



INTERNATIONAL
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PR/CL/001



E.T.S. de Ingenieros
Industriales

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

53001551 - Electromagnetic Compatibility

DEGREE PROGRAMME

05BG - Master Universitario En Electronica Industrial

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	53001551 - Electromagnetic Compatibility
No of credits	3 ECTS
Type	Optional
Academic year of the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	05BG - Master Universitario en Electronica Industrial
Centre	05 - Escuela Tecnica Superior De Ingenieros Industriales
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Miroslav Vasic (Subject coordinator)		miroslav.vasic@upm.es	--

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Analog And Power Electronics

3.2. Other recommended learning outcomes

- Electrotecnia, Electrónica Analógica, Digital y de Potencia.

4. Skills and learning outcomes *

4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CE02 - Ser capaz de desarrollar un proyecto de diseño de un sistema electrónico, identificando sus principales retos, en ámbitos de aplicación tales como el aeroespacial, la automoción, la ingeniería médica, las energías renovables o las comunicaciones

CE05 - Manejo de instrumentos de medida específicos para el diseño y verificación de sistemas electrónicos industriales

CG01 - Haber adquirido conocimientos avanzados y demostrado, en un contexto de investigación científica y tecnológica o altamente especializado, una comprensión detallada y fundamentada de los aspectos teóricos y prácticos y de la metodología de trabajo en uno o más campos de estudio

CG06 - Haber desarrollado la autonomía suficiente para participar en proyectos de investigación y colaboraciones científicas o tecnológicas dentro de su ámbito temático, en contextos interdisciplinares y, en su caso, con una alta componente de transferencia del conocimiento.

CT05 - Gestión de la información

4.2. Learning outcomes

RA5 - Examinar las técnicas que mitigan los problemas de ruido, interferencias y fallos en sistemas reales.

RA4 - Analizar los mecanismos que afectan a la compatibilidad electromagnética de circuitos y sistemas electrónicos.

RA6 - Analizar y diseñar circuitos y sistemas electrónicos para que sean Electromagnéticamente Compatibles.

RA7 - Mostrar casos prácticos de ensayos de homologación

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

The subject is organized so that the students can obtain a knowledge regarding the EMI and EMC, with a special emphasis on applications in power converters. EMI filters for three phase rectifiers will be analyzed in detail.

The idea is to form students to be capable of understanding the origin of all the mechanisms that generate electromagnetic noise (conducted and radiated), so that they can make optimized and reliable designs.

5.2. Syllabus

1. Introduction to EMC
2. Real components and intrinsic noise
3. Mechanisms of noise coupling
4. Cabling, connection to ground and earth, Filters
5. Device protection
6. Cables. Contact Protection. Error detection
7. Standards. Typical tests. Examples
8. PCB design
9. CM and DM filter design

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	Theory Duration: 05:00			
2	Theory Duration: 05:00			
3	Theory Duration: 02:00	Practical design of DM and CM filter Duration: 03:00		
4		Practical DM and CN filter design Duration: 05:00		
5	Theory Duration: 05:00			
6	Theory Duration: 05:00			Practical filter design Continuous assessment Presential Duration: 01:00
7				Exam Continuous assessment and final examination Not Presential Duration: 02:00
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
6	Practical filter design		Face-to-face	01:00	30%	5 / 10	CG06 CB06 CT05 CE05 CE02 CG01
7	Exam		No Presential	02:00	70%	5 / 10	CG06 CB06 CT05 CE05 CE02 CG01

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
7	Exam		No Presential	02:00	70%	5 / 10	CG06 CB06 CT05 CE05 CE02 CG01

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
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Examen extraordinario		Face-to-face	02:00	70%	5 / 10	CG01 CG06 CB06 CT05 CE05 CE02
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7.2. Assessment criteria

The subject is evaluated through the final exam only. It is necessary to obtain a note of 5 in order to pass the exam.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Internet	Web resource	Notas de aplicación de fabricantes y laboratorios oficiales
slides	Bibliography	
Simulation software	Equipment	