



## IDENTIFYING DATA

### Mathematics: Statistics

|                     |                                                                                                                                                                                                                             |                 |      |            |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|------------|
| Subject             | Mathematics:<br>Statistics                                                                                                                                                                                                  |                 |      |            |
| Code                | P03G370V01301                                                                                                                                                                                                               |                 |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                               |                 |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                                | Choose          | Year | Quadmester |
|                     | 6                                                                                                                                                                                                                           | Basic education | 2nd  | 1st        |
| Teaching language   | Spanish                                                                                                                                                                                                                     |                 |      |            |
| Department          |                                                                                                                                                                                                                             |                 |      |            |
| Coordinator         | Iglesias Pérez, María Carmen                                                                                                                                                                                                |                 |      |            |
| Lecturers           | Iglesias Pérez, María Carmen                                                                                                                                                                                                |                 |      |            |
| E-mail              | mcigles@uvigo.es                                                                                                                                                                                                            |                 |      |            |
| Web                 | <a href="http://webs.uvigo.es/mcigles/">http://webs.uvigo.es/mcigles/</a>                                                                                                                                                   |                 |      |            |
| General description | (*)Esta materia ten como obxectivo proporcionar unha formación estatística básica en descrición de datos, cálculo de probabilidades e inferencia estatística, poñendo o acento nos aspectos aplicados á enxeñaría forestal. |                 |      |            |

## Competencies

|      |                                                                                                                                                                                                                                                                  |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code |                                                                                                                                                                                                                                                                  |
| B4   | CG-04: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Matemáticos.                                                                                                                             |
| C11  | (*)CE-11: Aptitude para aplicar os coñecementos sobre estatística e optimización. Programas informáticos estatísticos de interese en enxeñaría.                                                                                                                  |
| D1   | (*)CBI 1: Capacidade de análise e síntese.                                                                                                                                                                                                                       |
| D6   | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                                                                                                                                        |
| D11  | (*)CBP 4: Habilidades de razoamento crítico.                                                                                                                                                                                                                     |
| D12  | (*)CBP 5: Desenvolver un compromiso ético, que implique o respecto dos dereitos fundamentais e de igualdade entre homes e mulleres, e dos principios de igualdade de oportunidades, accesibilidade universal a persoas con discapacidade e educación para a paz. |
| D13  | (*)CBS 1: Aprendizaxe autónoma.                                                                                                                                                                                                                                  |
| D19  | (*)CBS 7: Motivación pola calidade.                                                                                                                                                                                                                              |

## Learning outcomes

| Expected results from this subject                                                                                                                                                       | Training and Learning Results |     |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|--------------------------------------|
| (*)Purchase the basic statistical training in description of data, calculation of probabilities, statistical inference and optimisation in regression applied to the Forest Engineering. | B4                            | C11 | D1<br>D6<br>D11<br>D12<br>D13<br>D19 |
| New                                                                                                                                                                                      |                               |     |                                      |

## Contents

| Topic                                  |                                                                                                                                                                                                                                                                        |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Sampling and descriptive statistics | 1.1 Definition and field of application of the Statistics.<br>1.2 basic Concepts of sampling. Methods of random sampling.<br>1.3 descriptive Statistics: Measures of position, dispersion and form.<br>1.4 descriptive Statistics: Tables and graphic representations. |

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. Probability                                   | 2.1 random Experiment. Sample space. Events.<br>2.2 Probability: concept, properties and methods of determination.<br>2.3 Probability conditioned. Independence of events.<br>2.4 fundamental Theorems: of the product, total probabilities and Bayes.                                                                                                                                                                                                                                                                                |
| 3. Random variables and remarkable distributions | 3.1 Concept of random variable (v.To.)<br>3.2 random Variables discrete and continuous.<br>3.3 Characteristics of a v.To.<br>3.4 Models associated to a Process of Bernoulli.<br>3.5 Models associated to a Process of Poisson.<br>3.6 The Normal distribution.<br>3.7 Other remarkable models.                                                                                                                                                                                                                                       |
| 4. Intervals of confidence                       | 4.1 Estimator: concept and properties.<br>4.2 The average, variance and proportion samples.<br>4.3 Intervals of confidence for the average, variance and proportion.<br>4.4 Calculation of the size of the sample.<br>4.5 Intervals of confidence for the difference of averages and proportions.                                                                                                                                                                                                                                     |
| 5. Contrasts of hypothesis                       | 5.1 Definition and classical methodology of a contrast: types of hypothesis, errors associated to the contrast, level of significance, region of rejection. Power.<br>5.2 Critical Level or p-value.<br>5.3 Contrasts for the comparison of averages and variances of dosdistribuciones normal.<br>5.4 Contrast chi-square of independence.<br>5.5 Contrasts of normality.                                                                                                                                                            |
| 6. Introduction to the models of regression      | 6.1 Measurement of the linear association: covariance and coefficient of linear correlation.<br>6.2 Formulation of the model of simple linear regression.<br>6.3 Estimate of the parameters.<br>6.4 Intervals of confidence and contrasts of hypothesis.<br>6.5 Analyses of the variance and coefficient of determination. Goodness of adjust.<br>6.6 Validation of the structural hypotheses.<br>6.7 Prediction.<br>6.8 linear Model general.<br>6.9 Strategies of regression and comparison of models. Selection of optimum models. |

## Planning

|                                                          | Class hours | Hours outside the classroom | Total hours |
|----------------------------------------------------------|-------------|-----------------------------|-------------|
| Master Session                                           | 15          | 15                          | 30          |
| Troubleshooting and / or exercises                       | 15          | 15                          | 30          |
| Autonomous troubleshooting and / or exercises            | 0           | 24                          | 24          |
| Practice in computer rooms                               | 14          | 14                          | 28          |
| Tutored works                                            | 1.5         | 10                          | 11.5        |
| Long answer tests and development                        | 2           | 12                          | 14          |
| Practical tests, real task execution and / or simulated. | 1           | 7                           | 8           |
| Jobs and projects                                        | 2           | 2.5                         | 4.5         |

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

|                                               | Description                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Master Session                                | (*) Exposición por parte do profesor dos fundamentos teóricos, que deberán estudarse fóra de clase.<br>Ao principio de cada tema proporcionarase aos alumnos apuntes e/ou material para un mellor seguimento da clase.<br>Trabállanse as competencias CG4 e CE11.                                                                                         |
| Troubleshooting and / or exercises            | (*) Clases na aula dedicadas a resolver exercicios, e a expor, resolver ou analizar e interpretar problemas.<br>Trabállanse as competencias CG4, CE11, CT1, CT6, CT11 e CT19.                                                                                                                                                                             |
| Autonomous troubleshooting and / or exercises | (*) En cada tema os alumnos deberán traballar sobre un boletín para saber resolver problemas e exercicios similares aos de clase.<br>Tamén se proporá indagar sobre cuestións de interese.<br>Así mesmo, os alumnos realizarán cuestionarios de autoevaluación ao final dos temas ou bloques da materia.<br>Trabállanse todas as competencias da materia. |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Practice in computer rooms | (*) Manexo de software estatístico por parte de cada alumno.<br>Fundamentalmente usárase EXCEL ou CALC, e algo de R Commander.<br>En cada tema, traballarase no computador seguindo un guión para aprender a aplicación, cálculo e interpretación dos conceptos e técnicas básicas de estatística sobre arquivos de datos relacionados co ámbito da Enxeñaría Forestal.<br>Trabállanse as competencias CG4, CE11, CT1, CT6, CT11, CT12 e CT19.                                                                                                                           |
| Tutored works              | (*) Os alumnos organizaranse en grupos de traballo para o estudo dun caso de datos reais ou dunha simulación.<br>Cada grupo deberá elixir un problema relacionado co ámbito da Enxeñaría Forestal, obter ou simular datos relativos ao mesmo, describilos e analízalos estatisticamente e extraer algunhas conclusións relevantes.<br>O traballo realízase maioritariamente fora da aula, aínda que haberá unha parte de elaboración e supervisión presencial.<br>Así mesmo a presentación do traballo será presencial.<br>Trabállanse todas as competencias da materia. |

## Personalized attention

| Methodologies | Description |
|---------------|-------------|
| Tutored works |             |

## Assessment

| Assessment                                               | Description                                                                                                                                     | Qualification | Training and Learning Results |     |                                      |  |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-----|--------------------------------------|--|
| Autonomous troubleshooting and or exercises              | (*)Avaliaranse as actividades (problemas, cuestións, exercicios de computador) entregadas durante o curso e os cuestionarios de autoevaluación. | 20            | B4                            | C11 | D1<br>D6<br>D11<br>D12<br>D13<br>D19 |  |
| Long answer tests and development                        | (*)Exame escrito de problemas e pequenas cuestións de teoría.<br><br>Hai que sacar un mínimo para compensar (4 sobre 10).                       | 50            | B4                            | C11 | D1<br>D6<br>D11<br>D12<br>D19        |  |
| Practical tests, real task execution and / or simulated. | (*)Exame do software estatístico na aula de informática.<br><br>Hai que sacar un mínimo para compensar (4 sobre 10).                            | 20            | B4                            | C11 | D1<br>D6<br>D11<br>D12<br>D19        |  |
| Jobs and projects                                        | (*)Cualificación do contido e presentación do traballo de grupo.                                                                                | 10            | B4                            | C11 | D1<br>D6<br>D11<br>D12<br>D13<br>D19 |  |

## Other comments on the Evaluation

### Sources of information

#### Basic Bibliography

Navidi, W., **Estatística para Ingenieros y Científicos**, Mc. Graw Hill,  
Cao Abad, R. y otros, **Introducción a la Estadística y sus aplicaciones**, Pirámide,  
Peña, D., **Estatística. Modelos y Métodos. Fundamentos**, Alianza Universidad,

#### Complementary Bibliography

Alea Riera, V. y otros., **Guía para el análisis estadístico con R Commander**, Barcelona: Universidad de Barcelona,  
Pérez López, C., **Estatística aplicada : conceptos y ejercicios a través de Excel**, Madrid : Ibergarceta Publicaciones,  
Devore, J., **Probabilidad y estadística para ingeniería y ciencias**, Thomson,  
Walpole, R. E. et al., **Probabilidad y estadística para ingeniería y ciencias**, Pearson Educación,  
Rodríguez Muñiz, L.J. y otros, **Métodos estadísticos para ingeniería**, Madrid : Garceta,  
Framiñán Torres, J.M. y otros, **Problemas resueltos de probabilidad y estadística en la ingeniería**, Universidad de Sevilla,  
Susan Milton, J., **Estatística para Biología y Ciencias de la Salud**, McGraw Hill Interamericana,  
Ríos, F., Barón, F.J., Sánchez, E. y Parras, L., **Bioestadística: métodos y aplicaciones**, SPICUM (U. Málaga),  
<http://www.aulafacil.com/Excel/temario.htm>,  
<http://knuth.uca.es/moodle/mod/resource/view.php?id=1126>,

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## **Recommendations**

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### **Subjects that it is recommended to have taken before**

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Mathematics: Overview of mathematics/P03G370V01203

Mathematics: Mathematics and IT/P03G370V01103

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