# Universida<sub>de</sub>Vigo

#### Subject Guide 2022 / 2023

IDENTIFYIN	G DATA				
Control and	loptimization				
Subject	Control and				
	optimization				
Code	O07G410V01944				
Study	Grado en				
programme	Ingeniería				
	Aeroespacial				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Optional	4th	1st
Teaching	#EnglishFriendly				
language	Spanish				
	Galician				
Department					
Coordinator	García Rivera, Matías				
Lecturers	García Rivera, Matías				
E-mail	mgrivera@uvigo.es				
Web	http://moovi.uvigo.gal				
General	This subject presents differen	nt technics of analysis a	and design of cont	rol systems, usir	ng classical and modern
description	control. The technics of optir	mization are applied in	problems of desig	n.	

English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

Skills         Code         A2       That the students know how to apply their knowledge to their work or vocation in a professional way and that they possess the competences that are usually demonstrated through the elaboration and defense of arguments and th resolution of problems within their area of study         A3       That the students have the capability to gather and interpret relevant data (usually within their area of study) to is judgments that include a reflection on relevant social, scientific or ethical issues         A5       That the students develop those learning capabilities necessary to undertake further studies with a high degree of autonomy.         C31       Appropriate knowledge applied to engineering: physical phenomena of air defense systems, their qualities and the control, stability and automatic control systems.         D3       Capability of oral and written communication in native lenguage         D4       Capability for interpersonal communication         D6       Capability for interpersonal communication         D8       Capability for critical and self-critical reasoning         D13       Sustainability and environmental commitment. Equitable, responsible and efficient use of resources         Learning outcomes       Training and Learn Results		
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	Expe	ted results from this subject Training and Learning Results

		Res	ults	-
RA01: The students have a global vision of the methods of optimisation and its applications, in	A2	C31	D3	
particular in the modern technics of optimum control.	A3		D4	
	A5		D5	
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			D8	
			D11	
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Contents

Торіс
Introduction to optimization
Methods of multidimensional optimization
Optimization with constraints
Discrete and sampled systems
Design of PID controllers
State-Space
Linear-quadratic controller
State Estimation
Linear-quadratic gaussian controller
Minimum variance control
Model predictive control

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	18	0	18
Autonomous problem solving	0	87.5	87.5
Lecturing	32	0	32
Report of practices, practicum and external practices 0		10	10
Essay questions exam	2.5	0	2.5
*The information in the planning table is	for guidance only and does no	ot take into account the hete	erogeneity of the students.

Methodologies	
	Description
Laboratory practical	Once developed the contents of theory and corresponding problems, students will make practices of laboratory.
Autonomous problem solving	Once developed the contents of theory and corresponding problems, students will resolve problems of autonomous form.
Lecturing	The lecturer will explain the main of the contents of the matter. Active participation of the students is required.

Personalized assistance			
Methodologies	Description		
Lecturing	The lecturer will advise the student with the items of theory given in classes		
Laboratory practical	The lecturer will advise the student with the practices of laboratory		

Assessment					
	Description	Qualificatior	ו Le	Training earning	g and Results
Laboratory practical	In this test concepts given in practices of laboratory will be evaluated. Learning outcomes evaluated RA01.	30	A2 A3 A5	C31	D3 D4 D5 D6 D8 D11 D13
Autonomous problem solving	The delivery of solutions to a set of exercises proposed evaluates the resolution of problems and/or exercises of autonomous form. Learning outcomes evaluated RA01.	5	A2 A3 A5	C31	D3 D4 D5 D6 D8 D11 D13
Report of practices, practicum and external practices	The delivery of this report of practices evaluates the assistance and active participation in the theoretical and practical classes and tutorship. Learning outcomes evaluated RA01.	5	A2 A3 A5	C31	D3 D4 D5 D6 D8 D11 D13

Essay questions exam	This test evaluates theoretical concepts and the resolution of problems. Learning outcomes evaluated RA01.	60	A2 A3 A5	C31	D3 D4 D5 D6 D8 D11
			-		D13

# Other comments on the Evaluation

All references to numerical grades in this guide are about 10.

The dates of the final exams are published on the website of the EEAE in the web page

http://aero.uvigo.es/gl/docencia/exames.

## ASSESSMENT CRITERIA FOR ASSISTANT STUDENTS IN THE 1st EDITION OF ACTS

An assistant student is defined as the one who delivers the solutions to a series of exercises carried out autonomously and a practical report.

For a assistant students in the first edition of acts, the evaluation consists of:

- Examination of development questions. In this test theoretical concepts and problem solving related to the theory are evaluated. Represents 6 points of the final grade. In necessary to obtain a minimum of 3 points.
- Laboratory practices. In this test, concepts given in laboratory practices are evaluated. It represents 3 points of the final grade. In necessary obtain a minimum of 1.5 points.
- Delivery of the solutions to a series of proposed exercises carried out autonomously. Represents 0.5 points of the final grade. In necessary obtain a minimum of 0.25 points.
- Delivery of a practice report. Represents 0.5 points of the final grade. In necessary obtain a minimum of 0.25 points.

In the case of not reaching the required minimum in any of the parts, the subject will not be approved, and the final grade of the subject will never exceed the grade of 4.9.

# EVALUATION CRITERIA FOR NON ASSISTANT STUDENTS IN THE 1st EDITION OF ACTS

For non assistant students in the first edition of the proceedings, the evaluation consists of:

- Examination of development questions. In this test theoretical concepts and problem solving related to the theory are evaluated. Represents 6.5 points of the final grade. In necessary obtain a minimum of 3.25 points.
- Evaluation of laboratory practices. In this test concepts given in laboratory practices are evaluated. It represents 3.5 points of the final grade. In necessary obtain a minimum of 1.75 points.

In the case of not reaching the required minimum in any of the parts, the subject will not be approved, and the final grade of the subject will never exceed the grade of 4.9.

### ASSESSMENT CRITERIA FOR ASSISTANT AND NON ASSISTANT STUDENTS IN 2nd EDITION OF ACTS

For all students, non assistant and assistant, in the second edition of the acts the evaluation consists of:

- Examination of development questions. In this test theoretical concepts and problem solving related to the theory are evaluated. Represents 6.5 points of the final grade. In necessary obtain a minimum of 3.25 points.
- Evaluation of laboratory practices. In this test, concepts given in laboratory practices are evaluated. It represents 3.5 points of the final grade. In necessary obtain a minimum of 1.75 points.

In the case of not reaching the required minimum in any of the parts, the subject will not be approved, and the final grade of the subject will never exceed the grade of 4.9.

#### **GRADING PROCESS**

In the case of not reaching the required minimum in any of the parts, the subject will not be approved, and the final grade of the subject will never exceed the grade of 4.9.

#### **PROHIBITION OF USE OF ANY ELECTRONIC DEVICE**

Students are reminded of the prohibition of the use of any electronic device in the evaluation tests, in compliance with article 13.2.d) of the Statute of University Students, related to the duties of university students, which establishes the duty to "Refrain from using or cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university."

JUSTIFICATION OF ABSENCETo be able to justify the absence to a test is necessary a Proof of Absence or a Consultation and Hospitalization Proof (also called P10) issued by a SERGAS doctor, or a certificate issued by a medical collegiate. A proof of the doctor's appointment will not be valid.

### Sources of information

Basic Bibliography

Domínguez, S.; Campoy, P.; Sebastián, J.M.; Jiménez, A., **CONTROL EN EL ESPACIO DE ESTADO**, 2a, Pearson Educación S.A., Madrid,, 2006

K. OGATA, Ingeniería de control moderna, 5a, PRENTICE-HALL, 2010 B. C. KUO, Sistemas de control automático, 7a, PRENTICE HALL, 1996

R. FLETCHER, **Methods of Optimization**, John Wiley & Sons, 2007

Complementary Bibliography

Moreno, Garrido, Balaguer, Ingeniería de Control: modelado y control de sistemas dinámicos, Ariel, 2003

#### Recommendations

Subjects that it is recommended to have taken before

Electronics and automation/O07G410V01403