Course: **Information Coding**

Semester: Fall

Credits: 6 ECTS

Contact: Luis Miguel Pozo Coronado / luispozo@etsisi.upm.es

Objective/s:
The subject of this course is the study of the different possibilities to encode the information numerically, depending on the intended goal: conciseness (data compression), integrity (error detection codes) or security (cryptography).

The general objectives are: a) To understand the different mathematical concepts and tools underlying the models under consideration; and
b) To implement these models, with special attention to efficiency and securityissues.

Contents:

1. Introduction to Information Coding: Lossless compression, Huffman codes. Error detection, CRC.
2. Introduction to Cryptology.
3. Computational Complexity.
4. Number theory.
5. Public key cryptosystems: RSA, ElGamal. Digital Signature.
6. Primality tests.

Assessment (brief description):

- Continuous evaluation:

Written exams: 40% (T1: 8%; T2-3: 12%; T4-6: 20%)
Moodle tests: 10%
Lab projects: 25% (4 projects, 5% each; Validation test: 5%)
Final project (Toolbox including all lab work): 25%

- Only Final exam and students that need July exam to pass thecourse:

Written exam: 50%
Lab exam (using the Toolbox procedures): 50%

Students must get at least 5 out of 10 points to pass the course.

Course: **Legal and professional issues**

Semester: Fall

Credits: 3 ECTS

Contact: Celia Fernández Aller / mariacelia.fernandez@upm.es

Objective/s:

This course is focused in the fundamentals and underlying legal concepts concerning Computer and Software Engineering: privacy, data protection, intellectual property rights, IT contracts and E-commerce.

The general objectives are: a) Learn the law and legal principles in the areas concerning IT Law. B) Recognize and apply the ethical and legal rules and standards of conduct involved in the practice of Engineering. C) Analyze legal problems and interactions between Law and IT Tecnologies.

Contents:

1. Introduction to IT Law
2. Data protection: Principles; rights and duties; liability; international transfers
3. Intellectual Property Rights: copyright, rules on fair use, special rules on copy protection for digital media; patents; trademarks; software licenses, end user license agreements, free software licenses and open-source licenses; professional liability of individual developers, warranties
4. IT contract: preparation, future-proofing the contract, negotiating liability and indemnities
5. E-commerce

Assessment (brief description):

- Continuous evaluation:

WE*0.30+ LA*0.30+WGP*0.40

WE: Written exam; minimum 3 in 10
LA: Lab assignment; minimum 3 in 10
WGP: Presentation of work performed in groups

- Only Final exam and students that need July exam to pass the course:

WE*1

WE: Written exam; minimum 5 in 10

Students must get at least 5 out of 10 points to pass the course.

Course: **Linux system administration**

Semester: Fall

Credits: 6 ECTS

Contact: Pilar Manzano / pilar.manzano@upm.es

Objective/s:
Understanding and doing some of the most important tasks of Linux system administration.

Contents:

1. Introduction
2. System startup and shutdown
3. Installing and updating SW
4. User accounts
5. Managing system resources
6. System security
7. Automating tasks
8. File systems and disks
9. Advanced use of disk
10. Backups
11. Printer management

Assessment (brief description):

- Continuous evaluation:

Partial exams: 20% (Test1: 10%; Test2: 10%)
Lab assignments: 20%
Generic competence (written and oral communication): 20%
Final exam: 40% (Students must get at least 5 out of 10 points to pass the course)

- Only Final exam and students that need July exam to pass thecourse:

Lab assignments: 20%
Generic competence (written and oral communication): 20%
Final exam: 60% (Students must get at least 5 out of 10 points in this exam to pass the course)

Students must get a final grade of at least 5 out of 10 points to pass the course.

Course: **English for professional and academic communication**

Semester: Fall, Spring

Credits: 6 ECTS

Contact: Francisca López / flopez@etsisi.upm.es

Objective/s:
The course is mainly practical and it is taught in English. It covers aspects related to the writing of professional and academic documents in English. Besides, it deals with oral communication abilities required for negotiation, meetings and professional presentations, among others.

Contents:

1. Terminology in academic environments and TICs.
2. General characteristics of written professional communication.
3. Types of professional communication: letters, e-mail, report, memorandum and other types of documents.
4. General characteristics of written academic communication.
5. Types of academic communication: abstracts, papers, Diploma projects and other types of documents.
6. Oral professional communication.
7. Facts intervening in oral presentations: context, partners, formality degree, body language and others.

Students must get a final grade of at least 5 out of 10 points to pass the course.

Course: **Spanish for Science and Technology**

Semester: Fall, Spring

Credits: 3 ECTS

Information:

http://www.upm.es/Estudiantes/Movilidad/LenguasInternacionalizacion/AreaEspanol

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DIGITAL SIGNAL PROCESSING

- **Course**: Digital Signal Processing (DSP).
- **Semester**: Spring semester.
- **Credits**: 3 ECTS
- **Contact**: Paco Gómez (francisco.gomez@upm.es
- **Course objectives**: The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis DSP systems. Apply the principles of discrete-time signal analysis to perform various signal operations. Apply the principles of z-transforms to finite difference equations. Apply the principles of Fourier transform analysis to describe the frequency characteristics of discrete-time signals and systems. Apply the principles of signal analysis to filtering. Use computer programming tools to process and visualize signals.
- **Syllabus**: Introduction to DSP and its main basic concepts. Discrete-time signals and systems. Basic concepts and algorithms for discrete-time signals and systems. The *z*-transform: mathematical techniques to solve equations in discrete-time systems. The discrete Fourier transform: mathematical definition and algorithms for the discrete Fourier transform. The fast Fourier transform: optimization of performance for the Fourier transform.
- **Assessment** (brief description): For the continuous assessment, the score will be based on class participation, problem-solving, and MATLAB projects. For only-final exam students, a written exam plus a lab exam will be administered. Exams are assessed on a 0-10 scale and students need to get 5 out of 10 in order to pass the course.