

SUBJECT PROGRAM

I. SUBJECT IDENTIFICATION.

Subject: Mathematics IV		Acronym: MAT 024	Approval date 03/12/2013			
UTFSM Credits: 4	Prerequisites: MAT 023	Exam: Does not have	Faculty.			
SCT Credits: 6			Mathematics Department			
Weekly Lecture Hours: 3	Weekly Assistantship Hours: 1.5	Weekly Laboratory Hours: 0	Semester in which it is taught			
			Odd	Even	Both X	
Formative axis: Basic Engineering Sciences						
Total time dedicated to the subject: 187.5						

Subject Description

Intermediate theoretical and practical subject that provides the fundamental concepts of integral calculus in several variables, partial differential equations and their applications.

Entry requirements

- Apply the concepts of differential calculus of functions of several variables
- Apply the concepts of integral calculus of real functions of real variables.
- Apply the different methods to solve equations and systems of ordinary differential equations.

Contribution to the graduation profile

SPECIFIC COMPETENCES Apply the mathematical knowledge of integral and differential calculus in several variables, classical vector calculus and the resolution of partial equations in the modeling of scientific and technological problems and in the search for their respective alternative solutions. GENERAL/TRANSVERSAL//DISTINCTIVE COMPETENCES Collaborate and participate in the search for solutions to real problems in interdisciplinary work contexts.

Learning Results that are expected to be achieved in this subject.

1.	Use integral and differential calculus language and techniques in several variables.
2.	Formulate and calculate multiple integrals in different coordinate systems.
3.	Analytically and geometrically characterize curves and parametric equations.
4.	Understand the fundamental concepts of a vector function.
5.	Understand and apply the concepts and results related to line and surface integrals, especially the theorems of Green, Gauss, and Stokes.
6.	Model situations using functions of several variables.
7.	Translate classical problems in terms of partial differential equations.
8.	Solve and interpret problems from physical, engineering, economic or other fields.

Thematic contents

1. Derivation of vector functions
2. Definite integrals over flat and solid regions.
3. Green's theorem.
4. The divergence theorem and Stokes' theorem.
5. Partial differential equations.

Teaching and learning methodology.

<ul style="list-style-type: none">Expository classes combined with cooperative learning techniques.
<ul style="list-style-type: none">Experimentation with short teaching-learning cycles.
<ul style="list-style-type: none">Exercise guides with notes from the Mathematics Department and use of appropriate software.

Evaluation and grading of the subject. (Adjusted to Institutional Regulations-Regulation No. 1)

Approval requirements and qualification	<p>Exams (3), Controls, Works, or Exhibitions (6)</p> <p>Notation: Presentation Note (NP), Competition Note 1 (C1), Competition Note 2 (C2), Competition Note 3 (C3), Global Competition Note (E), Weighted Note between Controls and/or Works and/or Exhibitions (PO), Final Note of the course (NF). We calculate:</p> <div>NP=0.85*(C1+C2+C3)/3+0.15*PO</div> <ul style="list-style-type: none">If NP>=55 or if NP<45, then NF=NP.If 45<=NP<55, then the student must take the Global Competition and it is calculated: <div>NF=0.7*NP+0.3*E</div>
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Resources for learning.

Bibliography:

Guide Text	<ul style="list-style-type: none">KREYSZIG E. “Advanced mathematics for engineering. Volume I and II”, Editorial Limusa, 1994.STEIN S. and BARCELLOS A. “Calculus and Analytical Geometry”, Volume I and II McGraw-Hill Publishing, 1995.
Complementary or Optional	<ul style="list-style-type: none">KREIDER D., KULLER R., OSTBERG D., “Differential Equations”, Inter-American Development Fund Editorial, 1973.STEWART J. “Calculus.” Ibero-American Editorial Group 1994.MARDSDEN J., TROMBA A. “Vector calculus.” Adisson Wesley Publishing 1986.EDWARDS C., PENNEY D. “Calculus with Analytical Geometry.” Prentice Hall Publishing House 1994. Fourth Edition.THOMAS G., FINNEY R. “Calculus with Analytical Geometry.” Adisson-Wesley Publishing House 1987. Sixth Edition.

II. CALCULATION OF NUMBER OF HOURS OF DEDICATION - (SCT-Chile) - SUBJECT SUMMARY TABLE.

ACTIVITY	Number of hours of dedication		
	Number of hours by	Number of Total	number of weeks weeks hours
PRESENCE			
Lecture or theoretical classes	3	17	51
Assistantship/Exercises	1.5	17	25.5
Industrial visits (Field)			
Laboratories / Workshop			
Evaluations (exams, others)			
Other (Specify) Controls	0.75	6	4.5
NO PRESENCE			
Assistantship			
Mandatory tasks			
Personal Study (Individual or group)	6	17	102
Others (specify)			
TOTAL (HOURS)			187.5
Total number of TRANSFERABLE CREDITS			6