



مركز الاعتماد
و ضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Calculus I

1	Course title	Calculus I
2	Course number	(0301101)
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	None
5	Program title	B.Sc.
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Science
9	Department	Mathematics
10	Level of course	College requirement
11	Year of study and semester (s)	all Semesters
12	Final Qualification	B.Sc. in Mathematics
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	19/11/2017

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Emad Abu Osba

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

Functions: domain, operations on functions, graphs of functions; trigonometric functions; limits: meaning of a limit, computational techniques, limits at infinity, infinite limits; continuity; limits and continuity of trigonometric functions; the derivative: techniques of differentiation, derivatives of trigonometric functions; the chain rule; implicit differentiation; differentials; Roll's Theorem; the mean value theorem; the extended mean value theorem; L'Hopital's rule; increasing and decreasing functions; concavity; maximum and minimum values of a function; graphs of functions including rational functions (asymptotes) and functions with vertical tangents (cusps); antiderivatives; the indefinite integral; the definite integral; the fundamental theorem of calculus ; the area under a curve; the area between two curves; transcendental functions: inverse functions, logarithmic and exponential functions; derivatives and integrals; limits (the indeterminate forms); hyperbolic functions and their inverses; inverse trigonometric functions.

19. Course aims and outcomes:**A- Aims:**

1. Know the basic theories of calculus and the accompanying mathematical techniques and procedures required and become well-trained on them.
2. Solve several practical applications of calculus and to solve several applied problems using differentiation and integration in a clear, logical manner.
3. Develop ability to reason logically, then transfer mathematical concepts from one situation to another rather than memorizing mechanical procedures.

B- Intended Learning Outcomes (ILOs):

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding Skills: Student is expected to

- A1) Calculate the limit for various types of functions.
- A2) Determine whether a given function is continuous at a certain point.
- A3) Differentiate and integrate various types of functions.
- A4) Sketch the graph of polynomials, trigonometric and rational functions.
- A5) Use correctly some famous Theorems in calculus such as: Intermediate Value Theorem, Mean Value Theorem, and Fundamental Theorem of Calculus.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1) Use mathematical symbols as well as calculus I concepts (limits, continuity, derivatives, applications of the derivative, antiderivative, the definite and indefinite integral, and the Fundamental Theorem of Calculus) to analyze, graph, and solve real world problems.

C. Subject- Specific Skills: Student is expected to

- C1) Calculate limits and determine continuity for functions.
- C2) Perform differentiation and integration correctly.
- C3) Sketch the graph of polynomial and rational polynomial functions, as well as some transcendental functions.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

- D1) Use mathematical symbols and mathematical structures to model and solve real world problems.
- D2) Choose the correct use of quantifiable measurements of real world situations.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
1. Functions and models §1.1: Four ways to represent a function Ex: 2,4,7–10, 31-55,72–78 §1.2: Mathematical models: A catalog of essential functions Ex: 1-5,6,8,9 §1.3: New functions from old functions Ex:1, 3, 5-7, 9-24, 27, 33-36, 39, 43-47, 49, 50, 51, 61 §1.5: Exponential functions Ex: 1,3,11–21,33 §1.6: Inverse functions and logarithms Ex: 3–18,21-31,35–41,47–57,63–72,75	1-3		D1, D2	Exam	
2. Limits and derivatives §2.2 The limit of a function Ex: 7,8,15–17,29-33,38 §2.3 Calculating limits using the limit laws Ex: 1, 2, 7, 9-32, 37, 39, 41–46, 48, 49, 51, 52 § 2.5: Continuity Ex: 4, 18, 20, 23, 33, 35–39, 43, 45-47, 51-54, 57, 58, 65, 67 § 2.6: Limits at infinity; Horizontal asymptotes Ex: 3,7,15–38,41–46,48,52-56 §2.7: Derivatives and rate of change Ex: 27,29,31,33-38,53,54 §2.8: The derivative as a function Ex: 1,3,23,29,37-40	4-5		A1, A2, C1	Exam	
3. Differentiation rules §3.1: Derivatives of polynomials and exponential functions Ex: 3–36, 44, 46, 52-55, 57, 68, 70, 74, 75, 77 §3.2: The product and quotient rules Ex: 3-9, 11-13, 16-25, 27, 33, 39, 43, 48, 49, 52, 54 §3.3: Derivatives of trigonometric functions Ex: 1–16, 21–24, 30, 39–49, 52 §3.4: The chain rule Ex: 7–17, 23-45, 50, 51, 53, 56, 59, 61, 63, 65, 66, 69, 95-97 §3.5: Implicit differentiation Ex: 55–21, 24, 26, 37, 49-60, 75-78 §3.6: Derivatives of logarithmic functions Ex: 2-23, 26, 27, 29, 33, 41-52, 53, 55 §3.10: Linear approximations and differentials Ex: 2, 3, 6–11, 13, 15, 17, 19, 20, 23–31 §3.11: Hyperbolic Functions Ex: 7–21, 23, 31, 33, 35, 40, 41, 43, 45, 47, 54	5-8		A3, B1	Exam	
4. Applications of differentiation §4.1: Maximum and minimum values Ex: 9, 11, 13, 29–45, 47–62, 65–68 §4.2: The mean value theorem Ex: 2, 5, 7, 9, 11, 15, 17, 19, 23, 25	9-12		A4, A5, B1, C3	Exam	

§4.3: How derivatives affect the shape of A graph Ex: 5–7, 9, 11, 13, 15-17, 19, 25, 31, 37-53 §4.4: Indefinite forms and L'Hopital's rule Ex: 1–66, 74, 89, 90 §4.5: Summary of curve sketching Ex: 5, 9, 13, 17, 19, 24, 25, 29, 30, 37, 43, 45, 54, 66-69					
5. Integrals §5.2: The definite integral Ex: 34–42, 47–50 §5.3: The fundamental theorem of calculus Ex: 2, 7–44, 55–62 §5.4: Indefinite integrals and the net change theorem Ex: 2, 5–18, 21–46, 49, 50 §5.5: The substitution rule Ex: 7–48, 53–74, 74, 78, 79, 85, 86	13-15		A5, B1, C2	Exam	

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.
- Students are also encouraged to use graphing calculators extensively and to use computer software supplements.

Students may consult the webpage of the book for further practicing and more examples:
http://www.stewartcalculus.com/media/10_home.php

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exam	A1, A4, B1, D1

23. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on homeworks.

24. Required equipment:

Data Shows

25. References:

A- Required book (s), assigned reading and audio-visuals:

James Stewart (2012) Calculus (Early Transcendentals), 7th Edition, Thomson, Metric international version, Canada.

B- Recommended books, materials, and media:

- (1) G. Thomas (2005) Calculus, 11th edition, Addison Wesley (Person Education).
- (2) R. Smith and R. Minton (2007) Calculus, 3rd edition, McGraw Hill.
- (3) Howard Anton, Irl Bivens and Stephen Davis (2005) Calculus, 8th edition, John Wiley and sons Inc., New York.

26. Additional information:

Name of Course Coordinator: Dr. Emad Abu Osba Signature: ----- Date: 19/11/2017

Head of curriculum committee/Department: Dr. Emad Abu Osba Signature: -----

Head of Department: Dr. Baha Alzalg Signature: -----

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature: -----

Dean: Dr. Sami Mahmood Signature: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File