

**MATH 122**  
**CALCULUS (2)**  
**Term 4 - 2014**

**Course Profile**

All details in this course profile for MATH 122 have been officially approved by College of Computer and Information Science, Majmaah University. The information will not be change unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

**General Information**

**OVERVIEW**

This is the second semester in a three-semester calculus sequence. This course includes the study of applications of definite integral; techniques of antidifferentiation; improper integral and indeterminate forms; parametric and polar representation of plane curves; and sequences and series.

**DETAILS**

<b>Level</b>	3
<b>Credit Points</b>	3(3+0+1)
<b>Student Contribution Band</b>	-
<b>Function of full Time Student Load</b>	-

## PRE-REQUISITES OR CO-REQUISITES

Pre-requisite: MATH 112

## ATTENDANCE REQUIRMENTS

All CSIS students are expected to attend scheduled classes, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. The attendance and academic progress requirements in each study period (satisfactory attendance for all students is defined as maintaining at least a 90% attendance record).

## ASSESSMENT OVERVIEW

Assessment Task	Weighting
1. Midterm Exam-1	: 20%
2. Midterm Exam-2	: 20%
3. Quizzes	: 10%
4. Assignments/Report/Seminar	: 10%
5. Final Exam	: 40%

This is a graded course: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the course of at least 60%, or an overall grade of 'pass' in order to pass the course. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 60%). Consult the University's Grades and Results Procedures for more details of interim results and final grades.

## MAJMAAH University Policies

All University policies are available on the WEBPortal (mu.edu.sa) .

You may wish to view these policies:

- Assessment of Coursework Procedures
- Grads and Results Procedure
- Review ox Grade Policy

- Plagiarism Procedure
- Student Misconduct and Plagiarism Policy
- Monitoring Academic Progress Policy
- Monitoring Academic Progress Policy
- Monitoring Academic Progress Procedures
- Refund Excess Payments (Credit Balances) Policy
- Student complaints Policy
- Use of Internet, mail and Computing Facilities Policy

This list is not an exhaustive list of all University policies. The full lists of University policies are available on the <http://mu.edu.sa>

### Course Learning Outcomes

Upon successful completion of the course, students should be able to:

1. Manipulate the integration of complicated functions and evaluate double and triple integrals.
2. Use various tests to determine series convergence and successfully solve problems involving infinite series.
3. Use polar coordinates and their applications in the parametric equations.
4. Differentiate functions of two and three variables.

### Alignment of Learning outcomes, Assessment and Graduate attributes

#### ALIGNMENT OF ASSESSMENT TASKS TO LEARNING OUTCOMES

Assessment Task	Learning Outcomes				
	1	2	3	4	5
1. Midterm Exam-1	.	.	.	.	.

2. Midterm Exam-2	.	.	.	.
3. Quizzes	.	.	.	.
4. Assignments/Report/Seminar	.	.	.	.
5. Final Exam	.	.	.	.

## Textbook and Resources

1. Calculus, Early Transcendental Functions, Robert Smith, Roland Minton, McGraw-Hill Science Engineering, 2007.

### **PRESCRIBED TEXTBOOKS**

<b>Guide to Firewalls 7 VPN</b>			
Author/s	: Robert Smith, Roland Minton	Year	: 2007
Edition	:	McGraw-Hill Science Engineering	:
City	:	State	:MA
Country	:USA		

### **IT RESOURCES**

You will need access to the following IT resources:

- CSIS, Majmaah University Student Email
- Internet
- Course Website

## Referencing style

All submissions for this course must use the **American Psychological Association (APA)** referencing style (details can be obtained [here](#)) OR **Harvard (author-date)** referencing style (details can be obtained [here](#)). For further information, see the Assessment Tasks below.

## Teaching Contacts

<b>Course Coordinator:</b>	Dr Sunil Kumar Sharma
<b>Lab/Tutorial Instructor:</b>	-
<b>Email:</b>	s.sharma@mu.edu.sa
<b>Office Hours:</b>	8.00 a.m. to 02.30 p.m.
<b>Office Number:</b>	0164045388

## Schedule

Week	Module/Topic	Chapter	Event and submission
Week-1	Integration Techniques	Review of Integration by Substitution and Integration by Parts, Integration of Rational Functions Using Partial Fractions,	
Week-2	Integration Techniques	Trigonometric Techniques of Integration, Integrals involving logarithmic, exponential, and hyperbolic functions,	Assignment-1
Week-3	Integration Techniques	Improper Integrals.	Quiz 1
Week-4	Infinite series	Sequences and limit of a sequence. Infinite series of constant terms, convergence tests	
Week-5	Infinite series	convergence tests, alternating series and absolute convergence.	Assignment 2
Vacation week	Infinite series	Power series, the ratio test, and radius of convergence;	
Week-6	Infinite series	Taylor and MacLaurin series.	First Midterm Test

Week-7	Vectors and Geometry of Space	Vectors in Space, Dot Product, Cross Product, Lines and Planes in Space	
Week-8	Vectors and Geometry of Space	Cylindrical and Spherical Coordinates.	Quiz2
Week-9	Parametric Equations and Polar Coordinates	Plane Curves and Parametric Equations, Calculus and Parametric Equations	Assignment -3
Week-10	Parametric Equations and Polar Coordinates	Polar ordinates, Calculus and Polar Coordinates.	Second Midterm Test
Week-11	Functions of several variables and Partial Differentiation	Functions of several variables, Partial derivatives,	Assignment 4
Week-12	Functions of several variables and Partial Differentiation	Total derivative, Chain rule.	Display of the result.
Week-13	Multiple Integrals	Double and Triple Integrals in Cartesian Coordinates; Areas and Volumes,	Quize-4
Week-14	Multiple Integrals	Double Integrals in Polar Coordinates; Triple Integrals in Cylindrical and Spherical Coordinates.	Final Examination
Exam Week			Final Examination

## Assessment Task

### WRITTEN ASSESMENT

<b>Assessment Title</b>	Midterm Exam-1
<b>Task Description</b>	<p>This assignment is aligned to learning outcomes 1 and 2. In that regard, the assignment contains questions that assess:</p> <p>1) Students' are able to recognize and implement</p>

	<p>appropriate techniques to anti-differentiate products of trigonometric functions.</p> <p>2) Students' able to decompose a rational integrand using partial fractions.</p> <p>3) Students' are able to determine convergence of improper integrals with discontinuities in their domain or infinite limits of integration.</p> <p>4) Students' are able to use the concept of the limit at infinity to determine whether a sequence of real numbers is bounded and whether it converges or diverges.</p> <p>5) Students' are able to interpret the concept of a series as the sum of a sequence, and use the sequence of partial sums to determine convergence of a series.</p> <p>6) Students' are able to decide whether and to what value an infinite geometric series converges.</p> <p>7) Students' are able to use comparison with a corresponding integral with other series to decide whether infinite series (including <math>p</math>-series) converge or diverge.</p>
<b>Assessment Due Date</b>	<b>Week 6</b>
<b>Return Date to Students</b>	Week 8
<b>Weighting</b>	20%
<b>Assessment Criteria</b>	Students have to write a written test question paper will be provided to the students
<b>Referencing Style</b>	<a href="#">American Psychological Association (APA)</a>
<b>Submission</b>	Question paper will be collected and collected from the students and marks will be displayed.
<b>Learning Outcomes Assessed</b>	<ol style="list-style-type: none"> <li>1. Manipulate the integration of complicated functions and evaluate double and triple integrals.</li> <li>2. Use various tests to determine series convergence and successfully solve problems involving infinite series.</li> </ol>

<b>Assessment Title</b>	Midterm Exam-2
<b>Task Description</b>	This assignment is aligned to learning outcomes 1, 2 and 3. In that regard, the assignment contains questions that assess:

	<ol style="list-style-type: none"> <li>1) Students are able to distinguish among the main types of conic sections based on the discriminant criterion</li> <li>2) Students' are able to devise parametric representations for conic sections and other relations.</li> <li>3) Students' are able compute the length of a curve segment from its parametric representation.</li> <li>4) Students' are able to apply basic anti-differentiation techniques to selected problems arising in various fields such as physical modeling .</li> <li>5) Students' are able to determine the Taylor series of the <math>n</math>th order and determine an upper bound on its remainder.</li> <li>6) Students' are able to find the sum of the series with the help of Laurent's expansion.</li> </ol>
<b>Assessment Due Date</b>	<b>Week 10</b>
<b>Return Date to Students</b>	Week 12
<b>Weighting</b>	20%
<b>Assessment Criteria</b>	Students have to write a written test question paper will be provided to the students.
<b>Referencing Style</b>	<a href="#">American Psychological Association (APA)</a>
<b>Submission</b>	Question paper will be collected from the students and marks will be displayed.
<b>Learning Outcomes Assessed</b>	<ol style="list-style-type: none"> <li>1. Use various tests to determine series convergence and successfully solve problems involving infinite series.</li> <li>2. Use polar coordinates and their applications in the parametric equations.</li> </ol>

<b>Assessment Title</b>	Final Examination
<b>Task Description</b>	<p>This assignment task is aligned to learning outcomes 1, 2, 3, and 4. In that regard, the assignment contains questions that assess:</p> <ol style="list-style-type: none"> <li>1. Exhibit knowledge of convergence tests, their usefulness, conditions, and limitations, and apply the tests to determine the convergence or divergence of a series.</li> <li>2. Develop an organized approach for determining</li> </ol>



	<p>the convergence or divergence of a series.</p> <p>3. Find the interval and radius of convergence for a given power series.</p> <p>4. Find the Taylor and Laurent's series representations of a function and determine the interval of convergence.</p> <p>5. Relate differentiation/integration of a given function to differentiation/integration of the corresponding power series representation.</p> <p>6. Develop an organized approach for classifying a given integrand and determining the appropriate technique of antidifferentiation.</p> <p>7. Model applied problems of area, volume, arc length, and work using integrals.</p> <p>8. Recognize an improper integral and determine whether it is convergent or divergent.</p> <p>9. Find the value of a convergent improper integral symbolically when possible, otherwise estimate the value numerically.</p> <p>10. Apply antidifferentiation techniques, such as integration by parts, partial fractions, trigonometric substitution and the use of a table of integrals.</p> <p>11. Represent a plane curve parametrically and determine its orientation.</p> <p>12. Use parametric equations to model and analyze physical processes such as curvilinear motion.</p>
<b>Assessment Due Date</b>	<b>Week 14</b>
<b>Return Date to Students</b>	Week 15
<b>Weighting</b>	40%
<b>Assessment Criteria</b>	Students have to write a written test question paper will be provided to the students.
<b>Referencing Style</b>	<a href="#">American Psychological Association (APA)</a>
<b>Submission</b>	Question paper will be collected from the students and marks will be displayed.
<b>Learning Assessed</b>	<b>Outcomes</b>
	<ol style="list-style-type: none"> <li>1. Manipulate the integration of complicated functions and evaluate double and triple integrals.</li> <li>2. Use various tests to determine series convergence and successfully solve problems</li> </ol>

	involving infinite series. <b>3.</b> Use polar coordinates and their applications in the parametric equations. <b>4.</b> Differentiate functions of two and three variables.
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<b>Outline</b>	Complete an examination
<b>Date</b>	<b>During University examination period</b>
<b>Weighting</b>	<b>40%</b>
<b>Length</b>	3 Hrs
<b>Details</b>	Question paper will be given to the students Calculator Permitted Closed Books
<b>Learning Assessed</b> <b>Outcomes</b>	1. Manipulate the integration of complicated functions and evaluate double and triple integrals. 2. Use various tests to determine series convergence and successfully solve problems involving infinite series. 3. Use polar coordinates and their applications in the parametric equations. 4. Differentiate functions of two and three variables.