

Guia docent

240721 - 240721 - Càlcul II

Última modificació: 16/05/2023

Unitat responsable: Escola Tècnica Superior d'Enginyeria Industrial de Barcelona
Unitat que imparteix: 749 - MAT - Departament de Matemàtiques.

Titulació: GRAU EN TECNOLOGIES INDUSTRIALS I ANÀLISI ECONÒMICA (Pla 2018). (Assignatura obligatòria).

Curs: 2023 **Crèdits ECTS:** 6.0 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: AMADEU DELSHAMS I VALDES

Altres:

METODOLOGIES DOCENTS

OBJECTIUS D'APRENTATGE DE L'ASSIGNATURA

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.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

Tipus	Hores	Percentatge
Hores grup gran	60,0	40.00
Hores aprenentatge autònom	90,0	60.00

Dedicació total: 150 h

CONTINGUTS

1.- Continuity and derivability of functions of several variables

Descripció:

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

Dedicació: 55h

Grup gran/Teoria: 11h

Grup mitjà/Pràctiques: 11h

Aprenentatge autònom: 33h



2.- Integration of functions of several variables

Descripció:

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.

Dedicació: 35h

Grup gran/Teoria: 7h

Grup mitjà/Pràctiques: 7h

Aprenentatge autònom: 21h

3. Vector Calculus

Descripció:

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

Dedicació: 45h

Grup gran/Teoria: 9h

Grup mitjà/Pràctiques: 9h

Aprenentatge autònom: 27h

4. Numerical calculus: optimization

Descripció:

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

Dedicació: 15h

Grup gran/Teoria: 3h

Grup mitjà/Pràctiques: 3h

Aprenentatge autònom: 9h

SISTEMA DE QUALIFICACIÓ

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:

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

NORMES PER A LA REALITZACIÓ DE LES PROVES.

The students can bring a manuscript sheet DIN A4 with formulas for the exams. Calculator is not allowed.



BIBLIOGRAFIA

Bàsica:

- Stewart, James. Calculus : Early Transcendentals. 7th ed. Belmont, CA [etc.]: Cengage, 2017. ISBN 9788131521052.
- Dahlquist, Germund ; Björck, Ake. Numerical methods [en línia]. 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 línia]. 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 línia]. 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.