Syllabus
2022 - 2023

## GENERAL INFORMATION

| Data of the subject | |
|---|---|
| **Subject name** | Industrial Communication Systems |
| **Subject code** | DEAC-MII-631 |
| **Mainprogram** | Official Master´s Degree in Industrial Engineering |
| **Involved programs** | Máster Universitario en Ingeniería Industrial y Máster Universitario en Sistemas Ferroviarios [Second year]<br>Máster Universitario en Ingeniería Industrial + Máster en Industria Conectada / in Smart Industry [Second year]<br>Máster Universitario en Ingeniería Industrial [Second year]<br>Máster Universitario en Ingeniería Industrial + Máster en Industria Conectada / in Smart Industry [Second year] |
| **Level** | Postgrado Oficial Master |
| **Quarter** | Semestral |
| **Credits** | 4,5 ECTS |
| **Type** | Compulsory |
| **Department** | Department of Electronics, Control and Communications |
| **Coordinator** | Emilio Manuel Domínguez Adán |
| **Schedule** | Evenings |
| **Office hours** | Send e-mail to get an appointment Course overview |

| Teacher Information | |
|---|---|
| **Teacher** | |
| **Name** | Emilio Manuel Domínguez Adan |
| **Department** | Department of Electronics, Control and Communications |
| **EMail** | emdominguez@comillas.edu |
| **Teacher** | |
| **Name** | Francesc Rafecas Caminals |
| **Department** | Department of Electronics, Control and Communications |
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## DESCRIPTION OF THE SUBJECT

### Contextualization of the subject

### Course contents

### Contents

## Theory

- Part I. Introduction to Industrial Communications. Definition of Industrial Communications. Agents in a communication. Networks and field-busses.
- Part II. Basics in communications. About signals: Fourier and frequency spectrum, bandwidth, and wavelength. About transmission channel: transmission ways (guided and non-guided), network topologies and isolation. About signal transmission: bandwidth, speed transmission, SNR, BER, channel capacity, modulation, multiplexing, media access.
- Part III. Protocol architectures. Logic behavior of communications, OSI model, TCP/IP stack and different network devices.
- Part IV. Industrial applications. Protocols normally used in Industrial Environments. New trends and protocols.

## Laboratory

- Practices based on industrial communications protocols using RS232, RS485, Ethernet and wireless communications.

## EVALUATION AND CRITERIA

| Evaluation activities | Evaluation criteria | Weight |
|---|---|---|
| • Final exam (50%).<br>• Quick test (20%). | • Concepts understanding.<br>• Concept application for solving problems.<br>• Analysis and interpretation of obtained results from the problem resolution.<br>• Presentation and written communication. | 70 % |
| • Laboratory practices. | • Previous job.<br>• Individual work done during the practices.<br>• Quality, analysis and interpretation of obtained results.<br>• On time finishing.<br>• Presentation and oral and written communication.<br>• Initiative. | 30 % |

## Grading

The grade in the ordinary call is obtained according to the weights indicated in "Evaluation activities", provided that the gradesobtained in the final exam and in the laboratory practices are greater than or equal to 5. Otherwise, the final grade will be the lowest of them.

The qualification in the extraordinary call of the subject will be obtained in the same way as in the ordinary call placing the note of the final exam by the one obtained in the extraordinary test. Students who have failed the course and obtained a grade lower than 4 in the laboratory will be examined in an extraordinary call.

Class attendance is mandatory, according to the Academic Regulations of the Escuela Técnica Superior de Ingeniería (ICAI).

The requirements of attendance will be applied independently for theory and laboratory sessions:

- In the case of theory sessions, failure to comply with this rule may prevent you from taking the exam in the call ordinary.
- In the case of laboratory sessions, failure to comply with this rule may prevent you from taking the exam in the call ordinary and

extraordinary. In any case, unjustified absences from laboratory sessions will be penalized in the evaluation.

## WORK PLAN AND SCHEDULE

| Activities | Date of realization | Delivery date |
|---|---|---|
| Quick test | 7th or 8th week according to Academic Calendar | |
| Final exam | Ordinary exam period | |
| Laboratory practices | During six weeks | |
| Theory classes | Weekly | |

## BIBLIOGRAPHY AND RESOURCES

| Basic References |
|---|
| Slides and notes of the subject. |

COMILLAS
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|---|---|---|---|---|---|---|---|
| Septiembre | Semana 1 | lunes | | | viernes | 2-sept | Presentación de la asignatura |
| | Semana 2 | lunes | 5-sept | Introducción + señal | viernes | 9-sept | Señal repaso, canal y transmisión |
| | Semana 3 | lunes | 12-sept | Aplicaciones Industriales | viernes | 16-sept | Dispositivos de Red |
| | Semana 4 | lunes | 19-sept | Laboratorio p0 | viernes | 23-sept | Laboratorio p0 |
| Octubre | Semana 5 | lunes | 26-sept | Laboratorio p1 | viernes | 30-sept | Laboratorio p1 |
| | Semana 6 | lunes | 3-oct | Laboratorio p2 | viernes | 7-oct | Laboratorio p2 |
| | Semana 7 | lunes | 10-oct | | viernes | 14-oct | Repaso materia |
| | Semana 8 | lunes | 17-oct | Prueba seguimiento | viernes | 21-oct | Protocolos LAN |
| Noviembre | Semana 9 | lunes | 24-oct | Laboratorio p3 | viernes | 28-oct | Laboratorio p3 |
| | Semana 10 | lunes | 31-oct | | viernes | 4-nov | Dispositivos ZigBee |
| | Semana 11 | lunes | 7-nov | Laboratorio p4 | viernes | 11-nov | Laboratorio p4 |
| | Semana 12 | lunes | 14-nov | Laboratorio p5 | viernes | 18-nov | Laboratorio p5 |
| | Semana 13 | lunes | 21-nov | Laboratorio p6 | viernes | 25-nov | Laboratorio p6 |
| Diciembre | Semana 14 | lunes | 28-nov | | viernes | 2-dic | Cierre de curso |

(*) Las fechas son orientativas y pueden sufrir algún cambio