4. Introduce the concept of mathematical modeling and physical applications through various applications of calculus, namely: related rates, optimization problems, curve sketching and area under the curve. **5. Integrate technology throughout by using Mathematica to explain several concepts of calculus.**
Course Learning Outcomes (CLOs)	Upon successful completion of this course, the student will be able to:

	1	Explain some important concepts of Calculus (such as limit, continuity, derivative and integral).
	2	Compute limits, derivatives, linear approximations, and integrals using various techniques.
	3	Apply Calculus to geometry and to real world problems (such as graph sketching, optimization, related rates, area computation)
	4	Use technology to investigate limits, graphs, and integrals.
	5	Justify some general results in single-variable Calculus from a theoretical point of view.

Instructional Material & Learning Resources	Textbooks & Handout
Course Teaching & Learning Methods	• PPT Slides • Smart Board • Blackboard • Online Homework assignment • Textbook , Publisher's e-book • Mobile learning, iPad and Laptop
Course Policies & Attendance	Attendance is required for all classes. Students who are absent for more than 15% of required classes are prohibited from participating in subsequent exams and receive a grade of "F" for the course. University rules and regulations are strictly observed and implemented. If you are absent: • **3 sessions**, you will receive a **5% warning**. • **4 sessions**, you will receive a **10% warning**. • **5 sessions**, you will receive a **15% warning** and **Fail the course.**

Course Evaluation and Grading	Assessment Method	Weight	Due Date
	Two Tests	20%	Weeks 4 & 12
	Midterm	20%	Midterm: 27/2/2023, 7 Pm-8 PM Make up: 6/3/2023 6 PM (with approval excuses)
	3 Quizzes	5%	Weeks 2, 10, and 15 Count best two quizzes-No makeup
	Mathematica Labs (5 labs)	5%	According to schedule
	Mathematica-Test	5%	Last Lab
	Assignments	5%	4 assignments (online) Count best 3 assignments-No extension
	Final Exam	40%	**Monday May 8,2023 (8:30-10:30 AM)**
	Please refer to the university schedule for any changes**.** Based on the university rules, the student should note that there is no makeup quiz; makeup test until the student has an approved excuse from the university. For the assessments: the Instructor reserves the right to call any student for an oral examination to confirm his/her answers. **Failing to provide correct answers may decrease the initial grade.**		

Rubrics	Rubrics will be provided to students for grading their direct assessment works such as essays, research papers or reports, student portfolios, oral presentations, performances, problem-solving activities, and group activities.
Feedback	Feedback on progress in the course will be regularly provided to students to give them opportunities to improve their performance.
Topics to be covered	1. Limits and derivatives 2. Applications of derivatives 3. Study of functions 4. Anti-derivatives, Integrals and application 5. Improper integrals

Course Outline:					
Week	**Session Content**	**CLOs**	**Course Activities/ Teaching & Learning Methods Solving Problem #**	**Assessment Tools**	
Week #1 **Jan 9**	**Topic: Sections** 2.2, and 2.3 **Content:** The limits of a function and calculating limits using the limit laws.	**1,2,4**	**2.2:** 2, 3, 4, 5, 6, 7, 8, 15, 16, 29, 30. **2.3:** 1, 2, 4, 13-33(odd), 39-47(odd), 52, 54, 55, 66.	Assignment 1	**Lab 1: Introduction to Mathematica & Limits and Continuity And problem solving**
Week #2 **Jan 16**	**Topic:** Sections 2.5 and 2.6 **Content:** Continuity and limits at infinity; Horizontal asymptotes.	**1,2,4 ,5**	**2.5:** 3, 4, 8, 9, 13, 17, 18, 20, 27, 29, 47, 48, 49, 51, 55, 57, 59. **2.6:** 1, 3, 4, 15-37(odd), 40	Assignment 1 Quiz 1	
Week #3 **Jan 23**	Topic: Sections 2.7, 2.8 and 3.1 Content: Derivatives and rate of change, the derivative as a function and Derivative of polynomial and exponential functions	**1,2,4**	**2.7:** 3, 4: (a, b), 5, 8, 12, 13, 43-47(odd) **2.8:** 1, 3, 5, 10, 21, 23, 29, 31, 41, 43, 50. **3.1:** 3-29(odd), 40, 41, 49.	Assignment 1	
Week #4 **Jan 30**	**Topic:** Sections 3.2 and 3.3 **Content:** The product and quotient rule and derivatives of trigonometric functions	**2,4**	**3.2:** 3-35(odd), 46, 49, 51. **3.3:** 1-15(odd), 27, 29, 35, 46, 52.	Test 1 (Second class) Assignment 2	
Week #5 **Feb 6**	**Topic:** section 3.4 **Content:** Chain Rule	**2,4**	**3.4:** 1-37(odd), 53, 59, 83.	Assignment 2	**Lab 2: Derivatives**

					and problem solving
Week #6 Feb 13	**Topic:** Sections 3.5 and 3.6 **Content:** Implicit differentiation and derivative of logarithm functions	2,4,5	**3.5:** 5-21(odd), 24, 27, 43. **3.6:** 2, 3-19(odd), 29, 39, 43, 49, 51, 63-73(odd), 81.	Assignment 2	
Week #7 Feb 20	**Topic:** Sections 3.9 and 3.10 **Content:** Related rates, Linear approximation and differentials	2,3,4	**3.9:** 1, 3, 6, 7, 9, 13, 14, 22, 27. **3.10:** 1, 3, 5, 19, 25, 31, 33, 36, 41.	Assignment 2	
Week #8 Feb 27	**Topic:** Sections 4.1 and 4.2 **Content:** Maximum and minimum values, the mean value theorem	3,4,5	**4.1:** 1, 3, 5, 7, 9, 15, 17, 31, 41, 53, 57, 67. **4.2:** 1, 3, 5, 7, 9, 12, 15, 17, 23, 34, 40, 41.	Assignment 2 Midterm (27/2 from 7-8 PM)	**Lab 3: Applications of Derivatives And problem solving**
Week #9 March 6	**Topic:** Sections 4.3 and 4.5 **Content:** How derivatives affect the shape of a graph Summary of curve sketching	3,4	**4.3:** 1, 3, 5, 6, 7, 9, 11, 17, 23, 29, 37, 43. **4.5:** 4, 10, 14.	Assignment 3	
Week #10 March 13	**Topic:** Section 4.4 **Content:** Indeterminate form and l'Hopital's form.	2,4	**4.4:** 1, 2, 4, 7, 8, 11, 16, 27, 57, 59.	Assignment 3 Quiz 2	**Lab 4: Asymptotes - L'Hopital's rule –Related rates –Optimization and problem solving**
Week #11 March 20	**Topic:** Sections 4.7, 4.9 **Content:** Optimization problems and anti-derivatives	2,3,4	**4.7:** 2, 5, 6, 17, 27, 43, 44, 60. **4.9:** 5, 9, 13, 27, 28, 31, 47, 54.	Assignment 3	
Week #12 April 3	**Topic:** Section 5.2	1,2,4	**5.2:** 1, 3, 14, 19, 21, 35, 45.	Test 2 (second class)	

	Content: The definite integral.				
Week #13 April 10	**Topic:** Sections 5.3, 5.4 **Content:** The fundamental theorem of calculus, indefinite integrals and the net change theorem	**2,3, 4,5**	**5.3:** 2, 9, 11, 15, 25, 47, 50, 63, 67, 71. **5.4:** 2, 3, 8, 13, 21, 27, 39, 53, 58, 69, 71.	Assignment 4	**Lab 5: Definite and indefinite integrals, Area, Fundamental theorem of calculus and problem solving**
Week #14 April 17	**Topic:** 5.5 **Content:** Substitution method **Topic:** 6.1 Area between curves	**2,4**	**5.5:** 1, 3, 4, 9, 13, 15, 25, 31, 41, 50, 56, 75. **6.1:** 1, 2, 3, 4, 7, 13, 17, 19, 22, 27, 41, 42.**5.3:**2, 7, 9, 13, 19, 37, 40, 45, 55,59	**Assignment 4 (Final exam: Mathematica Lab)**	
Week #15 Nov 24	**Topic:** 7.8 **Content:** Improper integrals	**2,4**	**7.8:** 1, 7, 9, 29, 38, 39.	**Assignment 4 (Final exam: Mathematica Lab) Quiz 3**	
Final Exam: Monday, May 8,2023 (8:30-10:30 AM)					

Academic Integrity:

Academic integrity is of central importance to education at UAEU. Students have the responsibility to know and observe the requirements of the UAEU Code of Academic Honesty available: https://www.uaeu.ac.ae/en/catalog/plagiarism_and_academic_integrity.shtml and the penalties resulting from violation of this code. This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Cheating in any form and on any academic work results in serious penalties that include dissmissal from the university.

Students with Special Needs:

Students with special needs are encouraged to discuss their needs with the course instructor. You need to contact the Special Needs Services Center at +971 3 7134264 or email (disabilityservices@uaeu.ac.ae). All academic accommodations must be arranged through that office: http://www.uaeu.ac.ae/en/student_services/special_needs/

Student Support Services:

If you need more support please go to the Student Academic Success Program: http://www.uaeu.ac.ae/en/university_college/sasp/. This program provides students with academic support services such as Independent Learning Centers (ILCs), Tutorials, Writing & Speaking Centers. All students are encouraged to use these Centers

Assessment of Learning Outcomes

The purpose of this section is to demonstrate the relation between the Course Learning Outcomes and the Program Learning Outcomes and expected students learning assessments.

The Program learning outcomes

Upon completion of the program, students will be able to:

- PLO1: identify, formulate and solve mathematical problems by applying knowledge of mathematics. (Knwl: knowledge, Solv: solving)

- PLO2: formulate or design a mathematical model, procedure or algorithm for real-life and interdisciplinary problems. (Modl: modeling)

- PLO3: exploit data, use mathematical arguments in a clear well-organized and logical way and employ technology to assist in solving problems and to draw conclusions. (Tech: technology, Logc: logic)

- PLO4: communicate mathematical ideas effectively through presentations and reports with a range of audiences. (Comm: communication)

- PLO5: search mathematical literature and understand ethics and professional responsibilities and the impact of mathematical solutions in different contexts. (Litr: Information literacy)

- PLO6: Work effectively on teams to accomplish common goals, plan tasks, meet deadlines, and analyze risk and uncertainty. (GpWk: group work)

Proficiency level of the CLO with the PLO:

Use a proficiency level "I = Introduced, D = Developed, or M = Mastery" (recommended), or a check mark "✓" to map CLOs to PLOs.

I: Introduced   *D: Developed*   *M: Mastered*

Math	**PLOs**	**1** **Knwl, Solv**	**2** **Modl**	**3** **Logc**	**4** **Comm**	**5** **Litr**	**6** **GpWk**
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Mapping Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)

	PLO1 **Knwl, Solv**	**PLO2** **Modl**	**PLO3** **Logc**	**PLO4** **Comm**	**PLO5** **Litr**	**PLO6** **GpWk**
CLO-1	✓					
CLO-2	✓					
CLO-3		✓				
CLO-4			✓			
CLO-5			✓	✓		✓

CLOs Assessment Tools

Use a check mark "✓" to specify the assessment tools for each CLOs.

	Direct Assessment Tools[1]				
	HW	Quizzes	Labs	Tests & Midterm	Final
CLO-1	✓	✓		✓	✓
CLO-2	✓	✓	✓	✓	✓
CLO-3	✓		✓	✓	✓
CLO-4	✓	✓	✓		
CLO-5	✓			✓	✓

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[1] Assignment, Projects, quizzes, midterm, etc.