



## (\*)Escola de Enxeñaría Forestal

### Presentation

Welcome to the Forestry Faculty (Campus of Pontevedra - University of Vigo). Details information about our faculty can be found in <http://www.forestales.uvigo.es>

Our faculty offers the Degree in Forest Engineering

The Degree comprises 240 credits ECTS during four years, meaning an annual distribution of 60 ECTS distributed in 30 ECTS per semester.

### Address

1. Name: Forestry Technical School
2. Degree: Degree in Forestry
3. Postal address: Campus A Xunqueira, 36005 Pontevedra
4. Telephone: 986-801900
5. FAX: 986-801907
6. And-mail: [sdeuetf@uvigo.es](mailto:sdeuetf@uvigo.es)
7. Web: <http://www.forestales.uvigo.es>



### Faculty Management

#### Managerial team:

Director: D. Enrique Valero Gutiérrez del Olmo

Deputy director: D<sup>a</sup>. Angeles Cancela Carral

Secretary: D. Juan Picos Martín

#### Governing bodies:

- Faculty Assembly

- Commissions:

- Permanent
- Economic Affairs
- Academic Affairs
- Credit Validation
- Quality

#### Departments in the Centre:

## (\*)Servizo e Infraestructuras do Centro

(\*)

1. Administración: o horario de atención ao público de secretaría é de 9:00 a 14:00 horas.
2. Bibliotecas: [http://www.uvigo.es/uvigo\\_gl/Administracion/Biblioteca/directorio/campus\\_pontevedra.html](http://www.uvigo.es/uvigo_gl/Administracion/Biblioteca/directorio/campus_pontevedra.html)
3. Conserxaría: A conserxaría do Centro permanece aberta desde a apertura ao peche do Centro, en dúas quendas: 8:00 a 15:00 horas, e 15:00 a 22:00.
4. Reprografía: Este servizo atópase na Facultade de CC. Sociais e cobre as necesidades do Campus.
5. Cafetería
6. Administrador de Centros
7. Área de Servizos á Comunidade
8. Rexistro
9. LERD
10. Bolsas
11. CAP
12. OSIX

## Aulas e laboratorios:

### Aulas docentes:

| AULA        | Nº DE POSTOS TOTAIS | Nº DE POSTOS EN DISPOSICIÓN DE EXAME |
|-------------|---------------------|--------------------------------------|
| 1           | 65                  | 35                                   |
| 2           | 65                  | 35                                   |
| 3           | 65                  | 35                                   |
| 4           | 98                  | 53                                   |
| 5           | 104                 | 56                                   |
| 6           | 104                 | 56                                   |
| 7           | 104                 | 56                                   |
| 8           | 104                 | 56                                   |
| 9           | 104                 | 56                                   |
| <b>SUMA</b> | <b>813</b>          | <b>438</b>                           |

### Laboratorios e talleres:

| ANDAR   | LABORATORIO                               | DOCENTE               |                   | INVEST.              |                |
|---------|-------------------------------------------|-----------------------|-------------------|----------------------|----------------|
|         |                                           | Superficie            | Capacidad Persoas | Superficie           | Capac. Persoas |
| Soto    | Lab. Hidráulica e Hidroloxía Forestal     | 115,83 m <sup>2</sup> | 16                | 35,67 m <sup>2</sup> | 3              |
| Soto    | Lab. Enxeñaría Mecánica /Lab. Termotecnia | 110,17 m <sup>2</sup> | 16                | NO                   | No             |
| Soto    | Celulosa Pasta e Papel                    | 72,04 m <sup>2</sup>  | 15                | 35,67 m <sup>2</sup> | 3              |
| Soto    | Taller Enerxías Xiloxeneneradas           | 171,51 m <sup>2</sup> | 25                | 2º Andar             | 2º Andar       |
| Soto    | Taller de Madeiras                        | 342,11 m <sup>2</sup> | 35                | NO                   | NO             |
| P.Baixa | Aula Informática (1)                      | 108,85 m <sup>2</sup> | 24                | NO                   |                |
| P.Baixa | Aula Informática (2)                      | 107,34 m <sup>2</sup> | 24                | NO                   |                |
| P.Baixa | Expresión Gráfica                         | 168,45 m <sup>2</sup> | 48                | NO                   |                |
| P.Baixa | Proxectos                                 | 95,00 m <sup>2</sup>  |                   | 6                    |                |
| 1º      | Lab. Física                               | 112,54 m <sup>2</sup> | 16                | 35,67 m <sup>2</sup> | 4              |
| 1º      | Lab. Ecoloxía                             | 109,41 m <sup>2</sup> | 30                | 36,61 m <sup>2</sup> | 4              |
| 1º      | Lab. Enxeñaría do Medio Ambiente          | NO                    | NO                | 34,54 m <sup>2</sup> | 4              |
| 1º      | Lab. Topografía                           | 117,57 m <sup>2</sup> | 40                | 36,75 m <sup>2</sup> | 2              |
| 1º      | Lab. Edafoloxía                           | 109,98 m <sup>2</sup> | 16                | 27,40 m <sup>2</sup> | 7              |
| 2º      | Lab. Silvicultura e Repoboación           | 109,60 m <sup>2</sup> | 16                |                      |                |
| 2º      | Lab. Enerxías Xiloxeneneradas             | Soto                  | Soto              | 36,61 m <sup>2</sup> | 4              |
| 2º      | Lab. Incendios Forestais                  | 112,11 m <sup>2</sup> | 17                | 34,54 m <sup>2</sup> | 5              |
| 2º      | Lab. Producción Vexetal                   | 117,57 m <sup>2</sup> | 24                | 36,75 m <sup>2</sup> | 4              |
| 2º      | Lab. de Acuicultura                       | 112,54 m <sup>2</sup> | pendente          | NO                   | NO             |

|    |                          |                       |    |                      |    |
|----|--------------------------|-----------------------|----|----------------------|----|
| 2º | Lab. Enxeñaría Eléctrica | 110,73 m <sup>2</sup> | 21 | NO                   | NO |
| 2º | Lab. Enxeñaría Química   | 109,98 m <sup>2</sup> | 15 | 27,40 m <sup>2</sup> | 6  |

### Additional information

#### STUDENTS OFFICE:

Number tfno.: 986 801913

And-mail: daeuetf@uvigo.es



### Main Regulations

Rules of interest for the students; we indicate the links where the student can find information of his interest:

#### Specific rules of the University of Vigo: [www.uvigo.es](http://www.uvigo.es)

[http://www.uvigo.es/uvigo\\_gl/administración/servicioalumnado](http://www.uvigo.es/uvigo_gl/administración/servicioalumnado)

<http://extension.uvigo.es>

[http://webs.uvigo.es/vicoap/normativa\\_oa.gl.htm](http://webs.uvigo.es/vicoap/normativa_oa.gl.htm)

[http://www.uvigo.es/uvigo\\_gl/estudiostitulaciones](http://www.uvigo.es/uvigo_gl/estudiostitulaciones)

[http://www.uvigo.es/uvigo\\_gl/vidauniversitaria/calendarioescolar](http://www.uvigo.es/uvigo_gl/vidauniversitaria/calendarioescolar)

[http://www.uvigo.es/uvigo\\_gl/vidauniversitaria/universidadvirtual](http://www.uvigo.es/uvigo_gl/vidauniversitaria/universidadvirtual)

[http://secxeral.uvigo.es/secxeral\\_gl/normativa/normativauniversidad/estudaintes/regulamento\\_estudiantes.html](http://secxeral.uvigo.es/secxeral_gl/normativa/normativauniversidad/estudaintes/regulamento_estudiantes.html)

[http://www.uvigo.es/uvigo\\_gl/vidauniversitaria/normativa](http://www.uvigo.es/uvigo_gl/vidauniversitaria/normativa)

<http://www.forestales.uvigo.es>

### Other Information

- **Study Plan:** <http://www.forestales.uvigo.es>
- **Scholarships:** <http://193.146.32.123:8080/GestorBecas/user/Becas.do?accion=tiposList>
- **Medical assistance:** [http://www.uvigo.es/uvigo\\_gl/vidauniversitaria/salud/centromedico/](http://www.uvigo.es/uvigo_gl/vidauniversitaria/salud/centromedico/)
- **Employment Office :** <http://emplego.uvigo.es/>
- **Canteens and accommodation:** [http://www.uvigo.es/uvigo\\_gl/vidauniversitaria/comedores\\_aloxamento/](http://www.uvigo.es/uvigo_gl/vidauniversitaria/comedores_aloxamento/)
- **Other activities:**
  - [http://www.campuspontevedra.uvigo.es/index.php?\\*id=14](http://www.campuspontevedra.uvigo.es/index.php?*id=14) (Sports in the Campus of Pontevedra)
  - <http://deportes.uvigo.es/index.asp> (Sport Services).
  - <http://extension.uvigo.es/>

## (\*)Grao en Enxeñaría Forestal

### Subjects

**Year 2nd**

| Code          | Name                                                          | Quadmester | Total Cr. |
|---------------|---------------------------------------------------------------|------------|-----------|
| P03G370V01301 | Mathematics: Statistics                                       | 1st        | 6         |
| P03G370V01302 | Edaphology                                                    | 1st        | 6         |
| P03G370V01303 | Botany                                                        | 1st        | 6         |
| P03G370V01304 | Electrotechnology and rural electrification                   | 1st        | 6         |
| P03G370V01305 | Forest entomology and Zoology                                 | 1st        | 6         |
| P03G370V01401 | Forestry                                                      | 2nd        | 6         |
| P03G370V01402 | Forestry Ecology                                              | 2nd        | 6         |
| P03G370V01403 | Topography, remote sensing and geographic information systems | 2nd        | 9         |
| P03G370V01404 | Hydraulics                                                    | 2nd        | 9         |

| IDENTIFYING DATA        |                                                                                                                                                                                                                             |                 |      |            |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|------------|
| Mathematics: Statistics |                                                                                                                                                                                                                             |                 |      |            |
| Subject                 | Mathematics: 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                     | http://webs.uvigo.es/mcigles/                                                                                                                                                                                               |                 |      |            |
| 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 usarase 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 | <p>(*) Os alumnos organizaranse en grupos de traballo para o estudo dun caso de datos reais ou dunha simulación.</p> <p>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.</p> <p>O traballo realizarase maioritariamente fora da aula, aínda que haberá unha parte de elaboración e supervisión presencial.</p> <p>Así mesmo a presentación do traballo será presencial.</p> <p>Trabállanse todas as competencias da materia.</p> |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 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., **Estadística para Ingenieros y Científicos**, Mc. Graw Hill,  
Cao Abad, R. y otros, **Introducción a la Estadística y sus aplicaciones**, Pirámide,  
Peña, D., **Estadística. 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., **Estadística 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 Muñoz, 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., **Estadística 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>,  
<https://estadisticaorquestainstrumento.wordpress.com/>,

## Recommendations

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

---

Mathematics: Overview of mathematics/P03G370V01203

Mathematics: Mathematics and IT/P03G370V01103

---



| IDENTIFYING DATA    |                                 |           |      |            |
|---------------------|---------------------------------|-----------|------|------------|
| <b>Edaphology</b>   |                                 |           |      |            |
| Subject             | Edaphology                      |           |      |            |
| Code                | P03G370V01302                   |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal   |           |      |            |
| Descriptors         | ECTS Credits                    | Choose    | Year | Quadmester |
|                     | 6                               | Mandatory | 2nd  | 1st        |
| Teaching language   |                                 |           |      |            |
| Department          |                                 |           |      |            |
| Coordinator         | Marcet Miramontes, Purificación |           |      |            |
| Lecturers           | Marcet Miramontes, Purificación |           |      |            |
| E-mail              | marcet@uvigo.es                 |           |      |            |
| Web                 |                                 |           |      |            |
| General description |                                 |           |      |            |

| Competencies |                                                                                                                                                                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                                                                                                                                             |
| B6           | CG-06: Capacidade para identificar os diferentes elementos: elementos bióticos.                                                                                                                                                                                             |
| B7           | CG-07: Capacidade para identificar os diferentes elementos: elementos físicos.                                                                                                                                                                                              |
| C10          | (*)CE-10: Coñecementos básicos de xeoloxía e morfoloxía do terreo e a súa aplicación en problemas relacionados coa enxeñaría. Climatoloxía. Capacidade para coñecer, comprender e utilizar os principios de: ciencias do medio físico: xeoloxía, edafoloxía e climatoloxía. |
| D1           | (*)CBI 1: Capacidade de análise e síntese.                                                                                                                                                                                                                                  |
| D2           | (*)CBI 2: Capacidade de organización e planificación.                                                                                                                                                                                                                       |
| D3           | (*)CBI 3: Capacidade de comunicación oral e escrita tanto na lingua vernácula como en linguas estranxeiras.                                                                                                                                                                 |
| D6           | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                                                                                                                                                   |
| D7           | (*)CBI 7: Adquirir capacidade na toma de decisións.                                                                                                                                                                                                                         |
| D8           | (*)CBP 1: Capacidades de traballo en equipo, con carácter multidisciplinar e en contextos tanto nacionais como internacionais.                                                                                                                                              |
| D20          | (*)CBS 8: Sensibilidade cara a temas ambientais.                                                                                                                                                                                                                            |

| Learning outcomes                                                                                    |  |                               |     |
|------------------------------------------------------------------------------------------------------|--|-------------------------------|-----|
| Expected results from this subject                                                                   |  | Training and Learning Results |     |
| (*)                                                                                                  |  | B6                            | C10 |
|                                                                                                      |  | B7                            | D1  |
|                                                                                                      |  |                               | D2  |
|                                                                                                      |  |                               | D3  |
|                                                                                                      |  |                               | D6  |
|                                                                                                      |  |                               | D7  |
|                                                                                                      |  |                               | D8  |
|                                                                                                      |  |                               | D20 |
| (*)Coñecer os elementos básicos da dirección de equipos de proxectos en *AAPP e Sector non Lucrativo |  |                               |     |

| Contents                                                                     |                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                                                                        |                                                                                                                                                                                                                                                                                                             |
| 1.Introducción The wool environmental geology                                | Minerales, cristales and rocks. Geodynamic Internal. Geodynamic External. Geology of Galicia. Geological resources.                                                                                                                                                                                         |
| 2. The soil: Approaches, work and study.                                     | The soil: conceptual approaches. Edafic organizations. Edafology. The Science of the soil.                                                                                                                                                                                                                  |
| 3. Ecological factors of training                                            | Genesis of soils: factors and processes. Spatial variability of the soil. Horizonation. Ecological factors of training of soil.                                                                                                                                                                             |
| 4. Meteorization of rocks and minerales and edaphogenesis.                   | Weathering. Type and processes of weathering. Approach general of wool edaphogenesis. Conceptual model: basic processes in him development of the soil. Basic processes and resultant horizons. Weatherization and Deep geochemical                                                                         |
| 5 .Studio of the soils in him field. Morfology and description of the soils. | Place and pedión. Wool calicata. Morphology of the soil. Studio of wool internal organization of a soil. Interpretation of a profile of a soil. Properties and characteristics of a soil. You work of transferring. Description Of floors. Horizons of the soil: Horizons genetic and horizons of diagnosis |

|                                                                      |                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6. Physical properties and comportement of the soil.                 | The soil how system of three phases. Physical properties of the soil. Composition granulometric. Texture. Color. Structure of the soil: description of wool organization of wools individual particles. Density and porosity                                                                                                                       |
| 7. Inorganic components of the soil                                  | Origin of minerals of soil. The minerals Of wools particles of soil. Minerals Of wool fraction, sand and limo. Minerals Of wool fraction clay                                                                                                                                                                                                      |
| 8. Organic components of the soil.                                   | Contributions Of organic subject. Organic subject of the soil and humus. You work of wool organic subject of the soil. Factors that influence in him content, class and evolution of wool organic subject of the soil. Relation C / N. Evolution of wool organic subject of the soil. Importance environmental of wool organic subject of the soil |
| 9. Chemical properties, physical-chemical and behavior of the soil   | Chemical of the soils. Forms in that find the chemical elements in the soils: bioavailability. Colloidal properties of the soil and react of surface. Capacity of exchange Cationic. Reaction of soil. Salinity, Sodidity and Alkalinity of soil. Potential of Oxidation-Reduction. Pollution of soils.                                            |
| 10. Ecology Of the soil and cycle of the element                     | Soil and biodiversity: flows of nutrient and energy. Rhizosphere. You work of the organisms in him soil. Cycles biogeochemicals.                                                                                                                                                                                                                   |
| 11. Water Of soil: content, potentials and movement.                 | Content Of water in him soil. Measure of the content of water in him soil. Energy of water in soil: potential water and its components. Hydraulic conductivity. Infiltration. Classes of drainage                                                                                                                                                  |
| 12. Introduction The wool classification of the soils.               | Wool classification of soils. Soil Taxonomy. World Reference Base was Soil Resources.                                                                                                                                                                                                                                                              |
| 13. Quality and sustainability: Forests and quality of the ecosystem | I have ecosystem forest and I soil. Management or forest management sustainable. Quality of the soil. Indicators Of quality. Evaluation of wool quality of forest soils                                                                                                                                                                            |
| 14. Climatology                                                      | Factors that condition wool expression of a climate. Elements of the climate. Atmospheric circulation. Analysis and prediction Of the time. Wools climatic classifications.                                                                                                                                                                        |

## Planning

|                                 | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Laboratory practises            | 16          | 14                          | 30          |
| Outdoor study / field practices | 5           | 2                           | 7           |
| Presentations / exhibitions     | 3           | 20                          | 23          |
| Master Session                  | 30          | 60                          | 90          |

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

## Methodologies

|                                 | Description                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Laboratory practises            | Activities of application of the knowledge to concrete situations and of acquisition of basic and procedural skills related to the subject matter of study. They are developed in special spaces with specialized equipment (scientific-technical laboratories, languages, etc.).                                                                                            |
| Outdoor study / field practices | Activities of application of the knowledge to concrete situations and of acquisition of basic and procedural skills related to the subject matter of study. They are developed in non-academic outer spaces.<br>Among them we can mention field practices, visits to events, research centers, companies, institutions ... of academic-professional interest for the student |
| Presentations / exhibitions     | Exposition by the student to the teacher and / or a group of students of a topic about contents of the subject or the results of a work, exercise, project ... It can be carried out individually or in a group.                                                                                                                                                             |
| Master Session                  | Teacher presentation of contents on the subject matter of study, theoretical bases and / or guidelines of a work, exercise or project to be developed by the student                                                                                                                                                                                                         |

## Personalized attention

| Methodologies                   | Description |
|---------------------------------|-------------|
| Laboratory practises            |             |
| Outdoor study / field practices |             |
| Presentations / exhibitions     |             |

## Assessment

| DescriptionQualification | Training and Learning Results |
|--------------------------|-------------------------------|
|--------------------------|-------------------------------|

|                             |    |     |                                   |
|-----------------------------|----|-----|-----------------------------------|
| Laboratory practises        | 20 |     | D1<br>D2<br>D6<br>D7<br>D8<br>D20 |
| Presentations / exhibitions | 20 |     | D2<br>D3<br>D20                   |
| Master Session              | 60 | C10 | D1<br>D6                          |

#### Other comments on the Evaluation

#### Sources of information

##### Basic Bibliography

##### Complementary Bibliography

PORTA, J., LÓPEZ-ACEBEDO, M. , ROQUERO DE LABURU, C., **Edafología para la agricultura y el medio ambiente**, 2003,

PORTA, J; LÓPEZ-ACEVEDO, M , POCH, R.M., **Introducción a la Edafología: Uso y Protección del Suelo**, 2008,

PORTA, J. ,LÓPEZ-ACEVEDO M., **Agenda de campo de suelos. Información de suelos para la agricultura y el medio ambiente. del suelo.**, 2005,

BRADY, N. C., **Elements of the Nature and Properties of Soils**, 2010,

WHITE R., **Principles and practice of soil science**, 2007,

CHARMAN P., MURPHY B., **Soils . Their propierties and management**, 2007,

BLANCO H., LAL R., **Principles of soil conservation and management**, 2008,

FUENTES YAGÜE J.L., **Iniciación a la meteorología y climatología agrícola**, 2000,

Ledesma, Manuel, , **"Climatología y meteorología agrícola"**,, 2000,

Elías Castillo, Francisco / Castellví Sentís, Francesc,, **"Agrometeorología"**,, 2001,

#### Recommendations

| IDENTIFYING DATA    |                                                                                                                                                                                                                  |           |      |            |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| <b>Botany</b>       |                                                                                                                                                                                                                  |           |      |            |
| Subject             | Botany                                                                                                                                                                                                           |           |      |            |
| Code                | P03G370V01303                                                                                                                                                                                                    |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                    |           |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                     | Choose    | Year | Quadmester |
|                     | 6                                                                                                                                                                                                                | Mandatory | 2nd  | 1st        |
| Teaching language   |                                                                                                                                                                                                                  |           |      |            |
| Department          |                                                                                                                                                                                                                  |           |      |            |
| Coordinator         | Paz Bermudez, Maria Graciela                                                                                                                                                                                     |           |      |            |
| Lecturers           | Paz Bermudez, Maria Graciela                                                                                                                                                                                     |           |      |            |
| E-mail              | graciela@uvigo.es                                                                                                                                                                                                |           |      |            |
| Web                 | http://http://fatic.uvigo.es/index.php/es/                                                                                                                                                                       |           |      |            |
| General description | (*)Coñece-los conceptos básicos e a terminoloxía específica para aprender a diferenza-los grandes grupos de organismos que estuda a Botánica, incidindo nos grupos con maior presenza no ámbito forestal galego. |           |      |            |

| Competencies |                                                                                                                                                     |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                     |
| B1           | CG-01: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Biolóxicos.                 |
| B6           | CG-06: Capacidade para identificar os diferentes elementos: elementos bióticos.                                                                     |
| B8           | CG-08: Capacidade para identificar os diferentes elementos: recursos naturais renovables susceptibles de protección, conservación e aproveitamento. |
| B14          | CG-14: Capacidade para o uso das técnicas de protección do medio forestal.                                                                          |
| B16          | CG-16: Capacidade para o uso das técnicas de conservación da biodiversidade.                                                                        |
| C15          | (*)CE-15: Capacidade para coñecer, comprender e utilizar os principios de: botánica forestal.                                                       |
| D20          | (*)CBS 8: Sensibilidade cara a temas ambientais.                                                                                                    |

| Learning outcomes                  |                               |     |     |
|------------------------------------|-------------------------------|-----|-----|
| Expected results from this subject | Training and Learning Results |     |     |
| (*)                                | B1<br>B6<br>B8<br>B14<br>B16  | C15 | D20 |

| Contents                                            |                                                                                                                                 |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Topic                                               |                                                                                                                                 |
| 1. Concept of Botanist.                             | Categories and taxonomic unities. Botanic nomenclature.                                                                         |
| 2. Morphological levels of vegetal organization.    | Traffic of Therophytes to Cormophytes. Generalities of the vascular plants and its adaptive advantages.                         |
| 3. The reproduction                                 | Types of reproduction. Biological cycles. Alternation of generations and his importance.                                        |
| 4. The plants with seed (Spermatophytes).           | General characters. Root and cut. Main type and modifications. The leaf, special trainings and phylotaxic. Forms of life.       |
| 5. The flower.                                      | Concept of flower in gymnosperms and angiosperms. Floral receptacle. Perianth. Androceo. Xineceo. Inflorescences                |
| 6. Pollination                                      | Main type and floral syndromes. Evolution of the flower in relation of type of pollination                                      |
| 7. Fertilization                                    | Differences between the fertilization in Gymnosperms and Angiosperms. Training of the seed. Fruits and Infoscences. Dispersion. |
| 8. Gymnosperms                                      | General characters. Reproduction: Vital cycle. Main groups. Division Cycadophyta. Division Ginkgophyta.                         |
| 9. Division Coniferophyta. General characteristics. | General characteristics. Class Coniferopsida                                                                                    |
| Class Coniferopsida                                 |                                                                                                                                 |
| 10. Order Coniferales, Family Pinaceae.             | General characteristics. Ecological importance, forestal and economic. Genders more representative.                             |
| 11. Family Cupressaceae.                            | General characteristics. Genders more representative.                                                                           |
| 12. Family Taxodiaceae.                             | General characters. Genders more relevant. Forestal importance and examples. Family Araucariaceae, species more relevant.       |

13. Quotation of the families Podocarpaceae and (\*).  
Cephalotaxaceae. Order Taxales, Family  
Taxaceae, species more relevant and forestal  
importes.

|                                                                                           |                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14. Anxiospermas. Div. Magnoliophyta General characters.                                  | Reproduction: Vital cycle. Differential characters go in the classes Magnoliopsida (Dicotyledonous) and Liliopsida (monocotiledóneas).                              |
| 15. Magnoliopsida Class (dicotyledonous).<br>Subclass 1: Magnoliidae. General characters. | Families: Magnoliaceae, Lauraceae, Ranunculaceae, Berberidaceae.<br>Genders and species more important and examples.                                                |
| 16. Subclass 2: Hamamelididae.                                                            | General characters of the families Hamamelidaceae and Platanaceae.<br>Species of forestal and ornamental interest.                                                  |
| 17. Special quotation of the families Fagaceae and Betulaceae.                            | Genders and species more relevant. Ecological and economic interest.                                                                                                |
| 18. Family Juglandaceae. General characters of the families Ulmaceae and Moraceae.        | (*)                                                                                                                                                                 |
| 19. Subclass 3: Caryophyllidae.                                                           | General characters. Quotation of the most important orders. Examples.                                                                                               |
| 20. Subclass 4: Dilleniidae.                                                              | General characters of the families of main economic and forestall: Theaceae, Tiliaceae, Cistaceae, Salicaceae, Brasicaceae, Ericaceae.                              |
| 21. Subclass 5: Rosidae.                                                                  | Families of main forestal interest: Rosaceae, Leguminosaceae, Myrtaceae, Aquifoliaceae, Rutaceae, Anacardiaceae, Hippocastanaceae, Aceraceae, Rhamnaceae, Buxaceae. |
| 22. Subclass 6: Asteridae.                                                                | Quotation of the most representative families: Solanaceae, Caprifoliaceae, Lamiaceae, Oleaceae and Asteraceae                                                       |
| 23. Class Liliopsida (monocotiledoneas).                                                  | Differential characters and families more significant.                                                                                                              |
| 24. Concept of Geobotanic                                                                 | Distribution of the plants and floristic territories. Biogeographic kingdoms.                                                                                       |

## Planning

|                                               | Class hours | Hours outside the classroom | Total hours |
|-----------------------------------------------|-------------|-----------------------------|-------------|
| Outdoor study / field practices               | 2           | 0                           | 2           |
| Laboratory practises                          | 16          | 10                          | 26          |
| Autonomous troubleshooting and / or exercises | 4           | 28                          | 32          |
| Master Session                                | 30          | 60                          | 90          |

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

## Methodologies

|                                               | Description                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outdoor study / field practices               | Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. They thrive in nonacademic outdoor spaces. Among them we can cite practical field visits to events, research centers, companies, institutions ... academic-professional interest to the student. |
| Laboratory practises                          | Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. Special spaces are developed with specialized equipment (scientific and technical laboratories, languages, etc.).                                                                                |
| Autonomous troubleshooting and / or exercises | Actividade in which problems are formulated and / or exercises related to the course. The student must develop the analysis and resolution of problems and / or exercises independently.                                                                                                                                            |
| Master Session                                | Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.                                                                                                                                                              |

## Personalized attention

| Methodologies                                 | Description |
|-----------------------------------------------|-------------|
| Laboratory practises                          |             |
| Autonomous troubleshooting and / or exercises |             |

## Assessment

|                                 | Description                                                                                                           | Qualification | Training and Learning Results |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|
| Outdoor study / field practices | (*)No exame de laboratorio integraranse os coñecementos adquiridos nas saídas de campo.<br>Avalíase a competencia B20 | 5             | D20                           |

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |                  |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------------------|
| Laboratory practises                          | (*)Farase unha avaliación continua ó alumnado das actividades plantexadas nas clases prácticas. Ó final do curso o alumnado deberá entregar unha memoria final e/ou realizar unha proba sobre identificación de distintos pliegos de especies forestais. Avalíanse as competencias A10,A18,A20                                                                                                                                                      | 20 | B8<br>B14<br>B16 |
| Autonomous troubleshooting and / or exercises | (*)No exame da sesión magistral integraranse os coñecementos adquiridos coa resolución de problemas dun xeito autónomo. Ó final do curso o alumnado deberá entregar un herbario formado, principalmente, polas especies forestais tratadas na parte teórica e/ou un traballo bibliográfico ou de investigación. Estes coñecementos poderán integrarse no exame de laboratorio ou valorarse dun xeito independente Avalíanse as competencias A68,B20 | 5  | C15 D20          |
| Master Session                                | (*)Proba con preguntas tipo test, de resposta curta e de resposta longa; o alumnado deberá demostrar os coñecementos adquiridos. Avalían-se as competencias A2,A8,A68                                                                                                                                                                                                                                                                               | 70 | B1 C15<br>B6     |

## Other comments on the Evaluation

### Sources of information

#### Basic Bibliography

#### Complementary Bibliography

Díaz González T. E., Fernández-Carvajal M. C., Fernández Prieto J. A., **Curso de Botánica**, Ed. Trea, Oviedo, Izco J. (coord.), **Botánica**, Ed. McGraw- Hill. Interamericana, Madrid., Nabors M.W., **Introducción a la Botánica**, Ed. Pearson, Madrid., Strasburger, E., **Tratado de Botánica**, Ed. Omega, Barcelona, Blanco Castro, E. et al., **Los Bosques Ibéricos. Una interpretación Geobotánica.**, Ed. Planeta, Barcelona, Castro, M.; Prunell, A. & Blanco-Dios, J., **Guía das árbores autóctonas e ornamentais de Galicia.**, Ed. Xerais, Vigo, Castroviejo, S. (coord.), **Flora iberica: Plantas vasculares de la Península Ibérica e Islas Baleares.**, Real Jardín Botánico, C.S.I.C. Madrid, García, X.R., **Guía das plantas de Galicia**, Ed. Xerais, Vigo, López González, G., **Guía de los árboles y arbustos de la península Ibérica y Baleares**, Mundi-Prensa Libros, Carrión, J.S., **Evolución vegetal**, DM, Niño Ricoi, H., **Guía das árbores de Galicia**, Bahía, Polunin, O. & Smythies, B.E., **Guía de campo de las flores de España, Portugal y Sudoeste de Francia**, Omega,

### Recommendations

#### Subjects that continue the syllabus

Biology: Plant Biology/P03G370V01201  
Forestry Ecology/P03G370V01402

| IDENTIFYING DATA                            |                                                                                                                                                                                 |           |      |            |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| Electrotechnology and rural electrification |                                                                                                                                                                                 |           |      |            |
| Subject                                     | Electrotechnology and rural electrification                                                                                                                                     |           |      |            |
| Code                                        | P03G370V01304                                                                                                                                                                   |           |      |            |
| Study programme                             | (*)Grao en Enxeñaría Forestal                                                                                                                                                   |           |      |            |
| Descriptors                                 | ECTS Credits                                                                                                                                                                    | Choose    | Year | Quadmester |
|                                             | 6                                                                                                                                                                               | Mandatory | 2nd  | 1st        |
| Teaching language                           | Spanish<br>Galician                                                                                                                                                             |           |      |            |
| Department                                  |                                                                                                                                                                                 |           |      |            |
| Coordinator                                 | Moldes Eiroa, Ángel                                                                                                                                                             |           |      |            |
| Lecturers                                   | Moldes Eiroa, Ángel                                                                                                                                                             |           |      |            |
| E-mail                                      | angelmoldes@uvigo.es                                                                                                                                                            |           |      |            |
| Web                                         |                                                                                                                                                                                 |           |      |            |
| General description                         | (*)Se estudiarán los principios de funcionamiento de la electricidad y los circuitos eléctricos, así como los componentes, el diseño y el cálculo de una instalación eléctrica. |           |      |            |

| Competencies |                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                  |
| B28          | CG-28: Coñecementos das seguintes materias necesarios tanto para a xestión dos sistemas forestais como para a súa conservación: electrificación. |
| C14          | (*)CE-14: Capacidade para coñecer, comprender e utilizar os principios de: electrotecnia e electrificación forestais.                            |

| Learning outcomes                                                  |                               |     |
|--------------------------------------------------------------------|-------------------------------|-----|
| Expected results from this subject                                 | Training and Learning Results |     |
| (*)                                                                | B28                           | C14 |
| (*) Coñecer o réxime de impugnación das actuacións administrativas |                               |     |

| Contents                                    |
|---------------------------------------------|
| Topic                                       |
| INTRODUCTION AND AXIOMS                     |
| CIRCUITS OF CONTINUOUS CURRENT              |
| CIRCUITS OF ALTERNATES CURRENT              |
| TRIFÁSIC SYSTEMS BALANCED                   |
| OPERATION OF THE NATIONAL ELECTRICAL SYSTEM |
| ELEMENTS OF AN ELECTRICAL SYSTEM            |
| CALCULATION OF ELECTRICAL INSTALLATIONS     |
| ELECTRONIC REGULATION FOR LOW TENSION       |

| Planning                           |             |                             |             |
|------------------------------------|-------------|-----------------------------|-------------|
|                                    | Class hours | Hours outside the classroom | Total hours |
| Master Session                     | 16          | 16                          | 32          |
| Troubleshooting and / or exercises | 16          | 48                          | 64          |
| Laboratory practises               | 16          | 0                           | 16          |
| Practice in computer rooms         | 12          | 18                          | 30          |
| Troubleshooting and / or exercises | 3           | 0                           | 3           |
| Short answer tests                 | 1           | 0                           | 1           |
| Jobs and projects                  | 4           | 0                           | 4           |

\*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                     | EXHIBITION BY PART OF The PROFESSOR OF The THEORETICAL BASES OF The ASSIGN#PUT |
| Troubleshooting and / or exercises | FORMULATION And RESOLUTION OF PROBLEMS RELACIONED WITH The ASSIGN#PUT          |
| Laboratory practises               | ACTIVITIES OF APPLICATION OF KNOWLEDGES IN SPACES WITH SPECIALIZED EQUIPMENT   |
| Practice in computer rooms         | ACTIVITIES OF APPLICATION OF KNOWLEDGES IN CLASSROOM OF COMPUTING              |

| <b>Personalized attention</b>      |                    |
|------------------------------------|--------------------|
| <b>Methodologies</b>               | <b>Description</b> |
| Master Session                     |                    |
| Troubleshooting and / or exercises |                    |
| Practice in computer rooms         |                    |
| Laboratory practises               |                    |

| <b>Assessment</b>                  |                                                                                                        |               |                               |     |
|------------------------------------|--------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-----|
|                                    | Description                                                                                            | Qualification | Training and Learning Results |     |
| Laboratory practises               | EVALUATED BY MEANS OF IT DELIVERS OF A MEMORY WITH THE RESULTED NUMERICAL OBTAINED IN THE PRACTICAL    | 10            | B28                           | C14 |
| Troubleshooting and / or exercises | EVALUATED BY MEANS OF THE FORMULATION OF PROBLEMS THAT THE STUDENT WILL OWE TO ANSWER OF FORM WRITTEN  | 40            | B28                           | C14 |
| Short answer tests                 | EVALUATED BY MEANS OF THE FORMULATION OF QUESTIONS THAT THE STUDENT WILL OWE TO ANSWER OF FORM WRITTEN | 20            | B28                           | C14 |
| Jobs and projects                  | EVALUATED THE QUALITY OF ONE PROJECT OF ELECTRIC INSTALLATION CALCULATED POLE STUDENT                  | 30            | B28                           | C14 |

#### **Other comments on the Evaluation**

#### **Sources of information**

##### **Basic Bibliography**

##### **Complementary Bibliography**

PARRA, PEREZ, PASTOR, ORTEGA, **TEORÍA DE CIRCUITOS**, 2003,  
 GONZÁLEZ, GARRIDO, CIDRÁS, **EJERCICIOS RESUELTOS DE CIRCUITOS ELÉCTRICOS**, 1999,  
 SPITTA, **INSTALACIONES ELÉCTRICAS**, 1980,  
 MINISTERIO CIENCIA Y TECNOLOGÍA, **R.D. 842/2002 REGLAMENTO ELECTROTÉCNICO PARA BAJA TENSIÓN**, 2002,  
 MINISTERIO CIENCIA Y TECNOLOGÍA, **R.D.223/2008 REGLAMENTO DE LÍNEAS ELÉCTRICAS DE ALTA TENSIÓN**, 2008,  
 MINISTERIO CIENCIA Y TECNOLOGÍA, **R.D.337/2014 REGLAMENTO SOBRE CONDICIONES TÉCNICAS Y GARANTÍAS DE SEGURIDAD EN INSTALACIONES ELÉCTRICAS DE ALTA TENSIÓN**, 2014,

#### **Recommendations**

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

Physics: Physics I/P03G370V01102  
 Physics: Physics II/P03G370V01202  
 Mathematics: Overview of mathematics/P03G370V01203  
 Mathematics: Mathematics and IT/P03G370V01103



| IDENTIFYING DATA              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |      |            |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| Forest entomology and Zoology |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |      |            |
| Subject                       | Forest entomology and Zoology                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Code                          | P03G370V01305                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Study programme               | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Descriptors                   | ECTS Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Choose    | Year | Quadmester |
|                               | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Mandatory | 2nd  | 1st        |
| Teaching language             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |      |            |
| Department                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |      |            |
| Coordinator                   | Paz Bermudez, Maria Graciela                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |      |            |
| Lecturers                     | López de Silanes Vázquez, María Eugenia<br>Paz Bermudez, Maria Graciela<br>Souto Otero, José Carlos                                                                                                                                                                                                                                                                                                                                                                         |           |      |            |
| E-mail                        | graciela@uvigo.es                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |      |            |
| Web                           | <a href="http://http://faitic.uvigo.es/index.php/es/">http://http://faitic.uvigo.es/index.php/es/</a>                                                                                                                                                                                                                                                                                                                                                                       |           |      |            |
| General description           | (*)Esta materia ensina ó alumnado os fundamentos de zooloxía, con énfase nas especies máis comúns nos nosos bosques. Dada a gran importancia da entomoloxía no medio forestal, unha parte importante da materia adicarase a esta disciplina. Finalmente, outro bloque de temas centrarase en xenética, especialmente na de poboacións, co fin de que o alumno poida adquirir uns coñecementos fundamentais para comprende-la dinámica e a evolución das poboacións animais. |           |      |            |

| Competencies |                                                                                                                                                                    |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                                    |
| B1           | CG-01: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Biolóxicos.                                |
| B6           | CG-06: Capacidade para identificar os diferentes elementos: elementos bióticos.                                                                                    |
| B8           | CG-08: Capacidade para identificar os diferentes elementos: recursos naturais renovables susceptibles de protección, conservación e aproveitamento.                |
| B16          | CG-16: Capacidade para o uso das técnicas de conservación da biodiversidade.                                                                                       |
| C13          | (*)CE-13: Capacidade para coñecer, comprender e utilizar os principios de: zooloxía e entomoloxía forestais; fundamentos biolóxicos do ámbito animal na enxeñaría. |
| D20          | (*)CBS 8: Sensibilidade cara a temas ambientais.                                                                                                                   |

| Learning outcomes                  |                               |     |     |
|------------------------------------|-------------------------------|-----|-----|
| Expected results from this subject | Training and Learning Results |     |     |
| (*)                                | B1<br>B6<br>B8<br>B16         | C13 | D20 |

| Contents                 |                                                                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                    |                                                                                                                                                                                                      |
| I. General zoology       | 1. Introduction to the zoology<br>2. Structure of the animal cells<br>3. The cellular division<br>4. The fabrics                                                                                     |
| II. Genetic              | 1. Introduction to the mendelism<br>2. Nature of the hereditary material<br>3. Genetic structure of the populations<br>4. Changes of the genic frequencies<br>5. The continuous variation            |
| III. Descriptive zoology | 1. General characters of the invertebrates<br>2. Entomology. Characteristic and importance of the insects<br>3. Cordados. Introduction to fishes, amphibious and reptilian<br>4. Birds and mammalian |

| Planning                           |             |                             |             |
|------------------------------------|-------------|-----------------------------|-------------|
|                                    | Class hours | Hours outside the classroom | Total hours |
| Master Session                     | 32          | 48                          | 80          |
| Laboratory practises               | 16          | 26                          | 42          |
| Troubleshooting and / or exercises | 4           | 24                          | 28          |

\*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                     | Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.                                                                                                                                                                             |
| Laboratory practises               | Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. Special spaces are developed with specialized equipment (scientific and technical laboratories, languages, etc.).                                                                                               |
| Troubleshooting and / or exercises | Activity which formulated problem and / or exercises related to the course. The student should develop appropriate solutions or right through the exercise routines, application of formulas or algorithms, application processing procedures available information and interpretation of the results. It is often used to complement the lecture. |

| Personalized attention |             |
|------------------------|-------------|
| Methodologies          | Description |
| Master Session         |             |
| Laboratory practises   |             |

| Assessment                         |                                                                                                          |               |                               |     |     |
|------------------------------------|----------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-----|-----|
|                                    | Description                                                                                              | Qualification | Training and Learning Results |     |     |
| Master Session                     | (*)1.-Probas de tipo test<br>2.-Probas de respuesta corta<br>3.-Probas de respuesta larga, de desarrollo | 75            | B1<br>B6<br>B8<br>B16         | C13 | D20 |
| Laboratory practises               | (*)Informes/memorias de prácticas e/ou examen práctico                                                   | 20            | B6<br>B8<br>B16               | C13 | D20 |
| Troubleshooting and / or exercises | (*)                                                                                                      | 5             | B16                           |     |     |

#### Other comments on the Evaluation

| Sources of information                                                                                             |
|--------------------------------------------------------------------------------------------------------------------|
| <b>Basic Bibliography</b>                                                                                          |
| <b>Complementary Bibliography</b>                                                                                  |
| Davies RG, <b>Introducción a la entomología</b> , 1989,                                                            |
| Falconer DS, Mackay TFC, <b>Introducción a la genética cuantitativa</b> , 1996,                                    |
| Hickman CP, Roberts LS, Keen S, Larson A, l'Anson H, Eisenhour D, <b>Principios integrales de zoología</b> , 2009, |
| Paniagua R (coordinador), <b>Citología e histología vegetal y animal</b> , 2007,                                   |
| Barrientos JA (ed), <b>Curso práctico de entomología</b> , 2004,                                                   |
| Carlos de Liñán Vicente (coord), <b>Entomología agroforestal</b> , 1998,                                           |
| Chinery, M., <b>Guía de campo de los insectos de España y de Europa</b> , 2005,                                    |

| Recommendations                                                 |
|-----------------------------------------------------------------|
| <b>Subjects that are recommended to be taken simultaneously</b> |
| Forestry Ecology/P03G370V01402                                  |
| Mathematics: Statistics/P03G370V01301                           |

| IDENTIFYING DATA    |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| <b>Forestry</b>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Subject             | Forestry                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |      |            |
| Code                | P03G370V01401                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Choose    | Year | Quadmester |
|                     | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Mandatory | 2nd  | 2nd        |
| Teaching language   |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Department          |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Coordinator         | Picos Martín, Juan                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |      |            |
| Lecturers           | Picos Martín, Juan                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |      |            |
| E-mail              | jpicos@uvigo.es                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |      |            |
| Web                 | http://silvicultor.blogspot.com/                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| General description | <p>The general aims of the *asignatura are:</p> <p>to) Know the bases, object and foundations of the *Selvicultura</p> <p>*b) Know the foundations of the *Selvicultura Static</p> <p>*c) Know the foundations of the *Selvicultura Dynamic</p> <p>*d) Know the cultural characters of the forest species</p> <p>and) That the professional future was able to analyse and interpret the mountain to be able to propose suitable treatments in each case.</p> |           |      |            |

| Competencies |                                                                                                                                                     |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                     |
| B6           | CG-06: Capacidade para identificar os diferentes elementos: elementos bióticos.                                                                     |
| B7           | CG-07: Capacidade para identificar os diferentes elementos: elementos físicos.                                                                      |
| B8           | CG-08: Capacidade para identificar os diferentes elementos: recursos naturais renovables susceptibles de protección, conservación e aproveitamento. |
| B9           | CG-09: Capacidade para analizar a estrutura e función ecolóxica dos sistemas e recursos forestais, incluíndo as paisaxes.                           |
| B22          | CG-22: Capacidade para aplicar e desenvolver as técnicas selvícolas e de manexo de todo tipo de sistemas forestais, parques e áreas recreativas.    |
| C17          | (*)CE-17: Capacidade para coñecer, comprender e utilizar os principios de: silvicultura.                                                            |
| D1           | (*)CBI 1: Capacidade de análise e síntese.                                                                                                          |
| D5           | (*)CBI 5: Capacidade de xestión da información.                                                                                                     |
| D6           | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                           |
| D7           | (*)CBI 7: Adquirir capacidade na toma de decisións.                                                                                                 |
| D11          | (*)CBP 4: Habilidades de razoamento crítico.                                                                                                        |
| D13          | (*)CBS 1: Aprendizaxe autónoma.                                                                                                                     |
| D14          | (*)CBS 2: Adaptación a novas situacións.                                                                                                            |
| D15          | (*)CBS 3: Creatividade.                                                                                                                             |

| Learning outcomes                                                                                             |                               |     |     |
|---------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|
| Expected results from this subject                                                                            | Training and Learning Results |     |     |
| CONSULT TABLE *ASIGNACIO *CN RESULTED LEARNING And COMPETITIONS BY MATTER IN                                  | B6                            | C17 | D1  |
| http://forestales.uvigo.es/sites/default/files/cv%20*Armesto_0.Pdf#*overlay-*context=is/*content/*profesorado | B7                            |     | D5  |
|                                                                                                               | B8                            |     | D6  |
|                                                                                                               | B9                            |     | D7  |
|                                                                                                               | B22                           |     | D11 |
|                                                                                                               |                               |     | D13 |
|                                                                                                               |                               |     | D14 |
|                                                                                                               |                               |     | D15 |
| New                                                                                                           |                               |     |     |

| Contents                                      |                                    |
|-----------------------------------------------|------------------------------------|
| Topic                                         |                                    |
| Subject I.- Concept and bases of the forestry | 1. Concept and classes of forestry |
|                                               | 2. Static study of masses          |

## Subject II.- Forestry treatments

3. Dynamic study of the masses.
4. Influence of the ecological factors.
5. Classification of the forestry treatments.
6. Short to fact
7. Short by aclareo successive uniform
8. Short by entresaca
9. Complementary treatments, partial and derivative.
10. Treatments of low mountain and m.Half.
11. Transitory treatments
12. Forestry And defence of the mountain

Subject III.- Main cultural characters  
Forest species

13. Description of the cultural characters of the main forest species

**Planning**

|                                                          | Class hours | Hours outside the classroom | Total hours |
|----------------------------------------------------------|-------------|-----------------------------|-------------|
| Master Session                                           | 25.5        | 47.5                        | 73          |
| Troubleshooting and / or exercises                       | 8           | 14                          | 22          |
| Outdoor study / field practices                          | 8           | 8                           | 16          |
| Integrated methodologies                                 | 1           | 11.5                        | 12.5        |
| Case studies / analysis of situations                    | 10.5        | 14                          | 24.5        |
| Multiple choice tests                                    | 0.5         | 0                           | 0.5         |
| Short answer tests                                       | 0.5         | 0                           | 0.5         |
| Practical tests, real task execution and / or simulated. | 1           | 0                           | 1           |

\*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                        | Masterclasses in classroom                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Troubleshooting and / or exercises    | Resolution of problems and/or exercises in classroom, laboratory or in field.                                                                                                                                                                                                                                                                                                                                                                                           |
| Outdoor study / field practices       | Visit to mountains and forestry works.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Integrated methodologies              | <ul style="list-style-type: none"> <li>- Organization of seminars or specific conferences</li> <li>- Presentations/exhibitions: oral Exhibition by part of the students of a concrete subject or of a work (generally previous presentation written).</li> <li>- Multimedia sessions: Employment of videographyc material / on-line on appearances of the subject.</li> <li>- Days of study of appearances previously studied/analysed in the exits of field</li> </ul> |
| Case studies / analysis of situations | - Study of cases/analysis of situations or discussion directed: Formulation, analysis, resolution and debate of a problem or exercise related with the thematic of the subject.                                                                                                                                                                                                                                                                                         |

**Personalized attention**

| Methodologies                         | Description |
|---------------------------------------|-------------|
| Case studies / analysis of situations |             |
| Troubleshooting and / or exercises    |             |
| Outdoor study / field practices       |             |

**Assessment**

|                          | Description                                                                     | Qualification | Training and Learning Results |                                      |
|--------------------------|---------------------------------------------------------------------------------|---------------|-------------------------------|--------------------------------------|
| Master Session           | .                                                                               | 0             | B6<br>B7<br>B8<br>B9<br>B22   | C17                                  |
| Integrated methodologies | Proof written and/or *docuemnto memory summary on the activities *desarrolladas | 20            | B6<br>B7<br>B8<br>B9<br>B22   | C17<br>D1<br>D5<br>D11<br>D13<br>D15 |

|                                       |                                                                         |    |                             |     |                 |
|---------------------------------------|-------------------------------------------------------------------------|----|-----------------------------|-----|-----------------|
| Case studies / analysis of situations | Proof written and/or oral on the similar cases to the resolved in class | 20 | B6<br>B7<br>B8<br>B9<br>B22 | C17 | D1<br>D6<br>D11 |
| Multiple choice tests                 | Proof written on the teaching given in sessions *magistrales            | 30 | B6<br>B7<br>B8<br>B9<br>B22 | C17 | D11<br>D13      |
| Short answer tests                    | Proof written on the teaching given in sessions *magistrales            | 30 | B6<br>B7<br>B8<br>B9<br>B22 | C17 | D11<br>D13      |

#### Other comments on the Evaluation

To approve the matter have to surpass the common examinations and realise satisfactorily the works that \*eventualmente commission . The presence in practise and trips is compulsory. They will not save classifications of the theoretical notes, further of the announcements regulated of the academic year. The proofs of type test in the \*convocatorias of examination can have eliminatory character.

#### Sources of information

##### Basic Bibliography

##### Complementary Bibliography

Serrada, R., Montero, G. y Reque, J. Eds, **Compendio de \*Selvicultura Aplicada en España**, Madrid : Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria : Fundación Conde de, González Molina, José María, **Introducción a la selvicultura general**, León : Universidad, Secretariado de Publicaciones,

#### Recommendations

##### Subjects that continue the syllabus

Forest exploitation/P03G370V01601  
Dasometry/P03G370V01602  
Forest management/P03G370V01605  
Repopulation/P03G370V01603  
Forest and pasture management/P03G370V01704

##### Subjects that are recommended to be taken simultaneously

Botany/P03G370V01303  
Forestry Ecology/P03G370V01402

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

Biology: Plant Biology/P03G370V01201

| IDENTIFYING DATA    |                                                                                                                                                                                                                                                                    |           |      |            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| Forestry Ecology    |                                                                                                                                                                                                                                                                    |           |      |            |
| Subject             | Forestry Ecology                                                                                                                                                                                                                                                   |           |      |            |
| Code                | P03G370V01402                                                                                                                                                                                                                                                      |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                                                                      |           |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                                                                       | Choose    | Year | Quadmester |
|                     | 6                                                                                                                                                                                                                                                                  | Mandatory | 2nd  | 2nd        |
| Teaching language   | Spanish<br>Galician                                                                                                                                                                                                                                                |           |      |            |
| Department          |                                                                                                                                                                                                                                                                    |           |      |            |
| Coordinator         | Cordero Rivera, Adolfo                                                                                                                                                                                                                                             |           |      |            |
| Lecturers           | Cordero Rivera, Adolfo                                                                                                                                                                                                                                             |           |      |            |
|                     | Rivas Torres, Anaís                                                                                                                                                                                                                                                |           |      |            |
|                     | Sobrinho Garcia, Maria Cristina                                                                                                                                                                                                                                    |           |      |            |
|                     | Villamaña Rodríguez, Marina                                                                                                                                                                                                                                        |           |      |            |
| E-mail              | adolfo.cordero@uvigo.es                                                                                                                                                                                                                                            |           |      |            |
| Web                 | http://ecoevo.uvigo.es                                                                                                                                                                                                                                             |           |      |            |
| General description | (*)A Ecoloxía é a ciencia que estudia a resposta dos organismos ás variacións ambientais, dende o nivel individual ao ecosistema. Esta materia ten como obxectivos proporcionar os coñecementos básicos da Ecoloxía, con especial referencia ao ambiente forestal. |           |      |            |

### Competencies

|      |                                                                                                                                                     |  |  |  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Code |                                                                                                                                                     |  |  |  |
| B1   | CG-01: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Biolóxicos.                 |  |  |  |
| B2   | CG-02: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Físicos.                    |  |  |  |
| B3   | CG-03: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Químicos.                   |  |  |  |
| B6   | CG-06: Capacidade para identificar os diferentes elementos: elementos bióticos.                                                                     |  |  |  |
| B7   | CG-07: Capacidade para identificar os diferentes elementos: elementos físicos.                                                                      |  |  |  |
| B8   | CG-08: Capacidade para identificar os diferentes elementos: recursos naturais renovables susceptibles de protección, conservación e aproveitamento. |  |  |  |
| B9   | CG-09: Capacidade para analizar a estrutura e función ecolóxica dos sistemas e recursos forestais, incluíndo as paisaxes.                           |  |  |  |
| B10  | CG-10: Coñecemento dos procesos de degradación que afecten aos sistemas e recursos forestais: contaminación.                                        |  |  |  |
| B11  | CG-11: Coñecemento dos procesos de degradación que afecten aos sistemas e recursos forestais: pragas.                                               |  |  |  |
| B13  | CG-13: Coñecemento dos procesos de degradación que afecten aos sistemas e recursos forestais en xeral.                                              |  |  |  |
| B16  | CG-16: Capacidade para o uso das técnicas de conservación da biodiversidade.                                                                        |  |  |  |
| B17  | CG-17: Capacidade para avaliar e corrixir o impacto ambiental.                                                                                      |  |  |  |
| C12  | (*)CE-12: Capacidade para coñecer, comprender e utilizar os principios de: ecoloxía forestal                                                        |  |  |  |
| D1   | (*)CBI 1: Capacidade de análise e síntese.                                                                                                          |  |  |  |
| D6   | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                           |  |  |  |
| D15  | (*)CBS 3: Creatividade.                                                                                                                             |  |  |  |
| D20  | (*)CBS 8: Sensibilidade cara a temas ambientais.                                                                                                    |  |  |  |

### Learning outcomes

| Expected results from this subject                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Training and Learning Results |     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|
| CE12: Capacity to know, understand and use the principles of Ecology in Forestry. Capacity to know, understand and use the concept of ecosystem. CE03 Ability to understand and apply the evolutionary theory in forest management. CE04 Ability to know and develop demographic analyses in Forestry. CE05 Ability to identify and use ecological interactions in the analysis of forest ecosystems. CE06 Capacity to know, understand and maintain biological diversity in exploited forest ecosystems. CE07 Capacity to develop analyses of energy and matter fluxes in forest ecosystems. CE08 Ability to understand the implications of ecological succession in the management of forest ecosystems. CE09 Ability to know, analyse and control the negative effects of pollution on forest ecosystems. CE10 Ability to know, understand and use ecological principles in the exploitation of populations and control of forest pests. CE11 Capacity to know, understand and use basic principles of conservation biology on the management of forest ecosystems | B1                            | C12 | D1  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B2                            |     | D6  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B3                            |     | D15 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B6                            |     | D20 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B7                            |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B8                            |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B9                            |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B10                           |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B11                           |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B13                           |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B16                           |     |     |
| New                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | B17                           |     |     |

### Contents

Topic

|                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0. ORGANIZATION DO COURSE. FORESTS AND FOREST PLANTATIONS.                             | Development of the subject. Techniques of evaluation of the student: objectives and methods. Forests and plantations: differences and similitudes. The principles of Forest Ecology.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| SECTION I.<br>1. INTRODUCTION TO ECOLOGY.                                              | The concept of sustainability. The demographical problem (implications of human growth population on natural resources). Introduction to Ecology. Levels of biological organization and subdivisions of Ecology. The concept of ecosystem. Forest Ecology and the principle of determinism. The scientific method. Introduction to ecological economics (National accounting and the loss of natural resources. The ecospace and the ecological footprint). Ecology and environmentalism.                                                                                                                                                                                                           |
| SECTION II. THE ENVIRONMENT.<br>2. THE MATCH BETWEEN ORGANISMS AND THE ENVIRONMENT.    | Genotypic and phenotypic variation. Natural selection. Ecotypes. Concept of resource and ecological factor. Ecological effects of solar radiation (Photosynthesis, index of foliar surface, morphology, shadow tolerance, photoperiodism). The temperature and the organisms (Q10, diapause, physiological time, effects on plants, adaptations of plants to unfavourable temperatures). Atmospheric humidity and vegetal adaptations. Effects of the wind on vegetation (dissemination of reproductive propagules, physiological effects, morphological effects). Adaptations to fire.                                                                                                             |
| 3. FOREST IMPLICATIONS OF BIOLOGICAL ADAPTATION.                                       | Implications of evolutionary concepts in the exploitation of forests. Importance of the factor light in forestry. Importance of the factor temperature in forestry. Importance of water in forestry. Importance of the wind in forestry.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| SECTION III. ECOLOGY OF POPULATIONS.<br>4. DEMOGRAPHY.                                 | Concept of population. Unitary and modular organisms. Construction and analysis of life tables. Survivorship curves. Age pyramids. Populational growth (geometrical growth, mathematical models, intrinsic rate of growth, innate capacity of increase). Populational growth and intraspecific competition: concept of carrying capacity. Analysis of key factors.                                                                                                                                                                                                                                                                                                                                  |
| 5. INTERACTIONS (I): COMPETITION AND PREDATION.                                        | Theory of niche: concept, multidimensional approach. The relationship between niche and habitat. Type of interactions between organisms. Intraspecific competition (exploitation, interference, densodependency, population regulation, asymmetry). Allelopathy. Interspecific competition (logistical model, model of Tilman). Principle of competitive exclusion. Character displacement. Type of predators. Model of Lotka-Volterra. Examples in the laboratory and the field. Strategies in the search of food. Functional responses. Coevolution prey-predator. Mechanisms of defence of the prey (physical defences, chemical, crypsis, aposematism, mimicry). Interaction herbivores-plants. |
| 6. INTERACTIONS (II): MUTUALISM AND DETRITIVORY.                                       | Concept of mutualism. Types of mutualism (behaviour, care, polinización, intestinal, symbiosis, mycorrhizas). Lichens. Leguminous plants and Rhizobium. Decomposers: Bacteria and fungi. Soil detritivores (earthworms, insects). Aquatic detritivores. Relative role of microflora and detritivores. Interactions detritivore-resource (vegetal detritus, faeces, carrion).                                                                                                                                                                                                                                                                                                                        |
| SECTION IV. ESTRUCTURA AND ORGANIZATION OF ECOSYSTEMS.<br>7. THE BIOLOGICAL COMMUNITY. | Concept. Characteristics of the community. Physical structure (stratification, forms of growth, biomass). Seasonality (Temperate zones, tropical zones). Concept of ecotone (effect of border, ecotones between forests and grasslands). Concept of guild.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 8. DIVERSITY IN FOREST ECOSYSTEMS.                                                     | Concept and type of diversity. Why preserve biodiversity? The measure of the biodiversity (index of Shannon, rank-abundance plots). Latitudinal gradient of biodiversity. Main forest activities and their effect on biodiversity. Techniques for maintaining biodiversity in forest plantations. Principles of eco-forestry.                                                                                                                                                                                                                                                                                                                                                                       |
| 9. PRIMARY PRODUCTIVITY.                                                               | Production and respiration (biomass, net and gross production). Type of photosynthesis (plants C3, C4 and CAM). Methods to measure primary productivity. Quimiosynthesis. Limiting factors of primary productivity (terrestrial and aquatic communities). Relation Productivity:Biomass in natural ecosystems. The productivity of forest ecosystems (factors that affect forest NPP; NPP of forests and monocultures).                                                                                                                                                                                                                                                                             |
| 10. FLOW OF ENERGY.                                                                    | Thermodynamics. Trophic levels. Trophic chains and nets. Ecological pyramids. Diagramas of flow of energy. Storage and dynamic of the energy in ecosystems. Effects of the exploitation of forests in the flow of energy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 11. CYCLES DE MATTER.                                                                  | Circulation of the matter. Biogeochemical cycles (P, N, S, C, the greenhouse effect). Cycles of elements in forest ecosystems (effect of the age of the trees, of the type of ecosystem, of the type of tree, effects over production, additions and losses of nutrients, effects of the extraction of wood on long-term productivity).                                                                                                                                                                                                                                                                                                                                                             |

|                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. THE ECOLOGICAL SUCCESSION.                                                                        | The succession (primary/secondary, alogenic/autogenic/biogenic, degradative). Hypothesis on succession and the concept of climax. Mechanisms behind succession (colonization, alteration of the environment, species displacement). Successional models (Horn, Tilman). Changes in the functioning of the ecosystems during the succession. Examples of successions (abandoned fields, cyclic succession). Importance of the succession in the exploitation of the forests. |
| SECTION V. APPLIED ECOLOGY.<br>13. POLLUTION.                                                         | Definition. Types of pollutants. The acid rain (effects of the sulphur compounds on plants and animals: the decline of forest ecosystems). The hole in the layer of ozone. Noise. Water pollution. Bioindicators of water quality. Eutrophication (Causes, recovery of eutrophic lakes).                                                                                                                                                                                    |
| 14. EXPLOITATION AND CONTROL OF POPULATIONS.                                                          | Concept of maximum sustainable yield. Models of exploitation (fixed quota). Principles about the exploitation of populations (regulation of the effort of exploitation, instability, exploitation of a percentage, dynamic models). The exploitation of the forests. Techniques of pest control (aims, chemical control, biological control, genetic control, integrated control).                                                                                          |
| 15. BASIC PRINCIPLES OF CONSERVATION BIOLOGY.                                                         | The number of species that inhabit the planet. The value of the species and ecosystems (intrinsic, instrumental, peculiarity). Processes and causes of extinction (historic extinctions, antropic effects). Management of ecosystems. Social, economic and political factors.                                                                                                                                                                                               |
| 16. INTRODUCCIÓN TO THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA).                                        | Fundamentals, terminology and definitions. Objectives of the EIA. Phases of the EIA. Methods and models to define the relation cause-effect.                                                                                                                                                                                                                                                                                                                                |
| Practicals in the classroom.<br>1. METHODS IN FIELD ECOLOGY: mobile populations.                      | Methods and devices of sampling (devices for air, plants, soil, and water sampling). Methods of mark-recapture (index of Lincoln, method of Jolly). Relative estimates (selective predation, progressive predation, captures by unity of effort).                                                                                                                                                                                                                           |
| Practicals in the classroom.<br>2. METHODS DE WORK EN ECOLOGY DE FIELD: sessile populations.          | Quadrats. Transects. Linear interception. Punctual interception. Method of the quadrats centered in a point. Spatial distribution (patterns of distribution). Experiment: sampling of a simulated community of plants.                                                                                                                                                                                                                                                      |
| Practicals in the computer room.<br>3. ECOLOGICAL IMPORTANCE OF BODY SIZE: ALLOMETRY.                 | Variability of body size in different types of organisms. Concept of allometry. Types of allometry. Examples. Study of problems to determine of the existence of allometry.                                                                                                                                                                                                                                                                                                 |
| Practicals in the laboratory.<br>4. METHODS DE DETERMINATION OF AGE.                                  | Methods of determination of the age in different type of organisms. Growth of the organisms. Experiment: studio of the growth in different tree species.                                                                                                                                                                                                                                                                                                                    |
| (*)Práctica de laboratorio.<br>5. METABOLISMO MICROBIANO                                              | (*)Utilización do método Winkler para a determinación da actividade fotosintética e respiratoria                                                                                                                                                                                                                                                                                                                                                                            |
| Field practicals. 1. Forest pests.                                                                    | Density of <i>Gonipterus scutellatus</i> on <i>Eucalyptus</i> , and biological control by means of its parasitoid <i>Anaphes nitens</i> .                                                                                                                                                                                                                                                                                                                                   |
| Field practices. 2. Estimation of water quality in the river Almofrei by means of biological methods. | The use of bioindicators to study river water quality.                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Planning

|                                    | Class hours | Hours outside the classroom | Total hours |
|------------------------------------|-------------|-----------------------------|-------------|
| Master Session                     | 30          | 45                          | 75          |
| Outdoor study / field practices    | 9.8         | 14.7                        | 24.5        |
| Laboratory practises               | 9           | 13.5                        | 22.5        |
| Classroom work                     | 7           | 10.5                        | 17.5        |
| Practice in computer rooms         | 3           | 4.5                         | 7.5         |
| Short answer tests                 | 2           | 0                           | 2           |
| Troubleshooting and / or exercises | 1           | 0                           | 1           |

\*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                  | Class room lectures.                                   |
| Outdoor study / field practices | Field work in forest ecosystems                        |
| Laboratory practises            | Laboratory practical lectures                          |
| Classroom work                  | Class room work                                        |
| Practice in computer rooms      | Simulations of ecological systems in the computer room |

## Personalized attention



| Methodologies                   |                                                                                     | Description   |                                                  |     |                 |
|---------------------------------|-------------------------------------------------------------------------------------|---------------|--------------------------------------------------|-----|-----------------|
| Master Session                  |                                                                                     |               |                                                  |     |                 |
|                                 |                                                                                     |               |                                                  |     |                 |
| Assessment                      |                                                                                     |               |                                                  |     |                 |
|                                 | Description                                                                         | Qualification | Training and Learning Results                    |     |                 |
| Master Session                  | A final written examination will be used to evaluate the work done over the course. | 70            | B1<br>B6<br>B8<br>B9<br>B10<br>B11<br>B13<br>B16 | C12 | D1<br>D6<br>D20 |
| Outdoor study / field practices | (*)Avaliarase no exame escrito da materia                                           | 8             | B1<br>B6<br>B8<br>B9<br>B10<br>B11<br>B13<br>B16 | C12 | D20             |
| Laboratory practises            | (*)Avaliarase no exame escrito da materia                                           | 6             | B1<br>B6<br>B8<br>B9<br>B10<br>B11<br>B13<br>B16 | C12 | D6              |
| Classroom work                  | (*)Avaliarase no exame escrito da materia                                           | 10            | B1<br>B6<br>B8<br>B9<br>B10<br>B11<br>B13<br>B16 | C12 | D6              |
| Practice in computer rooms      | (*)Avaliarase no exame escrito da materia                                           | 6             | B1<br>B6<br>B8<br>B9<br>B10<br>B11<br>B13<br>B16 | C12 | D6              |

#### Other comments on the Evaluation

#### Sources of information

##### Basic Bibliography

##### Complementary Bibliography

Kimmins, J. P., **Forest Ecology**, 2,

Sevilla Martínez, F., **Una teoría ecológica para los montes Ibéricos**,

Cordero Rivera, A. (editor), **Proxecto Galicia: Ecoloxía**, vol. 44,

Terradas, J., **Ecología de la Vegetación**,

Molles, M.C., **Ecology: concepts and applications**, 6 (only until 4th edition available on the Library),

Barnes, B. V., Zak, D. R., Denton, S. R. & Spurr, S. H., **Forest Ecology**, 4,

Begon, M., Harper, J. L. & Townsend, C. R., **Ecología**,

Rico Boquete, E., **Política Forestal e Repoboacións En Galicia. 1941-1971**,

#### Recommendations

##### Subjects that continue the syllabus

Management of protected areas and biodiversity/P03G370V01801

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

---

Botany/P03G370V01303

Edaphology/P03G370V01302

Mathematics: Statistics/P03G370V01301

Forest entomology and Zoology/P03G370V01305

---

**IDENTIFYING DATA****Topography, remote sensing and geographic information systems**

|                     |                                                                                                                                                                                                                                                                                            |           |      |            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| Subject             | Topography, remote sensing and geographic information systems                                                                                                                                                                                                                              |           |      |            |
| Code                | P03G370V01403                                                                                                                                                                                                                                                                              |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                                                                                              |           |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                                                                                               | Choose    | Year | Quadmester |
|                     | 9                                                                                                                                                                                                                                                                                          | Mandatory | 2nd  | 2nd        |
| Teaching language   |                                                                                                                                                                                                                                                                                            |           |      |            |
| Department          |                                                                                                                                                                                                                                                                                            |           |      |            |
| Coordinator         | Lorenzo Cimadevila, Henrique                                                                                                                                                                                                                                                               |           |      |            |
| Lecturers           | Lorenzo Cimadevila, Henrique                                                                                                                                                                                                                                                               |           |      |            |
| E-mail              | hlorenzo@uvigo.es                                                                                                                                                                                                                                                                          |           |      |            |
| Web                 | <a href="http://fatic.uvigo.es/">http://fatic.uvigo.es/</a>                                                                                                                                                                                                                                |           |      |            |
| General description | (*)Trátase dunha materia que versa sobre os instrumentos e métodos utilizados para a realización de medición de precisión sobre o terreo e a súa representación a escala. Se abordan tamén as novas metodoloxías de adquisición e xestión de datos espaciais mediante SIX e Teledetección. |           |      |            |

**Competencies**

|      |                                                                                                                                                                                                                      |  |  |  |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Code |                                                                                                                                                                                                                      |  |  |  |
| B5   | CG-05: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Dos sistemas de representación.                                                              |  |  |  |
| B7   | CG-07: Capacidade para identificar os diferentes elementos: elementos físicos.                                                                                                                                       |  |  |  |
| B21  | (*)CG-21: Capacidade para medir, inventariar e avaliar os recursos forestais.                                                                                                                                        |  |  |  |
| B37  | CG-37: Capacidade para redactar informes técnicos.                                                                                                                                                                   |  |  |  |
| B39  | CG-39: Capacidade para redactar valoracións.                                                                                                                                                                         |  |  |  |
| B40  | CG-40: Capacidade para redactar peritaxes.                                                                                                                                                                           |  |  |  |
| B41  | CG-41: Capacidade para redactar taxacións.                                                                                                                                                                           |  |  |  |
| C16  | (*)CE-16: Capacidade para coñecer, comprender e utilizar os principios de: topografía e reformulacións. Sistemas de información xeográfica e teledetección. Programas informáticos de tratamento de datos espaciais. |  |  |  |
| D2   | (*)CBI 2: Capacidade de organización e planificación.                                                                                                                                                                |  |  |  |
| D4   | (*)CBI 4: Coñecementos básicos de informática.                                                                                                                                                                       |  |  |  |
| D6   | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                                                                                            |  |  |  |
| D7   | (*)CBI 7: Adquirir capacidade na toma de decisións.                                                                                                                                                                  |  |  |  |
| D8   | (*)CBP 1: Capacidades de traballo en equipo, con carácter multidisciplinar e en contextos tanto nacionais como internacionais.                                                                                       |  |  |  |
| D9   | (*)CBP 2: Habilidades nas relacións interpersoais.                                                                                                                                                                   |  |  |  |
| D13  | (*)CBS 1: Aprendizaxe autónoma.                                                                                                                                                                                      |  |  |  |
| D16  | (*)CBS 4: Liderado.                                                                                                                                                                                                  |  |  |  |

**Learning outcomes**

| Expected results from this subject | Training and Learning Results |     |     |
|------------------------------------|-------------------------------|-----|-----|
| (*)                                | B5                            | C16 | D2  |
|                                    | B7                            |     | D4  |
|                                    | B21                           |     | D6  |
|                                    | B37                           |     | D7  |
|                                    | B39                           |     | D8  |
|                                    | B40                           |     | D9  |
|                                    | B41                           |     | D13 |
|                                    |                               |     | D16 |
| New                                |                               |     |     |

**Contents**

|            |                                                                                                                                                                                              |  |  |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Topic      |                                                                                                                                                                                              |  |  |
| Topography | <ul style="list-style-type: none"> <li>- Introduction to Geodesy and Cartography</li> <li>- Instruments</li> <li>- Methods: radiation, itineraries, intersecting</li> <li>- Stake</li> </ul> |  |  |

|                                |                                                                                                                                                                                           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remote sensing                 | <ul style="list-style-type: none"> <li>- Physical fundamentals</li> <li>- Sensors and Platforms</li> <li>- Digital image processing</li> <li>- Applications</li> </ul>                    |
| Geographic information systems | <ul style="list-style-type: none"> <li>- SIX concept</li> <li>- Models and Data Structures</li> <li>- Vector GIS</li> <li>- SIG raster</li> <li>- Insert digital terrain modes</li> </ul> |

| Planning                                                 |             |                             |             |
|----------------------------------------------------------|-------------|-----------------------------|-------------|
|                                                          | Class hours | Hours outside the classroom | Total hours |
| Troubleshooting and / or exercises                       | 25          | 50                          | 75          |
| Seminars                                                 | 3           | 3                           | 6           |
| Master Session                                           | 1           | 1                           | 2           |
| Troubleshooting and / or exercises                       | 3           | 3                           | 6           |
| Laboratory practises                                     | 10          | 20                          | 30          |
| Practice in computer rooms                               | 16          | 32                          | 48          |
| Master Session                                           | 20          | 40                          | 60          |
| Short answer tests                                       | 1           | 0                           | 1           |
| Practical tests, real task execution and / or simulated. | 3           | 0                           | 3           |
| Reports / memories of practice                           | 10          | 0                           | 10          |

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

| Methodologies                      |                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | Description                                                                                                                                                                                                                                                                                                                                        |
| Troubleshooting and / or exercises | Activity which formulated problem and / or exercises related to the course. The student should develop appropriate solutions or right through the exercise routines, application of formulas or algorithms, application processing procedures available information and interpretation of the results. It is often used to complement the lecture. |
| Seminars                           | Activities focused to work on a specific topic, allowing delve or supplement the contents of the field. They can be used to supplement the lectures.                                                                                                                                                                                               |
| Master Session                     | Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.                                                                                                                                                                             |
| Troubleshooting and / or exercises | Activity which formulated problem and / or exercises related to the course. The student should develop appropriate solutions or right through the exercise routines, application of formulas or algorithms, application processing procedures available information and interpretation of the results. It is often used to complement the lecture. |
| Laboratory practises               | Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. Special spaces are developed with specialized equipment (scientific and technical laboratories, languages, etc.).                                                                                               |
| Practice in computer rooms         | Activities application of knowledge to specific situations, and the acquisition of basic skills and procedural matters related to the object of study, which are held in computer rooms.                                                                                                                                                           |
| Master Session                     | Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.                                                                                                                                                                             |

| Personalized attention             |             |
|------------------------------------|-------------|
| Methodologies                      | Description |
| Master Session                     |             |
| Troubleshooting and / or exercises |             |
| Seminars                           |             |
| Laboratory practises               |             |
| Tests                              | Description |
| Reports / memories of practice     |             |

| Assessment     |                  |               |                 |                  |
|----------------|------------------|---------------|-----------------|------------------|
|                | Description      | Qualification | Training        | Learning Results |
| Master Session | (*)Exame teórico | 20            | B5<br>B7<br>B21 | C16              |

|                                                          |                      |    |                                             |     |                                                |
|----------------------------------------------------------|----------------------|----|---------------------------------------------|-----|------------------------------------------------|
| Troubleshooting and / or exercises                       | (*)Exame práctico    | 30 | B5<br>B7                                    | C16 | D2<br>D4<br>D6<br>D13                          |
| Short answer tests                                       | (*)Proba tipo test   | 10 | B5<br>B7                                    | C16 |                                                |
| Practical tests, real task execution and / or simulated. | (*)Traballo práctico | 40 | B5<br>B7<br>B21<br>B37<br>B39<br>B40<br>B41 | C16 | D2<br>D4<br>D6<br>D7<br>D8<br>D9<br>D13<br>D16 |

---

#### Other comments on the Evaluation

---



---

#### Sources of information

---

#### Basic Bibliography

---

#### Complementary Bibliography

---



---

#### Recommendations

---

| IDENTIFYING DATA    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|
| <b>Hydraulics</b>   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| Subject             | Hydraulics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |      |            |
| Code                | P03G370V01404                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |      |            |
| Study programme     | (*)Grao en Enxeñaría Forestal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |      |            |
| Descriptors         | ECTS Credits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Choose    | Year | Quadmester |
|                     | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mandatory | 2nd  | 2nd        |
| Teaching language   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| Department          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| Coordinator         | Martínez Chamorro, Enrique José                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| Lecturers           | Martínez Chamorro, Enrique José                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |      |            |
| E-mail              | enrique.martinez.chamorro@gmail.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |      |            |
| Web                 | http://http://webs.uvigo.es/mchamorro/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |      |            |
| General description | <p>(*)1. Hidrostática. Ecuación fundamental de la hidrostática. Centro de presión. Fuerza de presión sobre superficies planas y curvas. Principio de Arquímedes.</p> <p>2. Hidrodinámica. Ecuación de continuidad. Ecuación de Bernouilli generalizada. Potencia de una máquina hidráulica. Ecuación de la cantidad de movimiento en régimen permanente.</p> <p>3. Transporte de agua en conducciones cerradas: tuberías. Pérdidas de carga continuas y singulares. Ecuación de Darcy-Weissbach. Timbraje en tuberías. Tuberías en serie y en paralelo.</p> <p>4. Régimen no estacionario de los líquidos en tuberías. Golpe de ariete. Cálculo de sobrepresiones.</p> <p>5. Diseño hidráulico en tuberías especiales para riego. Cálculo de ramales principales y laterales.</p> <p>6. Elevación e impulsión de líquidos mediante bombas hidráulicas. Curvas características. Elección de bombas.</p> <p>7. El ciclo hidrológico I: precipitación, interceptación y evapotranspiración.</p> |           |      |            |

| Competencies |                                                                                                                                                 |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Code         |                                                                                                                                                 |
| B2           | CG-02: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Físicos.                |
| B26          | CG-26: Coñecementos das seguintes materias necesarios tanto para a xestión dos sistemas forestais como para a súa conservación: hidráulica.     |
| C9           | (*)CE-09: Capacidade para coñecer, comprender e utilizar os principios de: hidráulica forestal; hidroloxía e restauración hidrolóxico-forestal. |
| D6           | (*)CBI 6: Adquirir capacidade de resolución de problemas.                                                                                       |

| Learning outcomes                  |                               |    |    |
|------------------------------------|-------------------------------|----|----|
| Expected results from this subject | Training and Learning Results |    |    |
| (*)                                | B2<br>B26                     | C9 | D6 |
| New                                |                               |    |    |

| Contents   |                                                                                                                                                                                                                                                                                                                         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic      |                                                                                                                                                                                                                                                                                                                         |
| Subject 1  | Physical properties of liquids. Concept and properties of hydrostatic pressure. Systems of measurements. Units                                                                                                                                                                                                          |
| Subject 2. | Basic equation of the hydrostatic. Hydrostatic pressure force on flat and curved surfaces. Pressure center. Archimedes' principle                                                                                                                                                                                       |
| Subject 3. | Design and calculation of dikes in forest hydrology: Forces acting. Conditions of stability. Dimensioning. Design of small dams. Concrete dams and glazed masonry                                                                                                                                                       |
| Subject 4. | Current regimes. Concepts used in the definition of movement. Flow and average speed. Continuity equation. Dynamics of perfect liquids. Equation of the amount of movement in steady state. Equation of Bernouilli. Permanent movement. Graphical representation of the Bernouilli equation. Emptying time of a deposit |
| Subject 5. | Generalized Bernouilli equation. Loss of load. Power of liquid current in a section. Extension of the Bernouilli equation to permanent real currents. Hydraulic machines: turbines and pumps. Power of a hydraulic machine.                                                                                             |

|             |                                                                                                                                                                                                                                                                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Subject 6.  | Measurement of capacity in watercourses: Landfills. Types. Classification. General equation of expenditure. Thin wall dumps. Landfills in thick wall. Flow gauging devices in forest basins.                                                                                                                                                              |
| Subject 7.  | Water transport in closed pipes. Reynolds number. Boundary layer Laminar and turbulent regimes in pipes. Continuous load losses. Darcy-Weisbach equation. Coefficient of friction. Diagram of Moody. Monomial exponential empirical formulas. Unique or secondary loss of load. Coefficients k for their estimation. Method of length of equivalent pipe. |
| Subject 8.  | Calculation of pipelines. General conditions. Calculation of a siphon. Timbre in pipes. Simple piping in series, in parallel. Introduction to the calculation of branched pipes.                                                                                                                                                                          |
| Subject 9.  | Non-stationary regime of liquids in pipes. Water hammer. Description of the phenomenon. Calculation of overpressures. Close quick. Allievi's formula. Slow closing. Michaud's formula. Methods of attenuation.                                                                                                                                            |
| Subject 10. | Hydraulic design in special pipes for irrigation. Characteristic curves of the emitters. Pipes with discrete flow distribution. Criteria and calculation for the dimensioning of a side of sprinklers. Drip irrigation ditto                                                                                                                              |
| Subject 11. | Lifting and discharge of liquids by hydraulic pumps I. Classification of hydraulic pumps. Centrifugal pumps. Geometric and elevation heights of elevation. Characteristic curve. Powers and yields. Loss of energy. Suction height. NPSH Factor. Non-cavitation condition.                                                                                |
| Subject 12. | Lifting and flow of liquids using hydraulic pumps II. Characteristic curves of rotodynamic pumps at constant speed. Operating point. Couplings. Formulas of similarity. General characteristics curves at different speeds. Choice of pumps.                                                                                                              |
| Subject 13. | Flow in open channels. Permanent and uniform movement. Vertical velocity distribution. Normal draft. Gradually varied permanent movement. Specific energy. Depth, speed and specific energy critical. Hydraulic overhang.                                                                                                                                 |
| Subject 14. | Hydrological cycle. Forest action on water regulation. Physical parameters of the hydrological basin. Soil and climate. Forest action on water regulation. Hydric balance. Criteria for restoring forest hydrological degraded areas.                                                                                                                     |

## Planning

|                                               | Class hours | Hours outside the classroom | Total hours |
|-----------------------------------------------|-------------|-----------------------------|-------------|
| Troubleshooting and / or exercises            | 30          | 45                          | 75          |
| Laboratory practises                          | 10          | 10                          | 20          |
| Autonomous troubleshooting and / or exercises | 0           | 60                          | 60          |
| Master Session                                | 20          | 20                          | 40          |
| Troubleshooting and / or exercises            | 4           | 26                          | 30          |

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

## Methodologies

|                                               | Description                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Troubleshooting and / or exercises            | Activity which formulated problem and / or exercises related to the course. The student should develop appropriate solutions or right through the exercise routines, application of formulas or algorithms, application processing procedures available information and interpretation of the results. It is often used to complement the lecture. |
| Laboratory practises                          | Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. Special spaces are developed with specialized equipment (scientific and technical laboratories, languages, etc.).                                                                                               |
| Autonomous troubleshooting and / or exercises | Actividade in which problems are formulated and / or exercises related to the course. The student must develop the analysis and resolution of problems and / or exercises independently.                                                                                                                                                           |
| Master Session                                | Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.                                                                                                                                                                             |

## Personalized attention

| Methodologies                                 | Description |
|-----------------------------------------------|-------------|
| Autonomous troubleshooting and / or exercises |             |
| Troubleshooting and / or exercises            |             |

## Assessment

|                                               | Description                                                                                                          | Qualification | Training and Learning Results |    |    |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|----|----|
| Autonomous troubleshooting and / or exercises | (*)Planteamiento de problemas que el alumno debe resolver de forma personalizada fuera de clase a lo largo del curso | 30            | B2<br>B26                     | C9 | D6 |
| Troubleshooting and / or exercises            | (*)Planteamiento de problemas que el alumno debe resolver en clase en el acto de evaluación                          | 70            | B2<br>B26                     | C9 | D6 |

#### Other comments on the Evaluation

#### Sources of information

##### Basic Bibliography

##### Complementary Bibliography

MOTT R.L., **Mecánica de fluidos**, Pearson. Prentice Hill-Mexico,

GILES, R.V., **Mecánica de los fluidos e hidráulica**, McGraw-Hill,

TARJUELO, J. M., **Hidráulica general aplicada**, Serv. Publicaciones E.U. Politécnica de Albacete,

ESCRIBÁ BONAFÉ, **Hidráulica para ingenieros**, Bellisco,

SALDARRIAGA, J., **Hidráulica de tuberías abastecimiento de agua , redes y riegos**, Alfaomega,

AGÜERA SORIANO, J., **Mecánica de fluidos incompresibles y turbomáquinas hidráulicas**, Ciencia,

MATAIX, C., **Mecánica de fluidos y máquinas hidráulicas**, Del Castillo,

WHITE, F. M., **Mecánica de fluidos**, McGraw-Hill,

LUIS A, **Materiales y cálculo de instalaciones. Biblioteca de instalaciones de agua, gas y aire acondicionado**, CEAC,

HERNÁNDEZ, A. y otros, **Manual de saneamiento Uralita**, Thomsosn Paraninfo,

SUAREZ, J. MARTINEZ, F., PUERTAS, J., **Manual de conducciones Uralita**, Thomsosn Paraninfo,

FUENTES YAGUE, **Técnicas de riego**, IRYDA.,

RODRIGO, J. y CORDERO ,L, **Riego localizado**, Mundi prensa,

DAL -RE, R., **Pequeños embalses de uso agrícola**, Mundi prensa,

AMIGO, E., y AGUILAR, E., **Manual para el diseño construcción y explotación de embalses impermeabilizados con geomembranas**, Gobierno de Canarias,

LLAMAS, J., **Hidrología General**, Servicio editorial. Univ. País Vasco,

LOPEZ CADENAS, F., **Restauración hidrológico-forestal de cuencas y control**, Tragsa-Tragsatec/Mº. Medio Ambiente/ Mundi-Prensa,

LOPEZ CADENAS, F. y MINTEGUI J.A., **Hidrología de superficie**, E.T.S.I.M. Madrid,

#### Recommendations

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

Physics: Physics I/P03G370V01102

Physics: Physics II/P03G370V01202

Mathematics: Overview of mathematics/P03G370V01203

Mathematics: Mathematics and IT/P03G370V01103