



## IDENTIFYING DATA

### Control and optimization

Subject	Control and optimization			
Code	O07G410V01944			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	Spanish Galician			
Department				
Coordinator	García Rivera, Matías			
Lecturers	García Rivera, Matías			
E-mail	mgrivera@uvigo.es			
Web	<a href="http://moovi.uvigo.gal">http://moovi.uvigo.gal</a>			
General description	This subject presents different technics of analysis and design of control systems, using classical and modern control. The technics of optimization are applied in problems of design.			
	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.			

## Training and Learning Results

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 the 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 issue 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 their control, stability and automatic control systems.
D3	Capability of oral and written communication in native language
D4	Capability of autonomous learning and information management
D5	Capability to solve problems and draw decisions
D6	Capabiliity for interpersonal communication
D8	Capabiliity for critical and self-critical reasoning
D11	Show motivation for quality with sensitivity towards subjects within the scope of the studies
D13	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources

## Expected results from this subject

Expected results from this subject	Training and Learning Results		
RA01: The students have a global vision of the methods of optimisation and its applications, in particular in the modern technics of optimum control.	A2	C31	D3
	A3		D4
	A5		D5
			D6
			D8
			D11
			D13

## Contents

Topic
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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	1.25	0	1.25
Essay questions exam	1.25	0	1.25

\*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	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	Qualification	Training and Learning 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.	30	A2 A3 A5	C31	D3 D4 D5 D6 D8 D11 D13
Essay questions exam	(*)Esta proba avalía os coñecementos, competencias e habilidades ou destrezas acadados nas clases de teoría.  Esta proba realizarase o día fixado no calendario oficial de exames para a proba de avaliación global.  Esta proba non é recuperable.  Resultado de aprendizaxe avaliado RA01.	30	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 ABSENCE** To 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.**

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#### **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

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#### **Recommendations**

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

Electronics and automation/O07G410V01403

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