VNIVERSITAT DE VALÈNCIA

Course Guide
44284 Electromagnetic compatibility in industrial systems

COURSE DATA

Data Subject	
Code	44284
Name	Electromagnetic compatibility in industrial systems
Cycle	Master's degree
ECTS Credits	2.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2199 - M.D. in Electronic Engineering	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
2199 - M.D. in Electronic Engineering	3 - Industrial electronic	Obligatory

Coordination

Name	Department
JORDAN MARTINEZ, JOSE FRANCISCO	242 - Electronic Engineering

SUMMARY

This is a subject of specialization within the knowledge of electromagnetic compatibility. It is taught as a compulsory subject in the Master of Electronic Engineering from the University of Valencia, during the first quarter.

The total teaching load is 2 ECTS. Corresponding to 20 student contact hours and 30 hours of individual work.

The purpose of this course is to introduce students to the techniques and methods for solving problems of electromagnetic compatibility. Emphasis will be placed on solving real problems in electronic subsystems and compatibility issues in industrial installations.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The background needed to properly follow the subject are taught in the basic subjects of electromagnetic compatibility. Specifically the basic knowledge about the sources of interference coupling mechanisms of interference and circuits and systems more susceptible to them.

OUTCOMES

2199 - M.D. in Electronic Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Take into account the economic and social context in engineering solutions, be aware of diversity and multiculturalism and ensure sustainability and respect for human rights and equality between men and women.
- Diseñar un sistema, componente o proceso que cumpla unas especificaciones desde diferentes puntos de vista: electrónico, económico, social, ético y medioambiental.
- Demostrar una comprensión sistemática de un campo de estudio y el dominio de las habilidades.
- Realizar un análisis crítico, evaluación y síntesis de ideas nuevas y complejas.
- Ser capaz de fomentar, en contextos académicos y profesionales, el avance tecnológico, social o cultural dentro de una sociedad basada en el conocimiento.
- Capacidad para proyectar, calcular y diseñar productos, procesos e instalaciones en todos los ámbitos de la Ingeniería Electrónica y en particular los de tratamiento de la señal, sistemas digitales y de comunicaciones y electrónica industrial.
- Capacidad para el modelado matemático, cálculo y simulación en todos los ámbitos relacionados con la Ingeniería Electrónica y campos multidisciplinares afines. En especial los de tratamiento de la señal, sistemas digitales y de comunicaciones y electrónica industrial.

- Identificar, formular y resolver problemas de los sistemas electrónicos industriales.
- Ability to specify, implement, document and set-up electronics, instrumentation and control equipment and systems, considering both technical aspects and the relevant regulatory requirements.

LEARNING OUTCOMES

After making the course the student should have acquired a number of skills. After completing the course the student should be able to:

1. Perform design electronic subsystems considering the basics of electromagnetic compatibility.

2. Predicting links that will take place during installation of an electronic subsystem.

3. Troubleshooting EMC electronic subsystems already assembled.

4. Perform wiring of industrial electronic systems to avoid coupling between them.

5. Troubleshooting EMC in industrial systems

DESCRIPTION OF CONTENTS

1. Unwanted energy exchange between circuits.

Unwanted energy exchange between circuits.
1.1. Senders and receivers of energy.
1.2. Parasitics electronics
1.3. Coupling mechanisms of interference

2. Galvanic coupling

Galvanic coupling.
1. Equivalent circuit of galvanic coupling.
2. Coupling mechanisms.
3. Reduction techniques galvanic coupling.

3. Inductive coupling.

Inductive coupling.
1. Equivalent circuit of inductive coupling.
2. Coupling mechanisms.
3. Reduction techniques inductive coupling.

4. Capacitive coupling

Capacitive coupling.
1. Equivalent circuit Capacitive coupling.
2. Coupling mechanisms.
March. Reduction techniques Capacitive coupling.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	10,00	100
Laboratory practices	10,00	100
Development of group work	5,00	0
Study and independent work	5,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	5,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	5,00	0
TOTAL	**50,00**	

TEACHING METHODOLOGY

The teaching methods employed in the development of the course are:

a) Theoretical activities.

Expository development of matter with the student's participation in the resolution of specific issues.

b) Practical activities.

Solving practical problems

c) Student's personal work.

Description: Performing outside the classroom to issues and problems as well as the preparation of classes and exams (study). This task will be performed individually and try to promote self-employment.

We will use e-learning platforms (LMS) to support communication with students. Through it the student will have access to course materials used in class, as well as solving problems and exercises.

EVALUATION

The evaluation of the course will be conducted by performing a test that will take the form of an individual examination or group work about the contents of the subject.

REFERENCES

Basic

- Joan Pere López Veraguas. "Compatibilidad electromagnética. Diseño de módulos electrónicos". Marcombo. 2006.
- Balcells,J. Daura,F. Esparza,R. Pallás,R., Interferencias Electrónicas en Sistemas Electrónicos Marcombo. 1992.
- Ott, H. W. Noise Reduction Techniques in Electronic Systems Wiley-1988.

Additional

- Tim Williams.EMC for Product Designers.Butterworth-Heinemann.
- Telemecanique."Compatibilidad Electromagnética".Schneider. Manual Didáctico 2000.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

In the event of a closure of the facilities due to the health situation that totally or partially affects the classes of the subject, these will be replaced by non-face-to-face sessions following the established schedules. If the closure affects any face-to-face assessment test of the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode through the tools with institutional support from the University of Valencia. The percentages of each evaluation test will remain unchanged, as established by this guide.