A) COURSE

Course Id:	Course
0053	Calculus C

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
2	2	2	6	64

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:	II	II	III	II	
Course Type (Required/Elective)	Required	Required	Required	Required	
Prerequisite Course:	Calculus A	Calculus A	Calculus A	Calculus A	
CACEI Classification:	BS	BS	BS	BS	

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
Analyze and handle vector functions and its main theorems and some applications.

D) TOPICS (CONTENTS AND METHODOLOGY)

1.- Vector algebra.		12 hours
Specific Objective:	The student will know, and apply the principles and theorems relative to vector algebra and geometric representation and / or application problems.	
1.1 Definition of vector. 1.2 Equality between vectors. 1.3 Multiplication by a scalar. 1.4 Unitary Vectors. 1.5 Graphical representation. 1.5.1 Representation punctual. 1.5.2 Representation by sum of components. 1.5.3 Representation by linear combination. 1.6. Vector operations. 1.6.1 Vector Addition. 1.6.2 Vector Subtraction. 1.6.3 Scalar Product. 1.6.4 Vector Product. 1.7 Triples. 1.7.1 Triple scalar product. 1.7.2 Triple vector product.		

Readings and other resources	Bibliography according to the topic and advice.
Teaching Methodologies	Exhibition topics, analysis of the concepts presented.
Learning Activities	Assignments and discussion of them.

2. Differential calculus vector.	**20 hours**
Specific Objective:	The student will analyze and describe the type of relationships and vector functions, their derivatives and their geometric meaning. The student will apply the vector functions to differential geometry and analyses the concept of vector operators.
2.1 Vector functions. 2.2 Derivatives of vector functions. 2.2.1 Derivatives of vector functions in a variable. 2.2.2 Derivatives of vector functions in several variables. 2.3 Rules of the vector derivation. 2.4 Differentials. 2.5 Differential geometry. 2.5.1 Main parameters. 2.5.2 Scalars important. 2.5.3 Orthogonal planes. 2.6 Vector Operators. 2.6.1 Nabla operator. 2.6.2 Gradient of a scalar function. 2.6.3 Divergence of a vector function. 2.6.4 Rotational of a vector function. 2.6.5 Laplacian operator. 2.6.6 Rules of the operators.	
Readings and other resources	Bibliography according to the topic and advice.
Teaching Methods	Exhibition topics, analysis of the concepts presented.
Learning Activities	Assignments and discussion of them.

3.-Curvilinear coordinates.	**12 hours**
Specific Objective:	The student will know other coordinate systems, as well as transformations and geometric developments. It will apply these transformations in simple functional expressions and position vectors in spherical and cylindrical coordinates.
3.1 Curvilinear coordinates. 3.2 Coordinate transformation. 3.3 Unitary vectors in curvilinear systems. 3.4 Volume elements. 3.5 Gradiente in generalized coordinates. 3.6 Divergence in generalized coordinates. 3.7 Rotations in orthogonal coordinates. 3.8 Cylindrical coordinates. 3.9 Spherical coordinates.	
Readings and other resources	Bibliography according to the topic and advice.
Teaching Methods	Exhibition topics, analysis of the concepts presented.
Learning Activities	Assignments and discussion of them.

4.Vector integration.		**12 hours**
Specific Objective:	The student will know the integration of common vector functions and vector functions of line, surface and volume.	
4.1 Ordinary integrals. 4.2 Integral curvaceous. 4.2.1 Line integrals. 4.2.2 Closed line integrals. 4.2.3 Surface integrals. 4.2.4 Closed surface integrals. 4.2.5 Volume integrals. 4.3 Application to mechanics.		
Readings and other resources	Bibliography according to the topic and advice.	
Teaching Methods	Exhibition topics, analysis of the concepts presented.	
Learning Activities	Assignments and discussion of them.	

5.-Theorems applicable to vector calculus.		**8 hours**
Specific Objective:	Students will learn and apply the relationship between vector and application integration with 3 important theorems, theorem of Green, Gauss and Stokes.	
5.1 Theorems integrals operational. 5.1.1 Theorem of plane. 5.1.2 Divergence theorem. 5.1.3 Rotational theorem. 5.2 Relationship between theorems. 5.3 Exercises.		
Readings and other resources	Bibliography according to the topic and advice.	
Teaching Methods	Exhibition topics, analysis of the concepts presented.	
Learning Activities	Assignments and discussion of them.	

E) TEACHING AND LEARNING METHODOLOGIES

a) Conventional Exposure of each topic by the teacher, using materials such as board.
b) Problem-based learning.
c) Practices data collection and analysis.

F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighing	Topics
1st. Partial Evaluation	16 Session	Exam 80%, Task 20%; (Relative value: 33.3%)	1 y 2
2nd Partial Evaluation	16 Session	Exam 80%, Task 20%; (Relative value: 33.3%)	3
3rd. Partial Evaluation	16 Session	Exam 80%, Task 20%; (Relative value: 33.3%)	4 y 5
Ordinary Final Evaluation		100 % (Average Partial Ratings)	

Other Activity:			
Extraordinary Exam	Week 17 the semester	Exam 100%	100% Topics
Title Exam	According to the Schedule of the school secretary	Exam 100%	100% Topics
Regularizatión Exam	According to the Schedule of the school secretary	Exam 100%	100% Topics

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books

1. Mena, Baltasar, Introducción al cálculo vectorial, 1ª edición, México, Thomson, 2003.
2. Estrada, o; García, p; y Monsivais, G., Cálculo vectorial y aplicaciones; 1ª edición, México, grupo editorial Iberoamérica,648 pp., 1999.
3. Marsden, Jerrold e. y Tromba, Anthony J. Cálculo Vectorial, 1ª edición, México, Prentice – Hall hispanoamericana, 1995.

Complementary Books

1. Davis, Harry F. Y snider, Arthur D. Análisis vectorial, 1ª edición. México, Mcgraw Hill, 430 pp. 1993.

Internet Links