# UniversidadeVigo

# Subject Guide 2020 / 2021

IDENTIFY				
Hydraulic	resources, installations and hydro-power plants			
Subject	Hydraulic			
	resources,			
	Installations and			
<u></u>	nyaro-power plants			
Code	V09G290V01601			
Study	Degree In Energy			
programm	e Engineering	Chasse	Veri	Quederest
Descriptor		Cnoose	rear	Quadmester
Teesta	0 Creatian	Mandatory	3ra	2na
leaching	Spanish English			
Doporter	EIIYIISII at			
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	Condo Fontonia, Marcas			
Lecturers	Conue Fontenia, Marcos Molares Rodríguez, Alejandro			
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<u>∟-man</u> Web	http://faitic.uvigo.es/			
General	The main goal of this course is to acquire the scientif	ic knowledge and	the study of the t	echnical application
description	concerning energy conversion devices that employ w	ater as the excha	nger fluid The an	nlication of fluid
acaciiptioi	mechanics to hydronower systems is revisited here f	rom an industrial r	nger nulu. The ap	ling with the most
	common types of water pumps and turbines		come or view, acu	
Comnete	ncies			
Code				
C20 Hydr	aulic works and installations. Planning and management	of hydraulic resou	irces	
$\frac{C20}{C21}$ Appli	ed knowledge of the basics of fluid-mechanic systems ar	nd machines		
C22 Know	ledge of electrical power systems and their applications			
C23 Ahilit	v to design electrical power plants			
D1 Cana	city to interrelate all the acquired knowledge and intern	ret it as componen	its in a body of kn	owledge with a clear
struc	ture and strong internal coherence			eeuge mar a cicul
D2 Capa	city to develop a complete project in any field included i	n this type of engi	neering, suitably	combining acquired
know	ledge, accessing necessary information sources. underta	aking the necessar	ry enquiries and in	ntegrating into inter-
discir	plinary work teams.	5		
D3 Propo	ose and develop practical solutions, which develop suital	ole strategies base	ed on theoretical k	nowledge, for problem
phen	omena and situations that arise as everyday realities in	engineering		- ·
D4 Enco	urage work based on cooperation, communication skills,	organization, plan	ining and recognit	tion of responsibility in
a mu	Itilingual and multidisciplinary working environment that	fosters education	in equality, peac	e and respect for
funda	amental rights			
D5 Know	what sources are available for ongoing and continual up	pdating of all the in	nformation require	ed to undertake their
work,	, with access to all the current and future tools for seekir	ng information and	l adapting it in the	e light of technological
and s	ocial changes			
D10 Beco	me aware of the need for training and continual improve	ment in quality, d	eveloping the value	ues associated with
scien	tine thinking and showing a flexible, open and ethical at	titude towards dive	erse opinions and	situations, particularly
in ma	atters of non-discrimination on the grounds of gender, ra	ce or religion, resp	bect for fundamen	ital rights, accessibility,
etc				
Learning	outcomes		<b>-</b> 1 1	
Expected	results from this subject		Training	g and Learning Results
паve а ра	sic grounding in Iluid machines		C20	נט נח
			UZ I	U2

D3

D4 D5 D10

C22

C23

Acquire the abilities used in the sizing process for hydraulic installations

C20	D1
C21	D2
C22	D3
C23	D4
	D5
	D10

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	III.5 Turbines ] operating curve.		
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	IX 5 Classification and general description of nower plants, dams and		
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	IX.0 Fullipeu-scolage flyaroelectric plants IX.7 River flow control. Electric energy production and consumption		
	Automatic control of hydroelectric nower plants		
Planning			
	Class hours Hours outside the Total hours		
	classroom		

Laboratory practical	2	0	2	
Problem solving	18	39.5	57.5	
Studies excursion	3.5	0	3.5	
Lecturing	26.5	40	66.5	
Problem and/or exercise solving	0	6	6	
Report of practices, practicum and externa	al practices 0	12	12	
Essay questions exam	2.5	0	2.5	
*The information in the planning table is for	or guidance only and does	s not take into account	the heterogeneity of the st	udents.

Methodologies	
	Description
Laboratory practical	Mainly, laboratory practices will consist of experimental activities in order to clarify the theoretical concepts seen on the previous master classes. Additionally, they can also include: Simulation Solution of problems Team working
Problem solving	Problem and exercise solving. They will apply the concepts tackled in the lectures. It includes activities such as: Readings Seminars Solution of problems Team working Study of actual cases
Studies excursion	The realization of the formative activity "Studies excursion", will be organized by the School board, according to the porposal of the teaching staff about the type of facility or company to visit.
Lecturing	The basics of the theory are explained in these sessions. They are mainly comprised of lectures but can also include: Readings Bibliographic review Exercise solving Conferences Technical films Oral presentations

Personalized assistance			
Methodologies	Description		
Lecturing	Personalized attention will be given to the students during class (throughout the possible questions that could arise) and during the specific timetable of the teacher for tutorships. Updated information of the tutorships timetables will be given to the students during first week of class. Tutorshiping will take place both in face-to-face or distance modes, by means of the e-learning applications offered by the University of Vigo or equivalent methods. The tutorial sessions will be carried out by telematic means (email, videoconference, FAITIC forums,) with prior agreement, in all teaching modalities.		
Laboratory practical	Personalized attention will be given to the students during class (throughout the possible questions that could arise) and during the specific timetable of the teacher for tutorships. Updated information of the tutorships timetables will be given to the students during first week of class. Tutorshiping will take place both in face-to-face or distance modes, by means of the e-learning applications offered by the University of Vigo or equivalent methods. The tutorial sessions will be carried out by telematic means (email, videoconference, FAITIC forums,) with prior agreement, in all teaching modalities.		

Assessment				
	Description	Qualification	Traini Learnin	ing and Ig Results
Problem and/or exercise solving	Resolution of proposed problems and/or exercises, that might include: - a number of weekly deliveries (no face-to-face) - face-to-face resolutions during class time	20	C20 C21 C22 C23	D1 D2 D3 D4 D5 D10
	LEARNING RESULTS: Have a basic grounding in fluid machines. Acquire the abilities used in the sizing process for hydraulic installations.			

Report of practices, practicum and external practices	Written report about the activities developed in the laboratory sessions, including experimental results and data analysis.	10	C20 C21 C22 C23	D1 D2 D3 D4
	LEARNING RESULTS: Have a basic grounding in fluid machines. Acquire the abilities used in the sizing process for hydraulic installations			D5 D10
Essay questions exam	Written test that may consist of: - theoretical questions - practical questions - exercises solving - specific point to be developed	70	C20 C21 C22 C23	D1 D2 D3 D4 D5 D10
	LEARNING RESULTS: Have a basic grounding in fluid machines. Acquire the abilities used in the sizing process for hydraulic installations.			DIU

#### Other comments on the Evaluation

Assessment methodology:

- There will be two continuous assessment quizzes, eachof them assessed from 0 to 1 points (2 points maximum). [C\_pec]

- There will be two lab sessions, with handed over labwork and report, each of them assessed up to 0.5 points (1 point maximum).[C\_lab]

- There will be a final exam, to be graded from 0 to 10 points. [C\_ex]

To compute the final grade (C\_actas), the followingformula will be used, where C\_actas has to equal 5 or above to pass the course:

Continuous assessment mode: C\_actas = (C\_pec + C\_lab) +C\_ex \* (1 - (C\_pec + C\_lab)/10)

Non-attendance mode (officially aproved): C\_actas = C\_ex

The same assessment methodology will apply in summer exam.

Calendar of examinations: Verify /consult of up to dateform in the page web of the centre:

http://minaseenerxia.uvigo.es/es/docencia/examenes

### Sources of information

Basic Bibliography

Round, George F., Incompressible Flow Turbomachines. Design, Selection, Applications, and Theory, 1<sup>a</sup> ed., Elsevier - Gulf Professional Publishing, 2004

Agüera Soriano, José, **Mecánica de fluidos imcompresibles y turbomáquinas hidráulicas**, 5ª ed., Editorial Ciencia 3, S.L., 2002

Mataix Plana, Claudio, **Mecánica de fluidos y máquinas hidraúlicas**, 2ª ed., Ediciones del castillo, S.A., 1986 Hussian, Z. and Abdullah, Z. and Alimuddin, Z., **Basic Fluid Mechanics and Hydraulic Machines**, 1ª ed., CRC Press, 2009 Modi, P. N. and Seth, S. M., **Hydraulics and Fluid Mechanics Including Hydraulic Machines (In SI Units)**, 15ª ed., Standard Book House, 2004

Complementary Bibliography

Mataix Plana, Claudio, **Turbomáquinas hidráulicas**, 2ª ed., ICAI, 2009

Girdhar, P. and Moniz, O., Practical Centrifugal Pumps. Design, Operation and Maintenance, 1<sup>a</sup> ed., Elsevier -Newnes, 2005

Hernandez Krahe, Jose Maria, Mecánica de Fluidos y Máquinas Hidráulicas/Unidades Didácticas V y VI, 1ª ed., UNED, 1995

Kothandaraman, C. P. and Rudramoorthy, R., **Fluid Mechanics and Machinery**, 2<sup>a</sup> ed., New Age International (P) Ltd., Publishers, 2007

Vasandani, V. P., **Theory and Design of Hydraulic Machines Including Basic Fluid Mechanics**, 11<sup>a</sup> ed., Khanna Publishers, 2010

Gülich, Johann F., Centrifugal Pumps, 3ª ed., Springer, 2014

Kumar, P., Hydraulic Machines: Fundamentals of Hydraulic Power Systems, 1ª ed., CRC Press, 2012

Bansal, R. K., **A Textbook of Fluid Mechanics and Hydraulic Machines (in SI units)**, 1<sup>a</sup> ed., Laxmi Publications, 2005 Gupta, S. C., **Fluid Mechanics and Hydraulic Machines**, 1<sup>a</sup> ed., Pearson Education Canada, 2006

#### Patra, K. C., Engineering Fluid Mechanics and Hydraulic Machines, 1ª ed., Alpha Science Intl Ltd, 2012

de Lamadrid Martínez, Abelardo, **Máquinas hidráulicas. Turbinas Pelton. Bombas centrífugas**, 1ª ed., Servicio de Publicaciones, ETSII - UPM, 1986

#### Recommendations

## Subjects that it is recommended to have taken before

Fluid mechanics/V09G290V01305

#### Contingency plan

#### Description

Considering the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University establishes an extraordinary planning that will be activated when the administrations and the institution determine it. It is based on safety, health and responsibility, and it guarantees teaching in an online or semi-presential modalities. These already planned measures will guarantee, at the required time, the development of teaching in a more agile and effective way, because they will be known in advance by students and teachers through the standardized tool for teaching guides DOCNET.

#### 1. Semi-presential modality

Once the semi-presential teaching is required, it would mean a reduction of the capacity of the teaching spaces used in the face-to-face modality. Therefore, as the first measure of the centre, the capacity of the teaching spaces would be reformulated and informed to the teachers, in order to proceed to reorganize the formative activities for the rest of the semester. It should be noted that the reorganization will depend on the moment throughout the semester in which this semi-presential modality is activated. For the reorganization of the teaching activities, the following guidelines would be followed:

Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

The tutorial sessions will be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement.

Once some of the students have carried out experimental or computer laboratory practices in the face-to-face modality, if it is possible, the rest of the students will have the possibility to perform the same or equivalent activities in the same modality.

For the rest of the activities until the end of the semester, it should be done a proper identification of those formative activities which can be done under face-to-face modality and those which will be carried out remotely.

Regarding the potential tools to be applied for the formative activities during the online mode, CampusRemoto and the FaiTIC platform will be used.

#### 2. Online modality

In the event that the non-face-to-face teaching modality is required (suspension of all face-to-face formative and assessment activities), the tools currently available at the University of Vigo, CampusRemoto and the FaiTIC platform will be used. The reorganization will depend on the moment throughout the semester in which this online modality is activated. In the reorganization of the teaching activities, the following guidelines would be followed:

#### 2.1. Communication

Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

#### 2.2. Adaptation and / or modification of teaching methodologies

As the teaching methodologies have been conceived for the face-to-face teaching modality, the teaching methodologies that would be kept and those which would be modified or replaced in the online modality are indicated below.

The teaching methodologies that would be kept, since they can be used in face-to-face and online teaching mode

Conventional lectures, practicum and seminars will be substituted by virtual ones, in the UVigo e-learning system. Practicum lessons contents will be adapted to allow the development of the self-tasks in common computers. New activities will focus in algorithms development and knowledge application to common tasks, basic skill adquisition and know-how adquisition, closely related with the main topics of the course. Tasks under evaluation will be performed at home, using GNU software or licensed software to the student available at the university at no extra charge.

2.3. Adaptation of tutorial sessions and personalized attention

The tutorial sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement

2.4. Evaluation

The same weights for the different parts of the course will remain unchanged. All the remaining tests and quizzes will be developed in the e-learnig platform of the UVigo (Moodle and so).

2.5. Bibliography or additional material to facilitate self-learning

Additional references (students self-learning improvement)

Mastering VBA for Microsoft Office 365 - Autor: Richard Mansfield; 944 páginas, Editor: John Wiley & Sons Inc; Edición: 2019; ISBN-10: 1119579333; ISBN-13: 978-1119579335)

Introducción a la programación en Matlab: para ingenieros civiles y mecánicos 🛛 Autor: Luis E. Suarez; 168 páginas; Publisher: CreateSpace Independent Publishing Platform; 1 edition; ISBN-10: 1490482393; ISBN-13: 978-1490482392)