



POLITÉCNICA

escuela técnica superior de  
**i**ngeniería  
y **d**iseño  
**i**ndustrial



# INTERNATIONAL SEMESTER

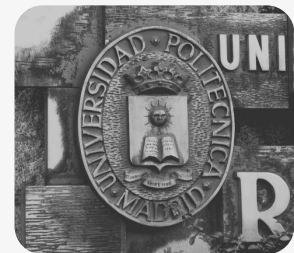
Courses in English  
+  
Spanish language  
course  
+  
Final Project

# INTERNATIONAL SEMESTER



## Dear Student,

The international semester offers an opportunity to study courses taught in English at Escuela Técnica de Ingeniería y Diseño Industrial (ETSIDI). These courses are available to any visiting or exchange student.



## About It

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During the **Fall Semester**, students can choose 12 ECTS corresponding to the Final Project and/or 30 ECTS from the offered English-taught courses and/or 6 ECTS of Spanish language course.

During the **Spring Semester**, students can choose 12 ECTS corresponding to the Final Project and/or 30 ECTS from the offered English-taught courses and/or 6 ECTS of Spanish language course.

Additionally, in either option, courses taught in Spanish may be chosen from those offered in any of ETSIDI's undergraduate and graduate degree programs.

# Program

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## FALL SEMESTER

SUBJECT	CREDITS (ECTS)
Art, Technology and Society	3
Computer Aided Manufacturing workshop	3
Design and selection of materials in 3D printing	3
English for Professional and Academic Communication	6
Intellectual capital and knowledge management	3
Introduction to Mechatronic Systems Design	3
Practical Internet of things with Raspberry Pi	3
Preparation of English	6
Spanish language course	6
Final Project	12

## SPRING SEMESTER

SUBJECT	CREDITS (ECTS)
Advanced Mathematics in Engineering	3
Design for Manufacturing and Assembly	3
Drawing and Sketching for Designers and Engineers	3
English for Professional and Academic Communication	6
Finite element based simulation model for fluid dynamics	3
Introduction to Chaos Applied to Systems, Processes and Products Design	3
Introduction to hybrid energy systems	3
Photovoltaic-powered products	3
Water and sustainability	3
Spanish language course	6
Final Project	12

# Subjects

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## **ADVANCED MATHEMATICS IN ENGINEERING**

The goal of this course is to deduce and simulate models of physical systems with interest in Engineering that require the use of differential equations. Special emphasis will be given to the corresponding mathematical theory and software tools that perform numerical simulations.

## **ART, TECHNOLOGY AND SOCIETY**

The main objective of this course is to develop professional and academic competencies for future engineers from a humanistic approach. These skills will be worked through a balance between practical and theoretical sessions about social, artistic, and technological topics that will encourage the development of creative/critical thinking; the design of projects; the use of artistic tools and methodologies; the implementation of hybrid initiatives of Engineering and Art in the community; and, finally, the prototyping of initiatives for sustainability and Sustainable Development Goals.

## **COMPUTER AIDED MANUFACTURING WORKSHOP**

This course provides an introduction to traditional machining processes that utilize Computer-Aided Manufacturing (CAM) systems. It offers an overview of software utilization for controlling machine tools and emphasizes the creation of machine plans, process documents, and machine operation/simulation. Additionally, it covers machining materials for various products and applications, exploring their desirable properties to optimize the machining process. Furthermore, students will learn about tool material selection, considering factors such as hardness, toughness, and chemical stability.

## **DESIGN AND SELECTION OF MATERIALS IN 3D PRINTING**

The attendance and use of this course will allow the student to know the current state of 3D printing techniques, as well as the criteria for an efficient design with the most suitable characteristics and materials for each project. In addition, the economic, technical and environmental implications are assessed.

**DESIGN FOR  
MANUFACTURING  
AND ASSEMBLY**

Design for Manufacturing and Assembly (DFMA) integrates the analysis, synthesis of technical criteria, and decision guidelines for engineers that facilitate parts and product fabrication, reduce cost, improve quality, and contribute to industrial processes' sustainability. DFMA aims at providing design and mechanical engineers with the key issues for a successful part shape and product configuration in relationship with the manufacturing and assembly/disassembly industrial processes with a product lifecycle approach.

**DRAWING AND  
SKETCHING FOR  
DESIGNERS AND  
ENGINEERS**

This course aims to consolidate the principles of drawing and sketching, with a special focus on the interconnected representation of objects and human figures. Special attention will be given to the study of proportions and the structure of the human body, particularly its skeletal and muscular parts. This study will enable us to apply the concepts of ergonomics and design with a descriptive and artistic aesthetic.

**ENGLISH FOR  
PROFESSIONAL AND  
ACADEMIC  
COMMUNICATION\***

This course develops all four macro-skills to enhance the student ability to cope with academic and professional communicative situations. Special attention is paid to those micro skills most useful for the main goal of the course. A task based approach is used. Complex communicative tasks are provided to allow the student use the resources previously drilled in class.

\*Click on this [link](#) and write the name of the subject to find its information.

**FINITE ELEMENT BASED  
SIMULATION MODEL  
FOR FLUID DYNAMICS**

The goal of this subject is that knowledge of the basic equations of Fluid Dynamics and creativity come together in an optimal product. For this purpose, complex Fluid Mechanics problems will be solved through the use of numerical techniques.

### **INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT**

Organizations in the Knowledge Age, in Industry 4-0 need a new management model for generating, capturing, and leveraging intellectual capital assets. The goal of this subject is to provide an in-depth understanding of the elements required for developing a comprehensive system for creating and applying sustained levels of intellectual capital in this millennium. A central question is how to measure this knowledge, that is, Intellectual Capital. The goal is to cultivate informed professionals capable of critically assessing Intellectual Capital that promotes innovations in this century.

### **INTRODUCTION TO CHAOS APPLIED TO SYSTEMS, PROCESSES AND PRODUCTS DESIGN**

The subject focuses on the study of nonlinear dynamic systems and the properties of their solutions. Analytical tools and criteria are presented for predicting the existence of non-deterministic solutions.

### **INTRODUCTION TO HYBRID ENERGY SYSTEMS**

The goal of this subject is to learn about the most used hybrid energy system configurations, their components and characteristics. Also, the measurement systems and the application and implementation of IoT sensors, as well as strategies based on prediction and classification algorithms to improve these systems.

### **INTRODUCTION TO MECHATRONIC SYSTEMS DESIGN**

Mechatronics engineering is an integrated discipline that focuses on the design and analysis of complete engineering systems. It is an area that merges concepts from at least four different disciplines: industrial design, mechanical engineering, electronic and electrical engineering and software engineering. This course aims to introduce the student to the multidisciplinary challenge required by modern mechatronic systems. At the end of the course, students will be able to propose integrated, innovative, efficient and environmentally sustainable solutions to technical problems that require the interaction of these disciplines.

### **PHOTOVOLTAIC- POWERED PRODUCTS**

This course focuses on the application of photovoltaics (PV) to industrial design for powering any kind of products or autonomous systems. The course introduces the fundamentals of PV cells and their behavior under real sun conditions, the design features of different PV cell technologies and module architectures, the main components and design principles of stand-alone PV systems for powering products, and their integration in products (product-integrated PV, PIPV), smart things, vehicles (VIPV), lighting or buildings (BIPV).

### **PRACTICAL INTERNET OF THINGS WITH RASPBERRY PI**

The Practical Internet of Things (IoT) with RaspberryPi course will allow students to use a Raspberry Pi to monitor and control devices around them. The student will have the necessary knowledge:

- To use sensors and actuators to monitor rooms or areas, and to be able to control devices (turning lights on and off, controlling motors, etc.)
- To develop programs that collect data and upload it to the cloud, using state-of-the art communication protocols (i.e. MQTT, Restful)
- To manage data in databases and visualize them.

### **PREPARATION OF ENGLISH**

It is a preparatory course for the successful completion of the TOEIC exam with a B2 level. The TOEIC test assesses the English language skills engaged in international business or intending to utilize English for communication purposes. We focus on Listening section Reading section, and use of English. This course offers strategies and skill reviews to help the students to overcome the most common challenges in Listening and Reading parts of the test.

### **SPANISH LANGUAGE COURSE**

This course trains students in the four Spanish language skills: listening comprehension, reading comprehension, speaking and writing. It focuses on the activities that an international student has to perform in every day and academic life. It aims to reach B1 language level according to the Common European Framework of Reference for Language.

## **WATER AND SUSTAINABILITY**

The goal of this course is to deal with sustainable issues related to water. That will include the water cycle, water uses, water pollution and water treatment to improve its quality. Furthermore, the course will include sustainable water management in industry, including the analysis of different processes considering water sustainability through cases studies.