



(*)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
7. Web: <http://www.forestales.uvigo.es>

Faculty Management

Managerial team:

Director: D. Juan Picos Martín

Deputy director: D^a. Angeles Cancela Carral

Secretary: D. José Manuel Casas Mirás

Governing bodies:

- Faculty Assembly

- Commissions:

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

Departments in the Centre:

Department of Engineering of the Natural Resources and Environment (<http://dir.uvigo.es>)

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
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 |
| SUMA | 813 | 438 |

Laboratorios e talleres:

| ANDAR | LABORATORIO | DOCENTE | | INVEST. | |
|---------|---|-----------------------|-------------------|----------------------|----------------|
| | | Superficie | Capacidad Persoas | Superficie | Capac. Persoas |
| Soto | Lab. Hidráulica e Hidroloxía Forestal | 115,83 m ² | 16 | 35,67 m ² | 3 |
| Soto | Lab. Enxeñería Mecánica /Lab. Termotecnia | 110,17 m ² | 16 | NO | No |
| Soto | Celulosa Pasta e Papel | 72,04 m ² | 15 | 35,67 m ² | 3 |
| Soto | Taller Enerxías Xiloxeneneradas | 171,51 m ² | 25 | 2º Andar | 2º Andar |
| Soto | Taller de Madeiras | 342,11m ² | 35 | NO | NO |
| P.Baixa | Aula Informática (1) | 108,85 m ² | 24 | NO | |
| P.Baixa | Aula Informática (2) | 107,34 m ² | 24 | NO | |
| P.Baixa | Expresión Gráfica | 168,45 m ² | 48 | NO | |
| P.Baixa | Proxectos | 95,00 m ² | | 6 | |
| 1º | Lab. Física | 112,54 m ² | 16 | 35,67 m ² | 4 |
| 1º | Lab. Ecoloxía | 109,41 m ² | 30 | 36,61 m ² | 4 |
| 1º | Lab. Enxeñería do Medio Ambiente | NO | NO | 34,54 m ² | 4 |
| 1º | Lab. Topografía | 117,57 m ² | 40 | 36,75 m ² | 2 |
| 1º | Lab. Edafoloxía | 109,98 m ² | 16 | 27,40 m ² | 7 |
| 2º | Lab. Silvicultura e Repoboación | 109,60 m ² | 16 | | |
| 2º | Lab. Enerxías Xiloxeneneradas | Soto | Soto | 36,61 m ² | 4 |
| 2º | Lab. Incendios Forestais | 112,11 m ² | 17 | 34,54 m ² | 5 |
| 2º | Lab. Producción Vexetal | 117,57 m ² | 24 | 36,75 m ² | 4 |
| 2º | Lab. de Acuicultura | 112,54 m ² | pendente | NO | NO |
| 2º | Lab. Enxeñería Eléctrica | 110,73 m ² | 21 | NO | NO |
| 2º | Lab. Enxeñería Química | 109,98 m ² | 15 | 27,40 m ² | 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/uvigo_gl/administración/servicioalumnado

<http://extension.uvigo.es>

http://webs.uvigo.es/vicoap/normativa_oa.gl.htm

http://www.uvigo.es/uvigo_gl/estudiostitulaciones

http://www.uvigo.es/uvigo_gl/vidauniversitaria/calendarioescolar

http://www.uvigo.es/uvigo_gl/vidauniversitaria/universidadvirtual

http://secxeral.uvigo.es/secxeral_gl/normativa/normativauniversidad/estudaintes/reglamento_estudiantes.html

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/
- **Employment Office :** <http://emprego.uvigo.es/>
- **Canteens and accommodation:** http://www.uvigo.es/uvigo_gl/vidauniversitaria/comedores_aloxamento/
- **Other activities:**
 - 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 | Type | Year | Quadmester |
| | 6 | Basic education | 2nd | 1st |
| Teaching language | Spanish Galician | | | |
| 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 | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CE11 | Ability to apply knowledge about statistics and optimization. Statistical computer programs of interest in engineering. |
| CT2 | Ability to communicate orally and written in Spanish or in English |
| CT5 | Capacity for information management, analysis and synthesis |
| CT8 | Ability to solve problems, critical reasoning and decision making |

Learning outcomes

| Learning outcomes | Competences |
|--|----------------------------|
| 1R. 2018 Knowledge and understanding of the mathematicians and other inherent basic sciences to the his speciality in engineering, it a level that allow them purchase the rest of the competitions of the qualifications. | CG1 CE11 CT2 CT5 CT8 |
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | |
| 4R. 2018 Capacity to analyze products, processes and complex systems in the his field of study; choose and apply analytical methods, of calculation and experimental relevantes of form relevante and interpret correctly the results of these analyses. | |
| 5R. 2018 Capacity to identify, formulate and resolve problems of engineering in the his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognize the importance of the social restrictions, of health and security, environmental, economic and industrial. | |
| 10R. 2018 Capacity and capacity to project and realize experimental investigations, interpret results and obtain conclusions in the his field of study. | |
| 11R. 2018 Understanding of the techniques and methods of analysis, project and applicable investigation and his limitations within the scope of the his speciality. | |
| 12R. 2018 practical Competition to resolve complex problems, realize complex projects of engineering and realize specific investigations stop his speciality. | |
| 17R. 2018 Capacity to collect and interpret data and handle complex concepts inside the his speciality, to issue judgements that involve a reflection on ethical and social questions | |
| 19R. 2018 Capacity to communicate of effective way information, ideas, problems and solutions in the field of the engineering and with the society in general. | |
| 21R. 2018 Capacity to recognize the need of a continuous training and realize this activity of independent way during his professional life. | |

Contents

| Topic | |
|--|---|
| 1. Sampling and descriptive statistics | 1.1 Definition and field of application of the Statistics. 1.2 Basic concepts of sampling. Methods of random sampling. 1.3 Descriptive Statistics: Tables and graphic representations. 1.4 Descriptive Statistics: Measures of position, dispersion and shape. |

| | |
|--|--|
| 2. Probability | 2.1 Random Experiment. Sample space. Events. 2.2 Probability: concept, properties and methods of determination. 2.3 Conditional Probability. Independence of events. 2.4 Fundamental theorems: Product rule, total probabilities and Bayes' rule. |
| 3. Random variables and remarkable distributions | 3.1 Concept of random variable (r.v.) 3.2 Discrete and continuous random variables. 3.3 Characteristics of a r.v. 3.4 Models associated to a Bernoulli Process. 3.5 Models associated to a Poisson Process. 3.6 The Normal distribution. 3.7 Other remarkable models. |
| 4. Intervals of confidence | 4.1 Estimator: concept and properties. 4.2 The sample mean, sample variance and sample proportion. 4.3 Intervals of confidence for the mean, variance and proportion. 4.4 Calculation of the size of the sample. 4.5 Intervals of confidence for the difference of two means and two proportions. |
| 5. Test of hypothesis | 5.1 Definition and classical methodology of statistical testing: types of hypothesis, type I and type II errors, level of significance, critical region. Power. 5.2 Critical level or p-value. 5.3 Test on two means and test on two variances (under normality). Test on two proportions. 5.4 Test chi-square of independence. 5.5 Normality test. |
| 6. Introduction to regression models | 6.1 Linear association measures: covariance and linear correlation coefficient. 6.2 The simple linear regression model. 6.3 Least squares and the fitted model. 6.4 Properties of the least squares estimators and inference. 6.5 Analyses of variance and sample coefficient of determination. 6.6 Model checking. 6.7 Prediction. 6.8 Multiple linear regression model. 6.9 Methods for model selection. |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|----------------------------|-------------|-----------------------------|-------------|
| Lecturing | 16 | 14 | 30 |
| Problem solving | 16 | 14 | 30 |
| Autonomous problem solving | 0 | 30 | 30 |
| Practices through ICT | 15 | 6 | 21 |
| Mentored work | 3 | 12 | 15 |
| Essay questions exam | 2 | 12 | 14 |
| Laboratory practice | 2 | 8 | 10 |

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

Methodologies

| | Description |
|----------------------------|---|
| Lecturing | Explanation by the professor of the theoretical foundations, which should be studied outside of class. At the beginning of each topic, students will be provided with notes and material for a better follow-up of the class. The CG1 and CE11 competences are worked on. |
| Problem solving | Classes in the classroom dedicated to solve exercises, and to propose, solve, analyze or interpret problems. The CG1, CE11, CT8 competences are worked on. |
| Autonomous problem solving | In each subject students should work on a bulletin to know how to solve problems and similar exercises to those in class. It will also be proposed to investigate questions of interest. Also, students will conduct self-assessment questionnaires at the end of the topics or blocks of the subject. There will also be computer exercises related to laboratory practices. All the competences of the subject are worked on. |

| | |
|-----------------------|---|
| Practices through ICT | Management of statistical software by each student. Fundamentally, EXCEL or CALC, and R Commander will be used. In each subject, work will be done on the computer following a script to learn the application, calculation and interpretation of basic statistical techniques. Data files related to the field of Forestry Engineering will be analyzed. All the competences of the subject are worked on. |
| Mentored work | The students will organize themselves in work groups to study a case of real data or a simulation. Each group should choose a problem related to the field of Forest Engineering, obtain or simulate data relative to it, describe and analyze them statistically and draw some relevant conclusions. The work will be done mostly outside the classroom, although some parts of preparation and supervision will be in the classroom. Likewise, the presentation of the work will be face-to-face. All the competences of the subject are worked on. |

Personalized assistance

Methodologies Description

| | |
|-----------------|--|
| Problem solving | The tutorials to resolve any doubt of the subject are in Office 23 of the Escuela de Enxeñería Forestal. |
| Mentored work | Each group must attend a face-to-face tutoring (at least one) before the presentation of the work. |

Assessment

| | Description | Qualification | Evaluated Competences | | |
|----------------------------|--|---------------|-----------------------|------|-------------------|
| Autonomous problem solving | The activities (problems, questions, computer exercises) given during the course and the self-assessment questionnaires will be evaluated. | 30 | CG1 | CE11 | CT2 CT5 CT8 |
| Mentored work | Qualification of the content and presentation of the group work. | 10 | CG1 | CE11 | CT2 CT5 CT8 |
| Essay questions exam | Written exam of problems and small questions of theory. You have to take a minimum to compensate (4 out of 10). | 40 | CG1 | CE11 | CT8 |
| Laboratory practice | Application of statistical software to data analysis in the computer classroom. You have to take a minimum to compensate (4 out of 10). | 20 | CG1 | CE11 | CT5 |

Other comments on the Evaluation

To pass the subject you must have the two compensable exams (4 points out of 10) and reach a final grade greater than or equal to 5.

In the second call there will be two exams: written and on computer, so that each student retrieves the pending one.

The group work and other activities can not be recovered on second call.

*Exam Data:

The official dates and the possible modifications are available on <http://forestaes.uvigo.es/gl/>

Sources of information

Basic Bibliography

Navidi, W., **Estadística para Ingenieros y Científicos**, Mc. Graw Hill, 2006
Cao Abad, R. y otros, **Introducción a la Estadística y sus aplicaciones**, Pirámide, 2001
Peña, D., **Estadística. Modelos y Métodos. Fundamentos**, Alianza Universidad, 1986-1999

Complementary Bibliography

Alea Riera, V. y otros., **Guía para el análisis estadístico con R Commander**, Barcelona: Universidad de Barcelona, 2014
Pérez López, C., **Estadística aplicada : conceptos y ejercicios a través de Excel**, Madrid : Ibergarceta Publicaciones, 2012
Devore, J., **Probabilidad y estadística para ingeniería y ciencias**, Thomson, 2016
Walpole, R. E. et al., **Probabilidad y estadística para ingeniería y ciencias**, Pearson Educación, 1998
Rodríguez Muñoz, L.J. y otros, **Métodos estadísticos para ingeniería**, Madrid : Garceta, 2011
Framiñán Torres, J.M. y otros, **Problemas resueltos de probabilidad y estadística en la ingeniería**, Universidad de Sevilla, 2016
Milton, J. Susan, **Estadística para Biología y Ciencias de la Salud**, McGraw Hill Interamericana, 2007
Ríus, F., Barón, F.J., Sánchez, E. y Parras, L., **Bioestadística: métodos y aplicaciones**, Madrid: Thomson, 2005
<http://www.aulafacil.com/Excel/temario.htm>

Recommendations

Subjects that it is recommended to have taken before

Mathematics: Overview of mathematics/P03G370V01203

Mathematics: Mathematics and IT/P03G370V01103

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

*Teaching methodologies that are maintained

All teaching methodologies are maintained with synchronous classes through the Remote Campus and with the support of Moovi (Moodle learning platform).

*Teaching methodologies that are modified

None

*Non-attendance mechanism for student attention (tutorials)

The tutorials may be carried out by telematic means:

- Email: mcigles@uvigo.es

- Videoconference in Virtual Office of the Remote Campus (requesting an appointment by email):

<https://campusremotouvigo.gal/faculty/993>

M^a Carmen Iglesias Pérez: Office 1291

*Modifications (if applicable) of the content to be taught

None

*Additional bibliography to facilitate self-learning

None

*Other modifications

None

=== ADAPTATION OF THE EVALUATION ===

The evaluation is maintained:

Autonomous problem solving (problems, questionnaires and computer exercises): 30%

Supervised work: 10%

Exam of development questions: 40%

Laboratory practice (computer exam): 20%

In each of the exams (written and computer) it is necessary to achieve a minimum grade of 4 out of 10.

A final weighted average of at least 5 points is required to pass.

In the second call there will be two exams: written and computer, so that each student recovers the one they have pending. Supervised work and the autonomous activities cannot be recovered on second call.

* Additional information

If the exams cannot be face-to-face, the Remote Campus and the Moovi platform will be used to do the exams.

IDENTIFYING DATA**Edaphology**

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

Competencies

| | |
|------|---|
| Code | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG3 | Knowledge of degradation processes that affect forest systems and resources (pollution, pests and diseases, fires, etc.) and capacity for the use of forest environment protection techniques, forest hydrological restoration and biodiversity conservation . |
| CE10 | Basic knowledge of geology and terrain morphology and its application in problems related to engineering. Climatology. Ability to know, understand and use the principles of: physical sciences: geology, soil science and climatology. |
| CT2 | Ability to communicate orally and written in Spanish or in English |
| CT4 | Sustainability and environmental commitment |
| CT5 | Capacity for information management, analysis and synthesis |
| CT6 | Organization and planning capacity |
| CT8 | Ability to solve problems, critical reasoning and decision making |
| CT9 | Teamwork skills, skills in interpersonal relationships and leadership. |
| CT10 | Autonomous Learning |

Learning outcomes

| | |
|-------------------|-------------|
| Learning outcomes | Competences |
|-------------------|-------------|

| | | | |
|--|-----|------|------|
| 2R. 2018 Knowledge and understanding of the disciplines of engineering of the his speciality, to the necessary level to purchase the rest of the competitions of the qualifications, including notions of the last advances. | CG1 | CE10 | CT2 |
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | | | CT4 |
| 4R. 2018 Capacity to #analyze products, processes and complex systems in the his field of study; choose and apply analytical methods, of calculation and experimental *relevantes of form *relevante and interpret correctly the results of these analyses. | | | CT5 |
| 5R. 2018 Capacity to identify, formulate and resolve problems of engineering in the his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognize the importance of the social restrictions, of health and security, environmental, economic and industrial. | | | CT6 |
| 8R. 2018 Capacity to realize bibliographic researches, consult and use databases and other sources of information with discretion, to realize @simulación and analysis with the objective to realize investigations on technical subjects of the his speciality. | | | CT8 |
| 9R. 2018 Capacity to consult and apply codes of good practices and security of the his speciality. | | | CT9 |
| 10R. 2018 Capacity and capacity to project and realize experimental investigations, interpret results and obtain conclusions in the his field of study. | | | CT10 |
| 12R. 2018 practical Competition to resolve complex problems, realize complex projects of engineering and realize specific investigations stop his speciality. | | | |
| 13R. 2018 Knowledge of the application of materials, teams and tools, technological processes and of engineering and his limitations within the scope of the his speciality. | | | |
| 14R. 2018 Capacity to apply norms of engineering in the his speciality. | | | |
| 15R. 2018 Knowledge of the social implications, of health and security, environmental, economic and @industrial of the practice in engineering. | | | |
| 17R. 2018 Capacity to collect and interpret data and handle complex concepts inside the his speciality, to issue judgements that involve a reflection on ethical and social questions | | | |
| 19R. 2018 Capacity to communicate of effective way information, ideas, problems and solutions in the field of the engineering and with the society in general. | | | |
| 20R. 2018 Capacity to work effectively in national and international contexts, individually and in team, and cooperate with the engineers and people of other disciplines. | | | |
| 22R. 2018 Capacity to be to the day of the scientific and technological news. | | | |

Contents

Topic

| | |
|--|--|
| 1.Introducción The wool environmental geology | Minerales, cristales and rocks. Geodynamic Internal. Geodynamic External. Geology of Galicia. Geologycal resources. |
| 2. The soil: Approaches, work and study. | The soil: conceptual approaches. Edafic organizations. Edafology. The Science of the soil. |
| 3. Ecologycal 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 componentcs 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, Sodicity 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 practical | 20 | 10 | 30 |
| Studies excursion | 5 | 2 | 7 |
| Presentation | 3 | 20 | 23 |
| Lecturing | 32 | 58 | 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 practical | 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.). |
| Studies excursion | 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. Among them we can mention field practices, visits to events, research centers, companies, institutions ... of academic-professional interest for the student |
| Presentation | 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. |
| Lecturing | 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 assistance

| Methodologies | Description |
|----------------------|-------------|
| Laboratory practical | |
| Studies excursion | |
| Presentation | |

Assessment

| | Description | Qualification | Evaluated Competences |
|----------------------|-------------|---------------|-----------------------|
| Laboratory practical | | 20 | CT2 CT6 CT8 |
| Presentation | | 20 | CT2 |
| Lecturing | | 60 | CE10 CT6 |

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

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

* Teaching methodologies modified

* Non-attendance mechanisms for student attention (tutoring)

* Modifications (if applicable) of the contents

* Additional bibliography to facilitate self-learning

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Tests that are modified

[Previous test] => [New test]

* New tests

* Additional Information

IDENTIFYING DATA**Botany**

| | | | | |
|---------------------|---|-----------|------|------------|
| Subject | Botany | | | |
| Code | P03G370V01303 | | | |
| Study programme | (*)Grao en Enxeñaría Forestal | | | |
| Descriptors | ECTS Credits | Type | 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 diferencia-los grandes grupos de organismos que estuda a Botánica, incidindo nos grupos con maior presenza no ámbito forestal galego. | | | |

Competencies

| | |
|------|---|
| Code | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG2 | Ability to analyze the ecological structure and function of forest systems and resources, including landscapes. |
| CE15 | Ability to know, understand and use the principles of: forest botany. |
| CE36 | Ability to solve technical problems derived from the management of natural spaces. Conservation of biodiversity. |
| CT2 | Ability to communicate orally and written in Spanish or in English |
| CT3 | Ability to communicate orally and in writing specifically in the Galician language |
| CT4 | Sustainability and environmental commitment |

Learning outcomes

| | | | |
|-------------------|-------------|--------------|-------------------|
| Learning outcomes | Competences | | |
| New | CG1 CG2 | CE15 CE36 | CT2 CT3 CT4 |

Contents

| | |
|--|---|
| Topic | |
| 1. Concept of Botanist. | Categories and taxonomic unities. Botanic nomenclature. |
| 3. The reproduction | Types of reproduction. Biological cycles. Alternation of generations and his importance. |
| 2. Morphological levels of vegetal organization. | Traffic of Therophytes to Cormophytes. Generalities of the vascular plants and its adaptive advantages. |
| 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. |
| 13. Quotation of the families Podocarpaceae and Cephalotaxaceae. Order Taxales, Family Taxaceae, species more relevants and forestal importes. | (*)Especies máis relevantes e importancia ecolóxica e forestal. |

| | |
|---|---|
| 14. Anxiospermas. Div. Magnoliophyta General characters. | Reproduction: Vital cycle. Differential characters go in the classes Magnoliopsida (Dicotyledonous) and Liliopsida (monocotiledóneas). |
| 15. Magnoliopsida Class (dicotyledonous). Subclass 1: Magnoliidae. General characters. | Families: Magnoliaceae, Lauraceae, Ranunculaceae, Berberidaceae. Genders and species more important and examples. |
| 16. Subclass 2: Hamamelididae. | General characters of the families Hamamelidaceae and Platanaceae. 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. | (*)Especies máis relevantes e importancia forestal |
| 20. Subclass 4: Dilleniidae. | General characters of the families of main economic and forestal: 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 |
|----------------------------|-------------|-----------------------------|-------------|
| Studies excursion | 2 | 0 | 2 |
| Laboratory practical | 20 | 6 | 26 |
| Autonomous problem solving | 4 | 28 | 32 |
| Lecturing | 32 | 58 | 90 |

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

Methodologies

| | Description |
|----------------------------|---|
| Studies excursion | 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 practical | 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 problem solving | 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. |
| Lecturing | 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 assistance

| Methodologies | Description |
|----------------------------|-------------|
| Laboratory practical | |
| Autonomous problem solving | |

Assessment

| | Description | Qualification | Evaluated Competences |
|----------------------|---|---------------|-----------------------|
| Studies excursion | (*)No exame de laboratorio integraranse os coñecementos adquiridos nas saídas de campo. Avaliase a competencia B20 | 5 | |
| Laboratory practical | (*)Farase unha avaliación continua ó alumnado das actividades plantexadas nas clases prácticas. O final do curso o alumnado deberá entregar unha memoria final e/ou realizar unha proba sobre identificación de distintos pliegos de especies forestais. Avaliáanse as competencias A10,A18,A20 | 20 | |

| | | | | |
|----------------------------|---|----|-----|------|
| Autonomous problem solving | (*)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 | | CE15 |
| Lecturing | (*)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 | CG1 | CE15 |

Other comments on the Evaluation

Tests dates:

First call: 9th january 2020 at 10.00h (theoretical test) and 12.30h (practical test)

Second call: 1th july 2020 at 16.00h (theoretical test) and 18.30h (practical test)

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,

<https://www.arbolesibericos.es/>,

Recommendations

Subjects that continue the syllabus

Biology: Plant Biology/P03G370V01201

Forestry Ecology/P03G370V01402

Contingency plan

IDENTIFYING DATA**Electrotechnology and rural electrification**

| | | | | |
|---------------------|--|-----------|------|------------|
| Subject | Electrotechnology and rural electrification | | | |
| Code | P03G370V01304 | | | |
| Study programme | (*)Grao en Enxeñaría Forestal | | | |
| Descriptors | ECTS Credits | Type | Year | Quadmester |
| | 6 | Mandatory | 2nd | 1st |
| Teaching language | Spanish Galician | | | |
| Department | | | | |
| Coordinator | | | | |
| Lecturers | | | | |
| E-mail | | | | |
| Web | | | | |
| General description | They will study the principles of operation of the electricity and the electrical circuits, as well as the components, the design and the calculation of an electrical installation. | | | |

Competencies

| | |
|------|---|
| Code | |
| CG9 | Knowledge of hydraulics, construction, electrification, forest roads, machinery and mechanization necessary both for the management of forest systems and for their conservation. |
| CE14 | Ability to know, understand and use the principles of: electrical engineering and forest electrification. |
| CT8 | Ability to solve problems, critical reasoning and decision making |

Learning outcomes

| Learning outcomes | Competences | | |
|--|-------------|------|-----|
| 2**R. 2018 Knowledge and understanding of the disciplines of engineering of his speciality, to the necessary level to purchase the rest of the competitions of the degree, including notions of the last advances. | CG9 | CE14 | CT8 |
| 3**R. 2018 Be conscious of the multidisciplinary context of the engineering. | | | |
| 4**R. 2018 Capacity to analyse products, processes and complex systems in his field of study; choose and apply analytical methods, of calculation and experimental notable of notable form and interpret properly the results of these analyses. | | | |
| 5**R. 2018 Capacity to identify, formulate and resolve problems of engineering in his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognise the importance of the social restrictions, of health and security, environmental, economic and industrial. | | | |
| 6**R. 2018 Capacity to project, design and develop complex products (pieces, components, products #finish, etc.), processes and systems of his speciality, that fulfil the requirements established, including the knowledge of the social appearances, of health and environmental security, economic and industrial; as well as select and apply methods of appropriate project. | | | |
| 7**R. 2018 Capacity of the project using some knowledges advanced of his speciality in engineering. | | | |
| 8**R. 2018 Capacity to make bibliographic researches, consult and use databases and other sources of information with discretion, to make simulations and analysis with the aim to make investigations on technical subjects of his speciality. | | | |
| 9**R. 2018 Capacity to consult and apply codes of best practices and security of his speciality. | | | |
| 10**R. 2018 Capacity and capacity to project and make experimental investigations, interpret results and obtain conclusions in his field of study. | | | |
| 11**R. 2018 Understanding of the technicians and methods of analysis, project and applicable investigation and his limitations in the field of his speciality. | | | |
| 12**R. 2018 practical Competition to resolve complex problems, make complex projects of engineering and make specific investigations for his speciality. | | | |
| 13**R. 2018 Knowledge of the application of materials, teams and tools, technological processes and of engineering and his limitations in the field of his speciality. | | | |
| 15**R. 2018 Knowledge of the social implications, of health and security, environmental, economic and industrial of the practice in engineering. | | | |

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 |
|---------------------------------|-------------|-----------------------------|-------------|
| Lecturing | 16 | 16 | 32 |
| Problem solving | 16 | 48 | 64 |
| Laboratory practical | 12 | 4 | 16 |
| Practices through ICT | 12 | 18 | 30 |
| Problem and/or exercise solving | 3 | 0 | 3 |
| Problem and/or exercise solving | 1 | 0 | 1 |
| Essay | 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 |
|-----------------------|---|
| Lecturing | EXHIBITION BY PART OF The PROFESSOR OF The THEORETICAL BASES OF The ASIGN#PUT |
| Problem solving | FORMULATION And RESOLUTION OF PROBLEMS RELACIONED WITH The ASIGN#PUT |
| Laboratory practical | ACTIVITIES OF APPLICATION OF KNOWLEDGES IN SPACES WITH SPECIALIZED EQUIPMENT |
| Practices through ICT | ACTIVITIES OF APPLICATION OF KNOWLEDGES IN CLASSROOM OF COMPUTING |

Personalized assistance

| Methodologies | Description |
|-----------------------|-------------|
| Lecturing | |
| Problem solving | |
| Practices through ICT | |
| Laboratory practical | |

Assessment

| | Description | Qualification | Evaluated Competence SS |
|---------------------------------|---|---------------|-------------------------|
| Laboratory practical | It EVALUATED BY MEANS OF The DELIVERY OF A MEMORY WITH The NUMERICAL RESULTS OBTAINED IN The PRACTICES | 10 | CE14 |
| Problem and/or exercise solving | It EVALUATED BY MEANS OF The APPROACH OF PROBLEMS THAT The STUDENT will HAVE TO ANSWER OF FORM WRITTEN | 40 | CE14 |
| Problem and/or exercise solving | It EVALUATED BY MEANS OF The APPROACH OF QUESTIONS THAT The STUDENT will HAVE TO ANSWER OF FORM WRITTEN | 20 | CE14 |
| Essay | It EVALUATED The QUALITY OF A PROJECT OF ELECTRICAL INSTALLATION CALCULATED BY The STUDENT | 30 | CE14 |

Other comments on the Evaluation

Will not conserve any note of previous announcements, except the note of the work and of the practices inside the same academic year. The note obtained in the work in the announcement of January will be valid for the announcement of Julio.

Calendar of examinations: Official dates and any modification will be accesible in the official notice board and in the web page <http://forestales.uvigo.es/gl/>

Sources of information**Basic Bibliography****Complementary Bibliography**PARRA, PEREZ, PASTOR, ORTEGA, **TEORÍA DE CIRCUITOS**, 2003,GONZÁLEZ, GARRIDO, CIDRAS, **EJERCICIOS RESUELTOS DE CIRCUITOS ELÉCTRICOS**, 1999,SPITTA, **INSTALACIONES ELÉCTRICAS**, 1980,MINISTERIO CIENCIA Y TECNOLOGÍA, **R.D. 842/2002 REGLAMENTO ELECTROTÉCNICO PARA BAJA TENSIÓN**, 2002,

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

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

* Teaching methodologies modified

* Non-attendance mechanisms for student attention (tutoring)

* Modifications (if applicable) of the contents

* Additional bibliography to facilitate self-learning

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Tests that are modified

[Previous test] => [New test]

* New tests

* Additional Information

IDENTIFYING DATA**Forest entomology and Zoology**

| | | | |
|---------------------|---|-----------|------|
| Subject | Forest entomology and Zoology | | |
| Code | P03G370V01305 | | |
| Study programme | (*)Grao en Enxeñaría Forestal | | |
| Descriptors | ECTS Credits | Type | Year |
| | 6 | Mandatory | 2nd |
| Teaching language | 1st | | |
| Department | | | |
| Coordinator | Paz Bermudez, Maria Graciela | | |
| Lecturers | López de Silanes Vázquez, María Eugenia Paz Bermudez, Maria Graciela Souto Otero, José Carlos | | |
| E-mail | graciela@uvigo.es | | |
| Web | http://http://faitic.uvigo.es/index.php/es/ | | |
| 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 | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG3 | Knowledge of degradation processes that affect forest systems and resources (pollution, pests and diseases, fires, etc.) and capacity for the use of forest environment protection techniques, forest hydrological restoration and biodiversity conservation . |
| CE13 | Ability to know, understand and use the principles of: forest zoology and entomology; biological foundations of the animal field in engineering. |
| CT4 | Sustainability and environmental commitment |
| CT5 | Capacity for information management, analysis and synthesis |

Learning outcomes

| Learning outcomes | Competences | | |
|--|-------------|------|-----|
| 2R. 2018 Knowledge and understanding of the disciplines of engineering of the his speciality, to the necessary level to purchase the rest of the competitions of the qualifications, including notions of the last advances. | CG1 | CE13 | CT4 |
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | | | CT5 |
| 4R. 2018 Capacity to #analyze products, processes and complex systems in the his field of study; choose and apply analytical methods, of calculation and experimental *relevantes of form *relevante and interpret correctly the results of these analyses. | | | |
| 8R. 2018 Capacity to realize bibliographic researches, consult and use databases and other sources of information with discretion, to realize @simulación and analysis with the objective to realize investigations on technical subjects of the his speciality. | | | |
| 9R. 2018 Capacity to consult and apply codes of good practices and security of the his speciality. | | | |
| 10R. 2018 Capacity and capacity to project and realize experimental investigations, interpret results and obtain conclusions in the his field of study. | | | |
| 12R. 2018 practical Competition to resolve complex problems, realize complex projects of engineering and realize specific investigations stop his speciality. | | | |
| 13R. 2018 Knowledge of the application of materials, teams and tools, technological processes and of engineering and his limitations within the scope of the his speciality. | | | |
| 15R. 2018 Knowledge of the social implications, of health and security, environmental, economic and @industrial of the practice in engineering. | | | |
| 17R. 2018 Capacity to collect and interpret data and handle complex concepts inside the his speciality, to issue judgements that involve a reflection on ethical and social questions | | | |
| 19R. 2018 Capacity to communicate of effective way information, ideas, problems and solutions in the field of the engineering and with the society in general. | | | |
| 21R. 2018 Capacity to recognize the need of a continuous training and realize this activity of independent way during his professional life. | | | |
| 22R. 2018 Capacity to be to the day of the scientific and technological news. | | | |

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

| Planning | | | |
|----------------------|-------------|-----------------------------|-------------|
| | Class hours | Hours outside the classroom | Total hours |
| Lecturing | 32 | 48 | 80 |
| Laboratory practical | 20 | 22 | 42 |
| Problem solving | 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 |
| Lecturing | 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 practical | 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.). |
| Problem solving | 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 assistance | |
|--------------------------------|-------------|
| Methodologies | Description |
| Lecturing | |
| Laboratory practical | |

| Assessment | | | |
|-------------------------|--|---------------|-----------------------|
| | Description | Qualification | Evaluated Competences |
| Lecturing | (*)1.-Probas de tipo test 2.-Probas de respuesta corta 3.-Probas de respuesta larga, de desarrollo | 75 | CG1 CE13 |
| Laboratory practical(*) | Informes/memorias de prácticas e/ou examen práctico | 20 | CE13 |
| Problem solving | (*) | 5 | |

Other comments on the Evaluation

Tests dates:

Official dates and any modification will be accesible in the official notice board and in the web page <http://forestales.uvigo.es/gl/>

| Sources of information | |
|---|--|
| Basic Bibliography | |
| Complementary Bibliography | |
| Davies RG, | Introducción a la entomología , 1989, |
| Falconer DS, Mackay TFC, | Introducción a la genética cuantitativa , 1996, |
| Hickman CP, Roberts LS, Keen S, Larson A, l'Anson H, Eisenhour D, | Principios integrales de zoología , 2009, |

Paniagua R (coordinador), **Citología e histología vegetal y animal**, 2007,
Barrientos JA (ed), **Curso práctico de entomología**, 2004,
Carlos de Liñán Vicente (coord), **Entomología agroforestal**, 1998,
Chinery, M., **Guía de campo de los insectos de España y de Europa**, 2005,

Recommendations

Subjects that are recommended to be taken simultaneously

Forestry Ecology/P03G370V01402

Mathematics: Statistics/P03G370V01301

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

* Teaching methodologies modified

* Non-attendance mechanisms for student attention (tutoring)

* Modifications (if applicable) of the contents

* Additional bibliography to facilitate self-learning

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Tests that are modified

[Previous test] => [New test]

* New tests

* Additional Information

IDENTIFYING DATA**Forestry**

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

Competencies

| | |
|------|---|
| Code | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG2 | Ability to analyze the ecological structure and function of forest systems and resources, including landscapes. |
| CG6 | Ability to measure, inventory and evaluate forest resources, apply and develop silvicultural techniques and management of all types of forest systems, parks and recreational areas, as well as techniques for harvesting timber and non-timber forest products |
| CE17 | Ability to know, understand and use the principles of silviculture. |
| CT5 | Capacity for information management, analysis and synthesis |
| CT8 | Ability to solve problems, critical reasoning and decision making |
| CT10 | Autonomous Learning |

Learning outcomes

| | |
|-------------------|-------------|
| Learning outcomes | Competences |
|-------------------|-------------|

| | | | |
|--|-----|------|------|
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | CG1 | CE17 | CT5 |
| 4R. 2018 Capacity to #analyze products, processes and complex systems in the his field of study; choose and apply analytical methods, of calculation and experimental *relevantes of form *relevante and interpret correctly the results of these analyses. | CG2 | | CT8 |
| 5R. 2018 Capacity to identify, formulate and resolve problems of engineering in the his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognize the importance of the social restrictions, of health and security, environmental, economic and industrial. | CG6 | | CT10 |
| 6R. 2018 Capacity to project, design and develop complex products (pieces, component, products finished, etc.), processes and systems of the his speciality, that fulfil the requirements established, including the knowledge of the social aspects, of health and environmental security, economic and industrial; as well as select and apply methods of appropriate project. | | | |
| 7R. 2018 Capacity of the project using any knowledges advanced of the his speciality in engineering. | | | |
| 8R. 2018 Capacity to realize bibliographic researches, consult and use databases and other sources of information with discretion, to realize @simulación and analysis with the objective to realize investigations on technical subjects of the his speciality. | | | |
| 9R. 2018 Capacity to consult and apply codes of good practices and security of the his speciality. | | | |
| 11R. 2018 Understanding of the techniques and methods of analysis, project and applicable investigation and his limitations within the scope of the his speciality. | | | |
| 12R. 2018 practical Competition to resolve complex problems, realize complex projects of engineering and realize specific investigations stop his speciality. | | | |
| 13R. 2018 Knowledge of the application of materials, teams and tools, technological processes and of engineering and his limitations within the scope of the his speciality. | | | |
| 15R. 2018 Knowledge of the social implications, of health and security, environmental, economic and @industrial of the practice in engineering. | | | |
| 19R. 2018 Capacity to communicate of effective way information, ideas, problems and solutions in the field of the engineering and with the society in general. | | | |
| 20R. 2018 Capacity to work effectively in national and international contexts, individually and in team, and cooperate with the engineers and people of other disciplines. | | | |
| 21R. 2018 Capacity to recognize the need of a continuous training and realize this activity of independent way during his professional life. | | | |
| 22R. 2018 Capacity to be to the day of the scientific and technological news. | | | |

Contents

| Topic | |
|---|--|
| I.- Concept and foundations of silviculture | 1. Concept and classes of silviculture 2. Static study of forest stands |
| II.- Silvicultural Systems | 3. Dynamic study of forest stands 4. Influence of ecological factors. 5. Classification of Silvicultural systems and methods 6. Clearcutting and Seed Tree system 7. Shelterwood systems 8. Selection systems 9. Tending of forest stands 10. Coppice systems 11. Transitory systems 12. Risk Mitigation and silviculture |
| III.- Silvics | 13. silvics of the main forest species |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Lecturing | 24.5 | 47.5 | 72 |
| Problem solving | 8 | 14 | 22 |
| Studies excursion | 8 | 8 | 16 |
| Project based learning | 1 | 11.5 | 12.5 |
| Case studies | 10.5 | 14 | 24.5 |
| Objective questions exam | 0.5 | 0 | 0.5 |
| Problem and/or exercise solving | 0.5 | 0 | 0.5 |
| Case studies | 1 | 1 | 2 |

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

Methodologies

| | Description |
|-----------|--|
| Lecturing | Masterclasses in classroom or vía Campus Remoto (online teaching Platform) |

| | |
|------------------------|---|
| Problem solving | Resolution of problem solving and/or exercises in classroom, laboratory or in field or via the online teaching platform (Faitic-Campus Remoto) |
| Studies excursion | Field Visits to Forest Management Units and to forestry works. |
| Project based learning | - Organization of seminars or specific conferences - Presentations/exhibitions: Presentations by students about an specific subject or about a personal work. - Multimedia sessions: Use od video, computer simulations or on-line materials. - Sessions about previously studied/analysed issues in the field trips |
| Case studies | - Study cases and guided debates: Formulation, analysis, resolution and debate of a problem or exercise. |

Personalized assistance

| Methodologies | Description |
|-------------------|-------------|
| Case studies | |
| Problem solving | |
| Studies excursion | |

Assessment

| | Description | Qualification | Evaluated Competences | |
|---------------------------------|---|---------------|-----------------------|----------|
| Lecturing | . | 0 | CG6 | CE17 |
| Project based learning | written exam and/or summary of the activities | 20 | CG6 | CE17 CT5 |
| Case studies | written exam and/or oral disertation about similar cases to those solved in class | 20 | CG6 | CE17 |
| Objective questions exam | written exam or test about the contants of the lectures given | 30 | CG6 | CE17 |
| Problem and/or exercise solving | written answer to those exercises suggested | 30 | CG6 | CE17 |

Other comments on the Evaluation

to pass the course the studant must pass the different exams and solve satisfactorily the assignments

Attendance to practical sessions and field excursions are mandatory.

Some of the tests or exams may have eliminator character.

Sources of information

Basic Bibliography

Complementary Bibliography

Serrada, R., Montero, G. y Reque, J. Eds, **Compendio de Selvicultura Aplicada en España**, 978-84-7498-521-4, Madrid : INIA - FUCOVASA, 2008

González Molina, José María, **Introducción a la selvicultura general**, 978-84-97732239, León : Universidad, Secretariado de Publicaciones, 2005

Sociedad Española de Ciencias Forestales, **Recursos Abiertos. SECF**, http://secforestales.org/recursos_abiertos, SECF, Sevilla Martínez, Froilan, **Una Teoria ecologica para los Montes ibericos**, 978-8461248315, Inst.Restauracion Y Medio A., 2012

Serrada Hierro, Rafael, **Apuntes de Selvicultura**, https://distritoforestal.es/images/Apuntes_de_Selvicultura_completo_2011.pdf, 1ª, FuCOVaSA, 2001

Recommendations

Subjects that continue the syllabus

Use of forests/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

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

** Teaching methodologies that are maintained

All methodologies but field trips are maintained. They will adapt to a non-face-to-face format using the official on-line teaching platforms.

* Teaching methodologies that are modified

In case of having to cancel field trips, they will be replaced by materials such as:

- Explanatory video pills. /
- Other recommended reading documents.
- External videos, web links, etc.

Some tasks / exercises will be proposed for evaluation. Delivery and review deadlines will be specified in each of the proposed tasks.

* Non-face-to-face service mechanism for students (tutorials)

Weekly an email will be sent to the students with instructions for the weekly session of the subject. Said email will be sent through the FAITIC platform.

A section will be opened in the FAITIC platform forum for the resolution of doubts.

Questions will be answered through email.

Tutorials can be made via the assigned room of the UVIGO REMOTE CAMPUS. For this, it is advised to send an email in advance to define day, time. These tutorials can be collective.

=== ADAPTATION OF THE EVALUATION ===

No changes will be made to the proposed evaluation system. They will only be adapted to be carried out in a on-line mode using the UVIGO Faitic-Remote Campus remote teaching platforms.

| IDENTIFYING DATA | | | | |
|-------------------------|---|-----------|------|------------|
| Forestry Ecology | | | | |
| Subject | Forestry Ecology | | | |
| Code | P03G370V01402 | | | |
| Study programme | (*)Grao en Enxeñaría Forestal | | | |
| Descriptors | ECTS Credits | Type | Year | Quadmester |
| | 6 | Mandatory | 2nd | 2nd |
| Teaching language | #EnglishFriendly Spanish Galician | | | |
| Department | | | | |
| Coordinator | Cordero Rivera, Adolfo | | | |
| Lecturers | Cordero Rivera, Adolfo Sobrinu Garcia, Maria Cristina | | | |
| E-mail | adolfo.cordero@uvigo.es | | | |
| Web | http://ecoevo.uvigo.es | | | |
| General description | Ecology is the science that studies the response of organisms to environmental variations, from the individual level to the ecosystem. This course has as objectives to provide the basic knowledge of Ecology, with special reference to the forest environment. | | | |

| Competencies | |
|---------------------|---|
| Code | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG2 | Ability to analyze the ecological structure and function of forest systems and resources, including landscapes. |
| CG3 | Knowledge of degradation processes that affect forest systems and resources (pollution, pests and diseases, fires, etc.) and capacity for the use of forest environment protection techniques, forest hydrological restoration and biodiversity conservation . |
| CE12 | Ability to know, understand and use the principles of: Forest Ecology |
| CT2 | Ability to communicate orally and written in Spanish or in English |
| CT3 | Ability to communicate orally and in writing specifically in the Galician language |
| CT4 | Sustainability and environmental commitment |
| CT5 | Capacity for information management, analysis and synthesis |
| CT7 | Skill in the use of IT tools and ICTs. |
| CT8 | Ability to solve problems, critical reasoning and decision making |

| Learning outcomes | | | |
|--------------------------|-------------|------|-----|
| Learning outcomes | Competences | | |
| New | CG1 | CE12 | CT2 |
| | CG2 | | CT3 |
| | CG3 | | CT4 |
| | | | CT5 |
| | | | CT7 |
| | | | CT8 |

| Contents | |
|--|--|
| Topic | |
| 0. ORGANIZATION OF THE 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. 1. INTRODUCTION TO ECOLOGY. | The concept of sustainability. The demographical problem (implications of human growth population on natural resources). The limits of the planet and the objectives for the sustainable development. 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. 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). 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. 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, mycorhyzes). 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. 7. THE BIOLOGICAL COMMUNITY. | Concept. Emerging properties of the communities. Characteristics of the community. Terrestrial communities (stratification, forms of growth, seasonality). Concept of ecotone (effect of border, ecotones between forests and grasslands). Biomas. Concept of guild. Galician forests. Epicontinental ecosystems (rivers, lakes, reservoirs). Thermal stratification in lakes. |
| 8. 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:Biomas in natural ecosystems. The productivity of forest ecosystems (factors that affect forest NPP; NPP of forests and monocultures). |
| 9. 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. |
| 10. CYCLES DE MATHER. | Circulation of the mather. 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). |
| 11. BIODIVERSITY IN FOREST ECOSYSTEMS. | Concept and types of diversity. Etodiversidade. Why conserve biodiversity?. Biodiversity assessment (Shannon index, range-abundance diagrams). Latitudinal grade of biodiversity. Main forestry activities and their effect on biodiversity. Techniques for maintaining biodiversity in forest plantations. Principles of ecological forestry. Forest certification |
| 12. THE ECOLOGICAL SUCESSION. | The sucesion (primary/secondary, alogenic/autogenic/biogenic, degradative). Hypotheses about sucesion and the concept of climax. Mechanisms behind sucesion (colonization, alteration of the environment, species displacement). Sucesional models (Horn, Tilman). Changes in the functioning of the ecosystems during the sucesion. Examples of sucesions (abandoned fields, cyclic sucesion). Importance of the sucesion in the exploitation of the forests. |

SECTION V. APPLIED ECOLOGY.

13. POLLUTION.

Definition. Types of pollutants. The acid rain (effects of the sulphur compounds on plants and animals: the decline of forest ecosystems). The ozone hole. Noise. Water pollution. Eutrophication (causes, recovery of eutrophic lakes). Soil contamination.

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.

Practicals in the classroom.

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.

2. METHODS OF WORK IN FIELD ECOLOGY: sesile 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.

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.

Field practicals. 1. Forest pests.

Density of *Gonipterus scutellatus* on *Eucalyptus*, and biological control by means of its parasitoid *Anaphes nitens*.

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.

Practicals in the laboratory.

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.

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Lecturing | 30 | 45 | 75 |
| Studies excursion | 9.8 | 14.7 | 24.5 |
| Laboratory practical | 9 | 13.5 | 22.5 |
| Mentored work | 7 | 10.5 | 17.5 |
| Practices through ICT | 3 | 4.5 | 7.5 |
| Problem and/or exercise solving | 2 | 0 | 2 |
| Problem and/or exercise solving | 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 |
|-----------------------|--|
| Lecturing | Class room lectures. |
| Studies excursion | Field work in forest ecosystems |
| Laboratory practical | Laboratory practical lectures |
| Mentored work | Class room work |
| Practices through ICT | Simulations of ecological systems in the computer room |

Personalized assistance

Methodologies Description

| | |
|-----------|---|
| Lecturing | It is recommended that the student that wish to be attended in a one-to-one tutorial contact the corresponding professor previously by email. |
|-----------|---|

Assessment

| | Description | Qualification | Evaluated Competences | |
|----------------------|---|---------------|-----------------------|------|
| Lecturing | A final written examination will be used to evaluate the work done over the course. | 70 | CG1 | CE12 |
| Studies excursion | Evaluation included in the written test | 8 | CG1 | CE12 |
| Laboratory practical | Evaluation included in the written test | 6 | CG1 | CE12 |

| | | | | |
|-----------------------|---|----|-----|------|
| Mentored work | Evaluation included in the written test | 10 | CG1 | CE12 |
| Practices through ICT | Evaluation included in the written test | 6 | CG1 | CE12 |

Other comments on the Evaluation

Participation in the practical lectures and field lessons is compulsory for a positive final evaluation.

Dates of exams:

The official dates and any subsequent modification are published on the School and in the web <http://forestaes.uvigo.es/gl/>

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

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* educational Methodologies that keep :

All the educational methodologies.

* Educational methodologies that modify

In case of a no face-to-face teaching, all the methodologies will be adapted virtually using as main tools the Remote Campus and Fatic platforms. The modifications will not be significant for most of the methodologies excepting the laboratory practical lessons which will be explained using specific tutorials specific for each subject.

* Mechanism no face-to-face of attention to the students (*tutorías)

One-to-one tutorials with the professors will be performed by using the virtual offices in Remote Campus platform.

* Modifications (if they proceed) of the contents to give

Contents will not be modified.

* Additional bibliography to facilitate the car-learning

Additional bibliography will not be necessary

=== ADAPTATION OF THE EVALUATION ===

The final test will be replaced by a written individual report that will include the answers to specific questions provided by the professors about the main contents from both, master classes and practical lessons, of the subject.

* Proofs that modify

[Test] = [Written individual report]

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 | Type | Year | Quadmester |
| | 9 | Mandatory | 2nd | 2nd |
| Teaching language | Galician | | | |
| Department | | | | |
| Coordinator | Lorenzo Cimadevila, Henrique | | | |
| Lecturers | Lorenzo Cimadevila, Henrique Novo Gómez, Ana | | | |
| E-mail | hlorenzo@uvigo.es | | | |
| Web | http://faitic.uvigo.es/ | | | |
| 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 | |
| CG6 | Ability to measure, inventory and evaluate forest resources, apply and develop silvicultural techniques and management of all types of forest systems, parks and recreational areas, as well as techniques for harvesting timber and non-timber forest products |
| CG13 | Ability to design, direct, elaborate, implement and interpret projects and plans, as well as to write technical reports, recognition reports, assessments, appraisals and appraisals. |
| CG14 | Ability to understand, interpret and adopt scientific advances in the forest field, to develop and transfer technology and to work in a multilingual and multidisciplinary environment |
| CE1 | Knowledge of representation techniques. Capacity for spatial vision. Standardization. Topographical drawing. Computer programs of interest in engineering: computer-aided design. |
| CE16 | Ability to know, understand and use the principles of: topography and stakeout. Geographic information systems and remote sensing. Computer programs for spatial data processing. |
| CT5 | Capacity for information management, analysis and synthesis |
| CT6 | Organization and planning capacity |
| CT8 | Ability to solve problems, critical reasoning and decision making |
| CT9 | Teamwork skills, skills in interpersonal relationships and leadership. |
| CT10 | Autonomous Learning |

Learning outcomes

| | |
|-------------------|-------------|
| Learning outcomes | Competences |
|-------------------|-------------|

| | | | |
|--|---------------------|-------------|----------------------------------|
| 2R. 2018 Knowledge and understanding of the disciplines of engineering of the his speciality, to the necessary level to purchase the rest of the competitions of the qualifications, including notions of the last advances. | CG6 CG13 CG14 | CE1 CE16 | CT5 CT6 CT8 CT9 CT10 |
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | | | |
| 4R. 2018 Capacity to #analyze products, processes and complex systems in the his field of study; choose and apply analytical methods, of calculation and experimental *relevantes of form *relevante and interpret correctly the results of these analyses. | | | |
| 5R. 2018 Capacity to identify, formulate and resolve problems of engineering in the his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognize the importance of the social restrictions, of health and security, environmental, economic and industrial. | | | |
| 7R. 2018 Capacity of the project using any knowledges advanced of the his speciality in engineering. | | | |
| 8R. 2018 Capacity to realize bibliographic researches, consult and use databases and other sources of information with discretion, to realize @simulación and analysis with the objective to realize investigations on technical subjects of the his speciality. | | | |
| 9R. 2018 Capacity to consult and apply codes of good practices and security of the his speciality. | | | |
| 10R. 2018 Capacity and capacity to project and realize experimental investigations, interpret results and obtain conclusions in the his field of study. | | | |
| 11R. 2018 Understanding of the techniques and methods of analysis, project and applicable investigation and his limitations within the scope of the his speciality. | | | |
| 13R. 2018 Knowledge of the application of materials, teams and tools, technological processes and of engineering and his limitations within the scope of the his speciality. | | | |
| 15R. 2018 Knowledge of the social implications, of health and security, environmental, economic and @industrial of the practice in engineering. | | | |
| 20R. 2018 Capacity to work effectively in national and international contexts, individually and in team, and cooperate with the engineers and people of other disciplines. | | | |
| 21R. 2018 Capacity to recognize the need of a continuous training and realize this activity of independent way during his professional life. | | | |
| 22R. 2018 Capacity to be to the day of the scientific and technological news. | | | |

Contents

Topic

| | |
|--------------------------------|--|
| Topography | - Introduction to Geodesy and Cartography - Instruments - Methods: radiation, itineraries, intersecting - Stake |
| Remote sensing | - Physical fundamentals - Sensors and Platforms - Digital image processing - Applications |
| Geographic information systems | - SIX concept - Models and Data Structures - Vector GIS - SIG raster - Insert digital terrain modes |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---|-------------|-----------------------------|-------------|
| Problem solving | 25 | 50 | 75 |
| Seminars | 3 | 3 | 6 |
| Lecturing | 1 | 1 | 2 |
| Problem solving | 3 | 3 | 6 |
| Laboratory practical | 10 | 20 | 30 |
| Practices through ICT | 16 | 32 | 48 |
| Lecturing | 20 | 40 | 60 |
| Problem and/or exercise solving | 1 | 0 | 1 |
| Laboratory practice | 3 | 0 | 3 |
| Report of practices, practicum and external practices | 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

| | |
|-----------------------|--|
| Problem solving | 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. |
| Lecturing | 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. |
| Problem solving | 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 practical | 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.). |
| Practices through ICT | 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. |
| Lecturing | 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 assistance

| Methodologies | Description |
|---|-------------|
| Lecturing | . |
| Problem solving | . |
| Seminars | . |
| Laboratory practical | . |
| Tests | Description |
| Report of practices, practicum and external practices | . |

Assessment

| | Description | Qualification | Evaluated Competences | | |
|---------------------------------|-------------------|---------------|-----------------------|------|-------------------|
| Lecturing | Exame teórico | 20 | CG14 | CE16 | |
| Problem solving | Exame práctico | 30 | | CE16 | CT6 |
| Problem and/or exercise solving | Proba tipo test | 10 | | CE16 | |
| Laboratory practice | Traballo práctico | 40 | CG14 | CE16 | CT6 CT8 CT9 |

Other comments on the Evaluation

Official dates and any modification will be accesible in the official notice board and in the web page <http://forestales.uvigo.es/gl/>

Sources of information

Basic Bibliography

Complementary Bibliography

BOSQUE SENDRA, J, **Sistemas de Información Geográfica.**, 2004
 CHUVIECO, E., **Fundamentos de Teledetección Espacial.**, Rialp, 2000
 MUÑOZ SAN EMETERIO, C, **Problemas básicos de Topografía.**, Ed Bellisco., 2005
 SANJOSÉ BLASCO, JJ, **Topografía para estudios de grado.**, Bellisco, 2004
 WOLF & BRINKER., **Topografía**, Alfaomega, 2008

Recommendations

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

- * Teaching methodologies maintained

- * Teaching methodologies modified

- * Non-attendance mechanisms for student attention (tutoring)

- * Modifications (if applicable) of the contents

- * Additional bibliography to facilitate self-learning

- * Other modifications

=== ADAPTATION OF THE TESTS ===

- * Tests already carried out
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...

 - * Pending tests that are maintained
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...

 - * Tests that are modified
[Previous test] => [New test]

 - * New tests

 - * Additional Information
-

| IDENTIFYING DATA | | | | |
|-------------------------|--|-----------|------|------------|
| Hydraulics | | | | |
| Subject | Hydraulics | | | |
| Code | P03G370V01404 | | | |
| Study programme | (*)Grao en Enxeñaría Forestal | | | |
| Descriptors | ECTS Credits | Type | Year | Quadmester |
| | 9 | Mandatory | 2nd | 2nd |
| Teaching language | Spanish | | | |
| Department | | | | |
| Coordinator | Álvarez Bermúdez, Xana | | | |
| Lecturers | Álvarez Bermúdez, Xana | | | |
| E-mail | xana.alvarez.bermudez@gmail.com | | | |
| Web | | | | |
| 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 | |
| CG1 | Ability to understand the biological, chemical, physical, mathematical and representation systems necessary for the development of professional activity, as well as to identify the different biotic and physical elements of the forest environment and renewable natural resources susceptible to protection, conservation and exploitations in the forest area. |
| CG9 | Knowledge of hydraulics, construction, electrification, forest roads, machinery and mechanization necessary both for the management of forest systems and for their conservation. |
| CE9 | Ability to know, understand and use the principles of: forestry hydraulics; hydrology and hydrological-forest restoration. |
| CT8 | Ability to solve problems, critical reasoning and decision making |

| Learning outcomes | | Competences | | |
|--|-----|--------------------|-----|--|
| Learning outcomes | | | | |
| 2R. 2018 Knowledge and understanding of the disciplines of engineering of the his speciality, to the necessary level to purchase the rest of the competitions of the qualifications, including notions of the last advances. | CG1 | CE9 | CT8 | |
| 3R. 2018 Be conscious of the multidisciplinary context of the engineering. | | | | |
| 5R. 2018 Capacity to identify, formulate and resolve problems of engineering in the his speciality; choose and apply analytical methods, of calculation and experiments properly established; Recognize the importance of the social restrictions, of health and security, environmental, economic and industrial. | | | | |
| 6R. 2018 Capacity to project, design and develop complex products (pieces, component, products finished, etc.), processes and systems of the his speciality, that fulfil the requirements established, including the knowledge of the social aspects, of health and environmental security, economic and industrial; as well as select and apply methods of appropriate project. | | | | |
| 7R. 2018 Capacity of the project using any knowledges advanced of the his speciality in engineering. | | | | |
| 8R. 2018 Capacity to realize bibliographic researches, consult and use databases and other sources of information with discretion, to realize @simulación and analysis with the objective to realize investigations on technical subjects of the his speciality. | | | | |
| 12R. 2018 practical Competition to resolve complex problems, realize complex projects of engineering and realize specific investigations stop his speciality. | | | | |
| 15R. 2018 Knowledge of the social implications, of health and security, environmental, economic and @industrial of the practice in engineering. | | | | |

| 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 Bernoulli 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. |
| Subject 15: practical sessions | HEC-RAS and Geographic Information Systems: Hydraulic modeling |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Problem solving | 40 | 55 | 95 |
| Autonomous problem solving | 0 | 60 | 60 |
| Lecturing | 20 | 20 | 40 |
| Problem and/or exercise solving | 3 | 26 | 29 |
| Laboratory practice | 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

| | |
|----------------------------|--|
| Problem solving | 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. |
| Autonomous problem solving | 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. |
| Lecturing | 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 assistance

| Methodologies | Description |
|----------------------------|---|
| Autonomous problem solving | Resolution of exercises and problems during the sessions of class and also of autonomous form |
| Problem solving | Practices in the classroom of computing with software of hydraulic simulation |

Assessment

| | Description | Qualification | Evaluated Competences | | |
|---------------------------------|---|---------------|-----------------------|-----|-----|
| Problem and/or exercise solving | Resolution of exercises and problems during the sessions of class and also of autonomous form | 70 | | CE9 | |
| Laboratory practice | Practices in the classroom of computing with software of hydraulic simulation | 30 | CG9 | CE9 | CT8 |

Other comments on the Evaluation

The official dates and the possible modifications are exposed in the web <http://forestales.uvigo.es/gl/>

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 continue the syllabus

Forestry hydrology/P03G370V01604

Subjects that it is recommended to have taken before

Physics: Physics I/P03G370V01102

Physics: Physics II/P03G370V01202

Mathematics: Overview of mathematics/P03G370V01203

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of the uncertain and unpredictable evolution of the sanitary alert caused by the *COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance (or with a wide *antelación) by the students and the *profesorado through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

* educational Methodologies that keep : the educational methodology of the practical part keeps . They will substitute the face-to-face classes by on-line classes and through videos by the professor

* educational Methodologies that modify : it changes from face-to-face modality to the on-line

* Mechanism no face-to-face of attention to the students (*tutorías): email and through the virtual dispatches

* Modifications (if they proceed) of the contents to give

* additional Bibliography to facilitate the car-learning

* Other modifications
