Universida_{de}Vigo

IDENTIFYING DATA

Hydraulics

Subject	Hydraulics
Code	P03G370V01404
Study programme	(*)Grao en Enxeñaría Forestal

Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	2nd	2nd

Teaching language	Spanish
Department	
Coordinator	Álvarez Bermúdez, Xana
Lecturers	Álvarez Bermúdez, Xana Bartolome Mier, Javier Ortiz Torres, Luis Valero Gutiérrez del Olmo, Enrique María
E-mail	xana.alvarez.bermudez@gmail.com
Web	
General description	(*)1. Hidrostática. Ecuación fundamental de la hidrostática. Centro de presión. Fuerza de presión sobre superficies planas y curvas. Principio de Arquímedes. 2. Hidrodinámica. Ecuación de continuidad. Ecuación de Bernouilli generalizada. Potencia de una máquina hidráulica. Ecuación de la cantidad de movimiento en régimen permanente. 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. 4. Régimen no estacionario de los líquidos en tuberías. Golpe de ariete. Cálculo de sobrepresiones. 5. Diseño hidráulico en tuberías especiales para riego. Cálculo de ramales principales y laterales. 6. Elevación e impulsión de líquidos mediante bombas hidráulicas. Curvas características. Elección de bombas. 7. El ciclo hidrológico I: precipitación, interceptación y evapotranspiración.

Competencies

Code	
B1	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.
B9	Knowledge of hydraulics, construction, electrification, forest roads, machinery and mechanization necessary both for the management of forest systems and for their conservation.
C9	Ability to know, understand and use the principles of: forestry hydraulics; hydrology and hydrological-forest restoration.
D8	Ability to solve problems, critical reasoning and decision making

Learning outcomes

Expected results from this subject	Training and Learning Results

2R. 2018 Knowledge and understanding of the disciplines of engineering of the his speciality, to   B1   C9   D8
the necessary level to purchase the rest of the competitions of the qualifications, including notions B9
of the last advances.

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	4	26	30

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

Methodologies

	Description
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	
Problem solving	

Assessment

	Description	Qualification	Training and Learning Results
Autonomous problem solving	(*)Planteamiento de problemas que el alumno debe resolver de forma personalizada fuera de clase a lo largo del curso	30	C9
Problem and/or exercise solving	(*)Planteamiento de problemas que el alumno debe resolver en clase en el acto de evaluación	70	C9

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LLAMAS, J., **Hidrología General**, Servicio editorial. Univ. Pais 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
Mathematics: Mathematics and IT/P03G370V01103

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 changues 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