Universitat de Lleida

DEGREE CURRICULUM

ESTADÍSTICA I OPTIMITZACIÓ

Academic year 2013-14

STATISTICS AND OPTIMIZATION 2013-14

Subject's general information

Subject name	ESTADÍSTICA I OPTIMITZACIÓ
Code	102006
Semester	2n Q Avaluació Continuada
Typology	Troncal
ECTS credits	9
Theoretical credits	0
Practical credits	0
Department	Matemàtica
Important information on data processing	Consult this link for more information.
Language	Catalan
Distribution of credits	Nacho Lopez Lorenzo 4.5 Josep M. Miret Biosca 4.5 Jordi Pujolàs Boix 4.5 Francisco Sebé Feixas 4.5
Office and hour of attention	Demanar per correu electrònic.

STATISTICS AND OPTIMIZATION 2013-14

Nacho Lopez Lorenzo
Josep M. Miret Biosca
Jordi Pujolàs Boix
Francisco Sebé Feixas

Subject's extra information

The course as part of the academic plan

This subject is given during the second semester in the first course. It corresponds to the basic training modulus.

Learning objectives

See competences

Competences

Degree-specific competences

- Ability to resolve logical problems that can arise in engineering. Aptitude to apply knowledge about lineal algebra; differential and integral calculus; numeric methods, numeric algorithms; statistics and optimization.

Goals

- Compute the derivative of univariate functions and partial derivatives of a multivariate function.
- Determine and characterize function extreme points.
- Use of integration methods.
- Distinguish the type of data representing a data set.
- Compute representative values of a data set.
- Apply the linear regresion model to numerical data.
- Manipulate properly operations among happenings.
- Apply the total probability and Bayes theorems.
- Distinguish discrete and continuous random variables.
- Compute the mean and variance of a random variable.
- Compute probabilities from density and distribution functions.
- Be able to determine the convergence of numerical series.
- Employ numerical methods for integration and equation systems solving.

- Ability to understand and master the basic concepts of discrete mathematics, logic, algorithm and computational complexity, and their application to the resolution of engineering problems.

Goals

Degree-transversal competences

- Ability for abstraction and critical, logical and logical reasoning.

Goals

- Ability to resolve problems and elaborate and defend arguments inside their field of study.

Subject contents

Part I. Optimization.

Chapter 1. Derivatives and optimization.

-Function derivative in a point.

-Geommetric interpretation.

-Derivative properties.

-Derivative of elemental functions.

-Univariate optimization.

-Partial derivatives.

-Multivariate optimitzation.

Chapter 2. Numerical series and integration.

-Sequences. Limit and convergence.

-Sequence manipulation. Indeterminates.

-Numerical series. Convergence.

-Geometrical sequences.

-Integration and primitive calculation.

-Variable changing formulas.

-Integration by parts.

-Definite integral. Geommetric interpretation.

Chapter 3. Numerical methods.

-Numerical integration.

-Iterative methods for solving linear systems of equations.

Part II. Statistics.

Chapter 4. Data set description.

-Qualitative and quantitative data.

-Representative values.

-Graphical representation.

Chapter 5. Probability.

- Set operations

- Random events

- Concept of probability

- Conditional probability

- Total probability and Bayes theorems

Chapter 6. Univariate random variables

- Discrete random variables: mean and variance. Uniform discrete distribution. Bernouilli and Binomial distributions. Poisson distribution. Geometric and Pascal distribution.

- Continuous random variables: Density function. Mean and variance. Uniform, exponential and normal distributions.

Chapter 7. Bidimensional description

- Relation between two numerical variables

- Linear correlation coefficient. Linear regression model.

- Relation between two ordinal variables.

- Spearman's rank correlation coefficient.

Methodology

S'alternen classes de teoria amb classes de problemes. Les classes de teoria aporten els conceptes bàsics de l'assignatura, tot incorporant exemples il.lustratius que en faciliten la comprensió. En les classes de problemes es combinen la resolució conjunta a la pissarra, amb la resolució individual i en grup dels estudiants en la mateixa aula.

Evaluation

L'avaluació es basarà en els següents ítems:

* prova escrita dels temes 1,2,5,6 (4 punts)

* prova escrita dels temes 3,4,7,8 (4 punts)

* activitat de control (1 punt)

* prova pràctica (1 punt)

En cadascuna de les proves de 4 punts cal treure com a mínim 1 punt.

Es pot obtenir 0.5 punts addicionals per la participació a classe.

Bibliography

Basic

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Additional

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