The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Calculus II

1	Course title	Calculus II
2	Course number	(0301102)
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	(0301101)
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	1.11.2016

16. Course Coordinator:

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

Dr. Saja Hayajneh

17. Other instructors:

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

18. Course Description:

As stated in the approved study plan.

Techniques of integration: integration by substitution; integration by parts, integrating powers of trigonometric functions, trigonometric substitutions, integrating rational functions, partial fractions, rationalization, miscellaneous substitution; improper integrals; application of definite integral: volumes, length of a plane curve, area of a surface of revolution polar coordinates and parametric equations: polar coordinates, graphs in polar coordinates, area in polar coordinates; infinite series: sequences, infinite series, convergence tests, absolute convergence, conditional convergence; alternating series; power series: Taylor and Maclurine series, differentiation and integration of power series.

19. Course aims and outcomes:

A- Aims:

1. Master techniques of integration.

2. Solve some practical applications of calculus such as finding areas, volumes and length of curves. Applications should be solved using integration in a clear, logical manner.

3. Develop student ability to reason in a clear, logical manner and transfer mathematical concepts from one situation to another rather than simply memorize mechanical procedures.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

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

A. Knowledge and Understanding Skills: Student is expected to

A1)   Compute integrals using various techniques including the methods of substitution, integration by parts, trigonometric substitution, partial fractions
A2)   Recognize an improper integral and determine whether it is convergent or divergent.
A3)   Use integration to find the volume of solids of revolution, the area of surface of revolution and the arc length of graphs of a function.
A4)   Verify the convergence or divergence of a sequence by employing appropriate tools, and find or estimate the limit of a convergent sequence.
A5)   Exhibit knowledge of convergence tests, their usefulness, conditions, and limitations, and apply the tests to determine the convergence or divergence of a series.
A6)   Find the Taylor and Maclaurin series representations of a function and determine the interval of convergence.
A7)   The ability to represent functions using power series and solve problems using these representations
A8)   Demonstrate knowledge of finding polar coordinates and polar graphs.
A9)   Find the area and arc length using polar coordinates.

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

B1)   Develop depth and breadth in mathematical knowledge essential to the degree/program, and develop confidence in problem solving skills.
B2)   Know fundamental concepts of calculus.
B3)   Read and understand mathematical language and symbols.
B4)   Apply mathematical concepts and techniques to solving applied problems.

C. Subject- Specific Skills: Student is expected to

C1)   Understand and apply various advanced integration techniques.
C2)   Find out whether given series converges or not, and to find and to use power series expansions of functions.

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

D1)   Encourages students to wrestle with basic theoretical concepts as well as apply results to mathematical problems.
D2)   Using mathematical reasoning.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference

7.1 Integration by parts,
    1, 2, 3, 7, 9, 10, 12, 13, 15, 16, 18, 22, 32, 34, 37, 39, 42, 45, 47
 	
7.2 Trigonometric Integrals
    1, 2, 3, 6, 7, 10, 11, 13, 15, 19, 21, 32, 22, 38, 42, 43, 44, 47, 48, 50, 56, 68, 69
7.3 Trigonometric Substitutions
    1, 2, 3, 5, 7, 10, 11, 12, 18, 23, 26, 27, 30, 32
7.4 Integration of Rational Functions by Partial Frachtions
    1-6, 7, 9, 12, 17, 18, 25, 26, 28, 29, 34, 47, 48, 51, 52
    Special Substitutions (Rationalizations and half-angle substitutions)
    39-52, 60-63
7.5 Strategy for integration
    1, 3, 7, 8, 9, 10, 18, 21, 22, 23, 24, 32, 35, 46, 47, 49, 52, 57, 62, 75, 76, 79, 81
7.8 Improper Integrals
    1, 2, 3, 5, 6, 7, 11, 14, 26, 27, 28, 31, 32, 38, 39
	1-3			A1	

6. 1 Areas between two curves.
    1-4, 5, 6, 9, 13, 14, 16, 20, 23, 29, 31, 32
6.2 Volumes
    1, 2, 5, 6, 7, 9, 19-30, 31, 32 ,39-42, 49, 50, 51, 53, 55-59, 61
6.3 Volumes by Cylindrical shells
    3, 4, 5, 7, 8, 9, 10, 13, 15, 17, 21, 24, 25, 29, 30, 31, 37, 41
	4-5			A1	

8.1 Arc. length
    1, 2, 3, 5, 6, 7, 10, 11, 13, 14, 18, 33, 35, 41
    Area of a surface of revolution.
    1, 2, 4, 5, 7, 10, 11, 13, 15, 16
	5-8			A1	

11.1 Sequences
    3, 5, 7, 9, 10, 12, 13, 15, 17, 19, 27, 28, 35, 36, 39, 40, 41, 43, 46, 48, 49, 50, 51, 58, 62, 67
11.2 Series
    3, 6, 7, 11, 13, 15, 16, 21, 22, 29, 30, 31, 35, 38, 40, 41, 55
11.3 Integral Test.
    3, 4, 5, 7, 8, 9, 11, 17, 21, 26, 27
11.4 Comparison test and limit comparison test
    3, 4, 5, 8, 9, 13, 24, 27, 29, 31, 32
11.5 Alternating Series
    2, 3, 4, 6, 7, 11, 13, 19, 20
	9-12			A1	

11.6 Ratio and Root tests and Absolute convergence 2, 3, 4, 7, 12, 15, 18, 19, 21, 22, 23, 25, 27 11.7 Strategy for testing Series. 1, 2, 5, 7, 9, 11, 12, 14, 15, 23, 27, 32, 33, 34, 35, 37 11.8 Power Series. 3, 4, 6, 7, 15, 19, 20, 24, 25 11.9 Representation of functions as power series. (Differentiation and Integration of power series). 3, 4, 5, 6, 8, 11, 13, 14, 15, 16, 23, 25, 27 11.10 Taylor and Maclaurin series. 1, 3, 4, 5, 6, 8, 11, 13, 15, 19, 25, 28, 29, 33, 35, 47, 48, 55, 56, 63, 65, 67, 68					
10.3 Polar Coordinates 1, 3, 5, 6, 7, 8, 13, 15, 16, 17, 21, 22, 25, 29, 30, 33, 34, 38, 39, 40, 42 10.4 Areas in Polar Goordinates. 1-8, 9, 10, 11, 14, 17, 18, 21, 23, 24, 27, 28, 29, 30, 31, 37, 38, 41	13-15			A1	

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following <u>teaching and learning methods</u>:

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 <u>assessment methods and requirements</u>:

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exam	A1

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.   Solutions for the exams questions and marks will be announced at the webpage of the instructor: http://eacademic.ju.edu.jo/eabuosba/default.aspx
6.   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. Saja Hayajneh Signature: ----------------------- Date: 1/11/2016

Head of curriculum committee/Department: Dr. Hisham M. Hilow 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