

QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Mathematics Department
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Study plan No.	2021/2022	University Specialization	Bachelor of Mathematics
Course No.	0101201	Course name	Calculus (3)
Credit Hours	3	Prerequisite/ Co-requisite	Calculus (2)
Course type	<input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS	<input type="checkbox"/> FACULTY MANDATORY REQUIREMENT <input type="checkbox"/> Support course family requirements	<input checked="" type="checkbox"/> Mandatory requirements <input type="checkbox"/> Elective requirements
Teaching style	<input type="checkbox"/> Full online learning	<input type="checkbox"/> Blended learning	<input checked="" type="checkbox"/> Traditional learning
Teaching model	<input type="checkbox"/> 1 Synchronous: 1 asynchronous	<input type="checkbox"/> 1 face to face : 1 asynchronous	<input checked="" type="checkbox"/> 2 Traditional

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of students	Teaching style	Approved model

Brief description

3-dimensional space, vectors, lines and planes in 3-space, Functions of two or more variables, partial derivatives and multiple integrals.
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Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	Calculus, 10 <sup>th</sup> edition By Howard Anton, Irl Bivens and Stephen Davis.				
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1 CALCULUS, 10 <sup>th</sup> Edition, by Finney and Thomas. 2 Calculus: One and Several Variables, Salas, John Wiley, 10 <sup>th</sup> Edition (2006) 3 Vector Calculus" Susan Colley. Pearson Prentice Hall, 3 <sup>rd</sup> Edition (2006)				
Supporting websites	<ul style="list-style-type: none"> <li>• <a href="http://www.sosmath.com/calculus/calculus.html">Calculus at S.O.S. Mathematics</a></li> <li>• <a href="http://www.sosmath.com/calculus/calculus.html">http://www.sosmath.com/calculus/calculus.html</a></li> <li>• <a href="http://archives.math.utk.edu/visual.calculus/index.html">Visual Calculus; tutorials and demos</a></li> <li>• <a href="http://archives.math.utk.edu/visual.calculus/index.html">http://archives.math.utk.edu/visual.calculus/index.html</a></li> <li>• <a href="http://www.ugrad.math.ubc.ca/coursedoc/math100/index.html">Calculus online</a></li> <li>• <a href="http://www.ugrad.math.ubc.ca/coursedoc/math100/index.html">http://www.ugrad.math.ubc.ca/coursedoc/math100/index.html</a></li> <li>• <a href="http://www.math.hmc.edu/calculus/tutorials/">Online tutorials and quizzes</a></li> <li>• <a href="http://www.math.hmc.edu/calculus/tutorials/">http://www.math.hmc.edu/calculus/tutorials/</a></li> </ul>				
The physical environment for teaching	<input checked="" type="checkbox"/> Class room	<input type="checkbox"/> labs	<input type="checkbox"/> Virtual educational platform	<input type="checkbox"/> Others	
Necessary equipment and software					

QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Mathematics Department
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Supporting people with special needs	
For technical support	

### Course learning outcomes (S= Skills, C= Competences K= Knowledge.)

No.	Course learning outcomes	The associated program learning output code
<b>Knowledge</b>		
<b>K1</b>	Identify the parametric and polar curves, three dimensional space and vectors	<b>MK 2</b>
<b>K2</b>	Define the functions of several variables and their domains and range	<b>MK 1</b>
<b>K3</b>	Recognize the concept of limits and continuity of a function of several variables.	<b>MK 1</b>
<b>K4</b>	Recognize the partial derivatives of first and high order for a function of several variables	<b>MK 1</b>
<b>K5</b>	Calculate the partial derivatives and the total differential for a function of several variables	<b>MK 1</b>
<b>K6</b>	Evaluate the double and triple integrals	<b>MK 4</b>
<b>Skills</b>		
<b>S1</b>	Exercise the fundamental notions of calculus with functions of several variables	<b>MS 4</b>
<b>S2</b>	Use different techniques of double and triple integral to solve problems related to areas or volumes of geometric shapes	<b>MS 4</b>
<b>S3</b>	Construct the graph of functions of several variables in the 3-space.	<b>MS 5</b>
<b>Competences</b>		
<b>C1</b>	Work professionally with multivariable functions.	<b>MC 2</b>
<b>C2</b>	Develop the individual's ability to communicate and interact with other mathematical courses	<b>MC 1</b>

### Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
First/Second exam	30%	30%	30%	30%
Participation / practical applications	0	0	20%	30%
Asynchronous interactive activities	30%	30%	0	0
Final exam	40%	40%	50%	40%

### Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style	Reference
1	Polar coordinates. Graphs in polar coordinates	Lecture	705-730
2	Rectangular coordinates in 3-space. Introduction to vectors, Norm of a vector.	Lecture	767-785
3	Dot product, Cross product.	Lecture	785-813
4	Lines and Planes in 3-space	Lecture	813-821

QF01/0408-4.0E		Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Mathematics Department	
5	Quadratic Surfaces	Lecture	821-840
6	Functions of several variables and level curves. Domain and range of functions of several variables	Lecture	906-917
7	Limits of functions of several variables. Continuity of functions of several variables.	Lecture	917-927
8	Partial Derivatives. Chain Rule and implicit differentiation	Lecture	927-960
9	Directional derivatives, gradient and tangent planes. <b>Mid exam</b>	Lecture	960-977
10	Extrema of functions of several variables.	Lecture	977-989
11	Double integrals. Double integrals over non-rectangular regions.	Lecture	1000-1018
12	Double integrals in polar coordinates. Solving exercises	Lecture	1018-1026
13	Triple Integrals in rectangular coordinates.	Lecture	1039-1048
14	Triple Integrals in cylindrical coordinates	Lecture	1048-1053
15	Triple Integrals in spherical coordinates	Lecture	1053-1058
16	<b>Final Exam</b>		