UNIVERSIDAD DE MURCIA

FACULTY OF MATHEMATICS

Functions of several variables III

Syllabus

Course code:	1583
Number of ECTS credits:	6
Semester:	2nd (February-June)
Prerequisites:	None
Recommended components:	Linear Algebra (1569) Functions of one real variable I (1568) Functions of one real variable II (1573) Functions of several variables I (1578) Functions of several variables II (1579)
Language of instruction:	Spanish (students are allowed to ask questions and write homeworks and exams in English and French)

Course description

This is one of the courses that are part of the subject *Functions of several variables*. We study the inverse function theorem and implicit function theorem, line and surface integral, and theorems of vector analysis (divergence theorem, Green's theorem, etc).

Learning outcomes and competences

After completion of this course you will:

1. deal with local inverse functions and implicitly defined function, know how to apply techniques of change of variables to solve simple functional equations,
2. know the notion of tangent space to a curve or surface and get its equations,
3. know the fundamentals of integration over curves and surfaces, understand its interpretations in the language of physics,
4. know how to deal with classical problems of geometrical and physical nature where integral over curves and surfaces are relevant,
5. know the differential operators of vector analysis and the different versions of the fundamental theorem of calculus where they appear,
6. understand the theoretical basis of these theorems, and know how to apply it in the language of physics or engeneering,
7. know how to use some program to represent curves and surfaces in the ordinary space and make geometrical interpretation of the basic concepts of the subject

Course contents

I. Inverse function theorem and implict function theorem.

Inverse function theorem. Implicit function theorem. Applications.

II. Integration over curves and surfaces of scalar and vector fields

Line integrals. Parametrized surfaces. Area of a surface. Surface integral.

III. Classical differential operators

Divergence. Rotational. Laplacian. Physical interpretations

IV. Integration theorems in vector analysis

Green's theorem. Stoke's theorem. Conservative fields. Gauss theorems. Applications to physics and engeneering

References

Main text

1. W. Fleming *Functions of several variables* Undergraduate texts in mathematics, Springer 1976

Supplementary references

1. Notes of Gabriel Vera on Analisis Matematico II, webs.um.es/gvb
2. G. L. Bradley y K. J. Smith. *Calculo de varias variables (Volumen 2).* Editorial: Prentice-Hall.
3. H M. Schey. *Div, grad, curl, and all that.* Editorial: Norton.
4. T. M. Apostol. *Calculus (Volumen 2).* Editorial: Reverté
5. J. A. Fernandez Viña, *Analisis Matematico II*, Tecnos
6. J. A. Fernandez Viña, Eva Sanchez Mañes, *Ejercicios y Complementos de Analisis Matematico II*, Tecnos
7. J. E. Marsden and A. J. Tromba, vector calculus, Worth Publ Inc.