



Guía docente

240721 - 240721 - Cálculo II

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Unidad responsable: Escuela Técnica Superior de Ingeniería Industrial de Barcelona

Unidad que imparte: 749 - MAT - Departamento de Matemáticas.

Titulación: GRADO EN TECNOLOGÍAS INDUSTRIALES Y ANÁLISIS ECONÓMICO (Plan 2018). (Asignatura obligatoria).

Curso: 2023

Créditos ECTS: 6.0

Idiomas: Inglés

PROFESORADO

Profesorado responsable: AMADEU DELSHAMS I VALDES

Otros:

METODOLOGÍAS DOCENTES

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

The main goal of the course is that the student reaches a sufficient solvency in the use of the tools of the differential calculus and the vector calculus. In particular, of the derivation and the integration in several variables, and the calculus with curves and surfaces. Likewise, the aim of the subject is that this solvency is not only manifested in the conceptual understanding of the contents and in the ability to identify which methods are suitable for each of the Problems treated, but also in the acquisition of a certain "fluidity" of calculus and in a good understanding of the interaction between these theoretical contents and the mathematical modeling of the problems of Science and Technology.

HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas grupo grande	60,0	40.00
Horas aprendizaje autónomo	90,0	60.00

Dedicación total: 150 h

CONTENIDOS

1.- Continuity and derivability of functions of several variables

Descripción:

Domain. Limit. Continuity. Derivability. Chain Rule. Taylor expansion. Inverse and Implicit Function Theorems. Extreme values.

Dedicación:

Grupo grande/Theory: 11h

Grupo mediano/Prácticas: 11h

Aprendizaje autónomo: 33h



2.- Integration of functions of several variables

Descripción:

The Riemann integral. Integral calculus. The Cavalieri principle. The Fubini theorem. Changes of variable. Areas and volumes. Approximate integration. Applications of the integral. Center of mass. Moment of inertia.

Dedicación: 35h

Grupo grande/Teoría: 7h

Grupo mediano/Prácticas: 7h

Aprendizaje autónomo: 21h

3. Vector Calculus

Descripción:

Integral of functions and vector fields on curves and surfaces. Theorems of Green, Stokes and Gauss. Extreme values and method of Lagrange Multipliers

Dedicación: 45h

Grupo grande/Teoría: 9h

Grupo mediano/Prácticas: 9h

Aprendizaje autónomo: 27h

4. Numerical calculus: optimization

Descripción:

Linear optimization, the simplex method. Nonlinear optimization problems. Unconstrained and Constrained optimization, Overdetermined nonlinear systems

Dedicación: 15h

Grupo grande/Teoría: 3h

Grupo mediano/Prácticas: 3h

Aprendizaje autónomo: 9h

SISTEMA DE CALIFICACIÓN

During the semester there will be two

- One midterm exam (ME), on the date determined by the School.
- One test about the Matlab Workshop (WE), that will take place during a workshop session and will be notified in advance.
- The final exam (FE), on the date determined by the School.

Exams will contain a mixture of computational and conceptual problems. Some of them will resemble problems from the list, while some will be brand new to you. The final exam is likely to be a mixture of multiple choice and free response problems.

The final mark (FM) will be computed according to this formula:

$$FM = \max(0.6*FE + 0.1*WE + 0.3*ME, 0.9*FE+0.1*WE)$$

The part corresponding to the Matlab Workshop will not be re-evaluated. Therefore, those students that take the re-evaluation exam (RE), the final mark will be computed according to this formula:

$$FM = 0.9*RE+0.1*WE$$

NORMAS PARA LA REALIZACIÓN DE LAS PRUEBAS.

The students can bring a manuscript sheet DINA4 with formulas for the exams. Calculator is not allowed.



BIBLIOGRAFÍA

Básica:

- Stewart, James. Calculus : Early Transcendentals. 7th ed. Belmont, CA [etc.]: Cengage, 2017. ISBN 9788131521052.
- Dahlquist, Germund ; Björck, Ake. Numerical methods [en línea]. Mineola: Dover, cop. 2003 [Consulta: 07/10/2020]. Disponible a: <https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=1894363>. ISBN 0486428079.
- Quarteroni, A.; Saleri, F.; Gervasio, P. Scientific computing with MATLAB and Octave [en línea]. 4th ed. Heidelberg: Springer, 2014 [Consulta: 07/09/2022]. Disponible a: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-642-12430-3>. ISBN 9783642453663.
- Sydsæter, K.; Berck, P.; Strøm, A. Economists' mathematical manual [en línea]. 4th ed. Berlin, Heidelberg: Springer Berlin Heidelberg, 2005 [Consulta: 29/03/2023]. Disponible a: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-540-28518-2>. ISBN 3540285180.
- Marsden, Jerrold E; Tromba, Anthony. Vector calculus. 6th ed., International ed. New York: W.H. Freeman, cop. 2012. ISBN 9781429224048.