Last update: 19-07-2019

270201 - CAL - Calculus

Coordinating unit: 270 - FIB - Barcelona School of Informatics

Teaching unit: 749 - MAT - Department of Mathematics

Academic year: 2019

Degree: BACHELOR'S DEGREE IN DATA SCIENCE AND ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)

ECTS credits: 7,5 Teaching languages: Catalan

Degree competences to which the subject contributes

Basic:

CB1. That students have demonstrated to possess and understand knowledge in an area of ??study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply Knowledge from the vanguard of their field of study.

Specific:

CE1. Skillfully use mathematical concepts and methods that underlie the problems of science and data engineering.

Generical:

CG2. Choose and apply the most appropriate methods and techniques to a problem defined by data that represents a challenge for its volume, speed, variety or heterogeneity, including computer, mathematical, statistical and signal processing methods.

Transversal:

CT5. Solvent use of information resources. Manage the acquisition, structuring, analysis and visualization of data and information in the field of specialty and critically evaluate the results of such management.

CT6. Autonomous Learning. Detect deficiencies in one's own knowledge and overcome them through critical reflection and the choice of the best action to extend this knowledge.

Teaching methodology

Lectures introduce the concepts, results and algorithms needed to achieve the required level of understanding

These concepts are put into practice ex
problem and laboratory sessions.

The teacher poses problems related to the current topic prior to each problem session.

Learning objectives of the subject

1.Grasp the concept of real i complex number
2.Ability to cope with interval calculus and inequalities
3.Modeling of problems of numerical optimization

Last update: 19-07-2019

270201 - CAL - Calculus

Study load

Total learning time: 187h 30m	Theory classes:	45h	24.00%
	Laboratory classes:	30h	16.00%
	Guided activities:	0h	0.00%
	Self study:	112h 30m	60.00%

Last update: 19-07-2019

270201 - CAL - Calculus

Content

Numbers

Degree competences to which the content contributes:

Description:
Rational, real and complex numbers. Absolute value. Operations and expressions. Fundamental theorem of algebra.

Functions

Degree competences to which the content contributes:

Description:
Qualitative study of the most common functions and their inverses. Limits and continuity.

Derivation

Degree competences to which the content contributes:

Description:
Derivative of a function. Derivative of a composition of functions and of the inverse function. Also for a function implicitly defined. Relative extremes. The mean value theorem. The L'Hôpital rule. The Taylor formula. Optimization problems. Partial derivatives and gradient. Introduction to Optimization in several variables.

Integration

Degree competences to which the content contributes:

Description:
Integral of a function over an interval. The Fundamental Theorem of Calculus. Calculation of primitives. Improper integrals.

Sequences and series

Degree competences to which the content contributes:

Description:
Sequances. Calculation of limits. Series of real and complex numbers. Convergence criteria. Power series. Radius of convergence. Differentiation and integration of power series.

Last update: 19-07-2019

270201 - CAL - Calculus

Planning of activities

Midterm exam	Hours: 7h Guided activities: 2h Self study: 5h
Specific objectives: 1, 2	

Final exam	Hours: 12h 30m Guided activities: 2h 30m Self study: 10h
Specific objectives: 2, 3	

Developing the first topic	Hours: 33h Theory classes: 9h Practical classes: 6h Laboratory classes: 0h Guided activities: 0h Self study: 18h

Developing the second topic	Hours: 33h Theory classes: 9h Practical classes: 6h Laboratory classes: 0h Guided activities: 0h Self study: 18h

Developing the third topic	Hours: 33h Theory classes: 9h Practical classes: 6h Laboratory classes: 0h Guided activities: 0h Self study: 18h

Deeveloping the fourth topic	Hours: 33h Theory classes: 9h Practical classes: 6h Laboratory classes: 0h Guided activities: 0h Self study: 18h

270201 - CAL - Calculus

Developing the fifth topic	Hours: 33h Theory classes: 9h Practical classes: 6h Laboratory classes: 0h Guided activities: 0h Self study: 18h

Qualification system

The maximum of the weighted average of the midterm (40%) and the final exam (60%) and the final exam.

In case of reevaluation, the new grade will replace the previous.

Bibliography

Basic:

Apostol, Tom M. Análisis matemático. 2a ed. Reverté, 1977. ISBN 8429150048.

Complementary:

Thompson, Silvanus Phillips; Gardner, Martin. Calculus made easy : being a very-simplest introduction to those beautiful methods of reckoning which are generally called by the terrifying names of the differential calculus and the integral calculus. 2nd ed. Macmillan and co., limited, 1998. ISBN 9781514779545.