Chose a Project work (12 ECTS) or Bachelor Project (24ECTS) taking into consideration the offer below.

Please bear in mind that a Bachelor Project requires a presentation and defense at EEBE at the corresponding period.

When you receive an acceptance from the advisor, please apply to EEBE following the instructions on the website.

Escoge una modalidad de proyecto Project Work (12 ECTS) o Trabajo Fin de Grado (24 ECTS).

Ten en cuenta que es necesario el depósito y defensa en la EEBE en las fechas indicadas.

Una vez recibas la aceptación por parte de tu tutor, haz tu solicitud en la EEBE siguiendo las indicaciones de nuestra página web.
<table>
<thead>
<tr>
<th>Title: Developing management tools for project management offices (PMO) in Engineering Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description: The project consists of the implementation of new features in project management tools. It is necessary to know the state of the art in engineering project management applications.</td>
</tr>
<tr>
<td>The development shall take into account the Project Management Body of Knowledge by the Project Management Institute (PMI).</td>
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<tr>
<td>The work involves working in a team to develop PMO applications in engineering or consulting firms. Some of the requested characteristics refer to planning and monitoring, workflows, task management, and knowledge management.</td>
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<tr>
<td>These projects may include a short stage in CONEIX Company: <a href="https://coneix.com/">https://coneix.com/</a></td>
</tr>
<tr>
<td>No. ECTS: 24</td>
</tr>
<tr>
<td>Advisor: Francesc Alpiste (<a href="mailto:francesc.alpiste@upc.edu">francesc.alpiste@upc.edu</a>) / Jordi Torner (<a href="mailto:Jordi.torner-ribe@upc.edu">Jordi.torner-ribe@upc.edu</a>)</td>
</tr>
<tr>
<td>Bachelor degree: All</td>
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<table>
<thead>
<tr>
<th>Title: Design of a Local Area Network</th>
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<tbody>
<tr>
<td>Description: Based on the connectivity requirements of a medium-sized company, the project involves projecting the communications infrastructure of the company. Design of the local area network, providing connectivity to the users, and providing a realistic budget are parts of the work. Basic networking knowledge is required.</td>
</tr>
<tr>
<td>No. ECTS: 24</td>
</tr>
<tr>
<td>Advisor: Antoni Perez-Poch</td>
</tr>
<tr>
<td>Bachelor degree: Electronics, Electrical, Computer Science, Robotics and Automation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title: Analysis of the Telecommunications market in Europe</th>
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<tbody>
<tr>
<td>Description: The work is composed of an historical (from the last 20 years) evolution of the telecommunications market in the European Union area, with a focus on the present status, along with the development of a basic application (web, mobile app, or blog) in which interactive presentations and graphs are presented.</td>
</tr>
<tr>
<td>No. ECTS: 24</td>
</tr>
<tr>
<td>Advisor: Antoni Perez-Poch (<a href="mailto:anotni.perez-poch@upc.edu">anotni.perez-poch@upc.edu</a>)</td>
</tr>
<tr>
<td>Bachelor degree: any</td>
</tr>
</tbody>
</table>
Title: Instrumentation management of an electronics laboratory

Description:

Using a PC and LabVIEW software from National Instruments, the student will develop a system for the management of the most common tasks of data acquisition and signal generation in an electronics laboratory and automate these tasks to perform repetitive operations without human intervention. The whole system will consist of a PC and several instruments as programmable signal generators, digital oscilloscopes and power sources connected through different links as GPIB, USB, RS-232 and Ethernet.

Previous knowledge on Labview software is desired.

No. ECTS: 24

Advisor: Jordi Cosp Vilella (Jordi.cosp@upc.edu)

Bachelor degree: Industrial Electronics and Automation

Title: Design of a simple microcontroller on a programmable logic device

Description:

The aim of the thesis is to develop a complete but simple microprocessor on a digital programmable device (as an FPGA) using the VHDL description language. In order to obtain the microcontroller, the microprocessor will be expanded with some peripherals as a timer, communication units and/or a PWM modulator, also designed using VHDL.

Previous knowledge on the VHDL description language and digital electronics is required to develop this project.

No. ECTS: 24

Advisor: Jordi Cosp Vilella (Jordi.cosp@upc.edu)

Bachelor degree: Industrial Electronics and Automation

Title: Design, implementation and test of a datalogger based on an Arduino platform

Description:

The aim of the thesis is to develop and test a datalogger based on an Arduino platform. The main goal is to develop a simple system that can measure some magnitudes as temperature or air pressure and send this data through a wireless link (i.e. Zigbee or bluetooth) to a base station to store the recording. One of the main issues will be the use of low-power devices and algorithms in view of powering the datalogger with an energy harvesting device. Thus, eventually, a specific hardware platform compatible with Arduino could be developed to perform the logging task with lower power requirements.

No. ECTS: 12 or 24

Advisor: Jordi Cosp Vilella (Jordi.cosp@upc.edu)

Bachelor degree: Industrial Electronics and Automation
Title: PM generator for low speed applications

Description:
You must design a PM generator for very low speed range (5 to 150 rpm) and low power output (10 to 100 W) with high efficiency. This is a typical design for low power wind design turbine as is a public light autonomous system.

No. ECTS: 12 or 24
Advisor: Ramon Bargalló (ramon.bargallo@upc.edu)
Bachelor degree: Electricity/Energy

Title: Design of an electrical machine with wide speed range

Description:
You must design a Synchronous Reluctance Machine for a wide speed range to special application such as a washing machine or centrifugal device. The inputs are: rated values for power and voltage, type of cooling, class of efficiency. Outputs: main dimensions, FE analysis, main parameters and characteristics. To optimize wide speed range you must use the Response Surface Methodology method or other at your convenience. If necessary you must consider PM support to increase the speed range.

Advisor: Ramon Bargalló (ramon.bargallo@upc.edu)
No. ECTS: 24
Bachelor degree: Electricity

Title: Direct drive motor

Description:
You must design a PM motor for low/high speed applications and high torque requirements, such as lift, washing machine or motorbike. To optimize wide speed range you must use the Response Surface Methodology method or other at your convenience.

Advisor: Ramon Bargalló (ramon.bargallo@upc.edu)
No. ECTS: 24
Bachelor degree: Electricity
**Title: Finite Element Analysis of Traction Force Microscopy**

**Description:**

In many engineering applications, elastic mechanical analysis allows for retrieving the displacements from a set of known loads. This is so-called direct or forward analysis. Instead, in laboratory experiments, the cellular displacements are measured, and the loads that they exert are instead unknown. The computation of these loads is so-called an inverse problem.

This Bachelor thesis aims to use finite elements for the inverse analysis of cell monolayer on elastic substrates. This technique has become experimentally very popular, but its application to substrates with non-homogenous stiffness requires some special computational extensions.

An existent Matlab finite element code will be used to analyse the cost and accuracy of the method, and apply to real experiments. The forces and the mechanical response of the cells will be also studied.

No. ECTS:12/24

Advisor: Jose J Muñoz (j.munoz@upc.edu)

Bachelor degree: Mechanical Engineering, Biomedical engineering

**Title: Analysis of remodelling of curved Multicellular systems**

**Description:**

The mechanical response of active biological tissues is determined by the internal remodelling of each cell, and reorganisation of the cell-cell connectivity. Recent computational models aim to appropriately simulate this response by including appropriate rheological laws and the capability of dynamically changing the neighbouring cells.

This thesis aims to test a numerical Matlab code, and simulate an active curved monolayer subjected to growth and cell shape changes. The results have applications on the dynamics of general cellular systems such as cancer proliferation or embryo development of organisms.

No. ECTS:12/24

Advisor: Jose J Muñoz (j.munoz@upc.edu)

Bachelor degree: Mechanical Engineering, Biomedical engineering
Title: Flexible mechanisms analysis

Description:

In many industrial applications the rigid assumption of mechanisms is not sufficient, and elastic deformations must be taken into account. These deformations are of outmost importance in systems such as pantographs, aerial runways, or other applications with sliding joints.

In order to handle the non-linear equilibrium equations and the kinematic constraints of these joints, specific robust numerical algorithms must be designed. Energy preserving algorithms are renowned for its robustness.

This thesis aims to test energy-preserving algorithms (available in Matlab) for flexible mechanisms, and apply them to a cable--pantograph system.

No. ECTS:12/24

Advisor: Jose J Muñoz (j.munoz@upc.edu)

Bachelor degree: Mechanical Engineering

Title: Computational Limit Analysis

Description:

The bearing capacity of structures has been traditionally computed resorting to classical solutions. Recent techniques in optimisation have allowed engineers and practitioners to evaluate this bearing capacity and the stability of structures for general geometries and plastic materials.

This thesis aims to apply some recent numerical formulations based on stresses for computing the stability of strip footing foundations and excavation slopes. A Matlab and fortran90 code is available, which will be modified and adapted for a traction based formulation.

No. ECTS:12/24

Advisor: Jose J Muñoz (j.munoz@upc.edu)

Bachelor degree: Mechanical Engineering
**Title: Heart rate variability analysis in patients with sleep apnea-hypopnea syndrome**

**Description:**

We have a database of Polysomnographic (PSG) sleep studies taken at hospital in several subjects with different severity degrees of Sleep Apnea Hypopnea Syndrome (SAHS). The aim of the present proposal is to extract the heart rate series from the PSG ECG channels and to study the Heart Rate Variability (HRV) in the time domain and in the frequency domain, during periods of normal breathing and during apneas/hypopneas. The algorithms will be developed in Matlab environment.

No. ECTS: 24 (12)

Advisor: Jordi Solà Soler (Jordi.sola@upc.edu)

Bachelor degree: Biomedical Engineering

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**Title: Cardiorespiratory synchronization analysis in patients with sleep apnea-hypopnea syndrome**

**Description:**

We have a database of Polysomnographic (PSG) sleep studies taken at hospital in several subjects with different severity degrees of Sleep Apnea Hypopnea Syndrome (SAHS). In previous works we have developed an algorithm to analyse the cardiorespiratory synchronization during the night. The aim of the present proposal is to develop an alternative method for cardiorespiratory synchronization analysis and to compare its performance with the previous one in a subset of patients from our database. The algorithms will be developed in Matlab environment.

No. ECTS: 24 (12)

Advisor: Jordi Solà Soler (Jordi.sola@upc.edu)

Bachelor degree: Biomedical Engineering
Title: quantified proposals – based on a different criteria (climate justice, developing countries goals, etc.) - of distribution within the different unfccc part-states of the mitigation global objective defined by different rcp5s of the ipcc

Description: In the context of Paris 2015 Climate Summit (before and after), it is very important that mitigation emissions proposals arise from all positions and perspectives, in order to help to enable the international community to finally find “the proposal based on a consensus on some criteria that is possible to share – by all the parts- and quantify” which makes possible a political agreement.

The social and economic development and the eradication of poverty are the highest priority in the developing world and, therefore, their achievement of the emissions peak has to go beyond the one done by the developed countries, in the joint direction of a global equitable access to sustainable development and the complete de-carbonization.

We therefore assume this as one of the political bases of our proposal, while taking into account, explicitly in these premises, the historically written “Principle of Common but Differentiated Responsibilities”, which are added today, although not always consensually, according to their Respective Capabilities, Historical Responsibilities, Equity, National Circumstances, etc.

At the other hand, the proposals elaborated should fulfill the global emissions scenario requirements defined in the RCPs, and more specifically with the evolution of the mitigation CO2 emissions from burning fossil fuels and cement manufacturing, contained in the AR5 of the IPCC.

No. ECTS: 12 or 24

Advisor: Olga Alcaraz (olga.alcaraz@upc.edu) & Josep Xercavins (josep.xercavins@upc.edu)

Bachelor degree: All

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Title: Creating Apps using Virtual and Augmented Reality

Description:

This proposal includes Projects involving application design using Virtual Reality and Augmented Reality. These apps can be applied to many fields: engineering, design, architecture, education, etc.

We focus on technology innovations, mainly on visual immersion and sensorial interaction.

These projects may include a short stage in VYSION Company (http://www.visyon360.com/).

No. ECTS: 24

Advisor: Francesc Alpiste (francesc.alpiste@upc.edu) / Jordi Torner (Jordi.torner-ribe@upc.edu)

Bachelor degree: All
Title: Time series analysis in the field of engineering.

Description:
Studies / analysis of time series of interest for engineering estimating and / or predicting future results or past.

The title of the proposal is generic, it will be decided after the interview with the persons concerned.

Generic proposed: Choose one of the following skills: Effective oral and written Solvent use of information resources, Self, Sustainability and social commitment, teamwork.

Advisor: Pablo Buenestado. (pablo.buenestado@upc.edu)

Bachelor degree: All

Title: Statistical applications to engineering.

Description:
In many engineering problems require skill to make a decision based on a statistical carry out a statistical quality control, working with a large database and / or related variables of interest.

In this study is to analyze statistical tools that help engineer / yy improve results in the tasks described above or some of them.

The title of the proposal is generic, it will be decided after the interview with the persons concerned.

Generic proposed: Choose one of the following skills: Effective oral and written Solvent use of information resources, Self, Sustainability and social commitment, teamwork.

Ponent: Pablo Buenestado. (pablo.buenestado@upc.edu)

Bachelor degree: All.

Advisor: Andreas Sumper (andreas.sumper@upc.edu)

Different project proposals:

- Internet of Thinks: Conceptual study of energy applications
- Smart Cities. Sustainability and Smart approaches
- Electric vehicle data collection
- Island electricity systems and sustainability
- Collecting data of electricity systems
- European Power System modelling
- Wind power system modelling
- Photovoltaic power system modelling
- Impact of power lines
Títol: Energies Renovables: Anàlisis dels Pobles Energèticament Independents  //  Renewable energies: analysis of energetically independent towns
Descripció: El projecte consisteix en fer un estudi de poblacions petites de tot el món que han posat en marxa instal·lacions per a generar la seva pròpia energia, independent-se de la xarxa nacional o del subministrament de les grans companyies, convertint-se en productors, propietaris i consumidors de les seves pròpies necessitats energètiques. Amb les dades recopilades, es proposaran models d’inversió, gestió i finançament d’aquestes instal·lacions i s’analitzaran la qualitat de servei i/o avantatges pels habitants d’aquestes poblacions.
Competències genèriques proposades: Emprenedoria i innovació, Sostenibilitat i compromís social, Ús solvent dels recursos d’informació, Tercera llengua (El TFG es pot fer en Anglès)
Ponent: Joan Martínez
Titulació: Qualsevol (preferentment Energia, però obert a totes les titulacions. Convé tenir interès per renovables i estar familiaritzat)

Títol: Big Data: Aplicació a la cerca d’informació i presa de decisions a l’Empresa  //  Big data: application to information research and decision making in a company
Descripció: Aplicació de diferents software a la cerca d’informació en internet, pàgines web de companyies i en bases de dades empresarials o xarxes socials per a realitzar estudis de mercat, de comportament de consumidors, selecció de recursos humans, o altres aspectes d’interés en la gestió, i anàlisi de cóm aquesta informació pot ajudar a prendre decisions per part de la direcció de les companyies.
Competències genèriques proposades: Emprenedoria i innovació, Sostenibilitat i compromís social, Ús solvent dels recursos d’informació, Tercera llengua (El TFG es pot fer en Anglès)
Ponent: Joan Martínez
Titulació: Totes (convé tenir interès per la informàtica i la gestió de l’empresa)

Títol: Desenvolupament d’un entorn per a la gestió de camps de variables atmosfèriques
Descripció: L’objectiu és la implementació d’un programa en un entorn Visual Fortran que permeti la obtenció, a partir de bases de dades procedents dels centres de predicció, de variables meteorològiques (com vent, geopotencial, temperatura, etc) i el seu tractament posterior. Aquest software constarà de 3 mòduls:
- Mòdul de lectura de les dades meteorològiques, que permeti escollir les variables i el domini espacial i temporal.
- Mòdul de càlcul.
- Mòdul de representació, que permetrà visualitzar els camps obtinguts en un entorn gràfic.
Competències genèriques proposades: Sostenibilitat, Tercera llengua, Cominicació oral i escrita, Treball en equip, Us dels recursos d’informació, Treball autònom
Ponent: Marta Alarcón Jordán
Titulació: Totes les Titulacions

Títol: Barcelona ZERO-G Challenge
Descripció: Design and development of experiments in zero gravity. L’estudiant ha de proposar, dissenyar i fabricar un experiment per ser conduit en vol parabòlic de gravetat zero, amb l’ajut de tutors experts de la UPC. Hi ha la possibilitat de volar l’experiment un cop llegit el PFC a l’Aeroport de Sabadell mercés a un conveni signat amb BAIE i la UPC.
Competències genèriques proposades: Ús solvent de recerca d’informació, idioma anglès.
Ponent: Antoni Pérez-Poch
Titulació: Totes les Titulacions
Evaluation of the potential of GPR to define subterranean streams by means of backscattering and frequency content.

The project consists of the analysis of ground-penetrating radar (GPR) data in order to determine the ability of the methodology in the detection of shallow geological targets. The analysis will be performed based in changes of the frequency content and in the evaluation of the backscattered energy. The tasks include radar data acquisition in a selected area of Barcelona, radar data processing and interpretation, development of programs to measure the scattered energy and the change in the frequency content, comparison with numerical simulations, evaluation of the methodology and elaboration of the budget for a wide study in an area of the city. If necessary, could be designed, prepared and performed some laboratory test.

Competències genèriques proposades: Third language, self-learning, effective use of resources information, efficient oral and written communication.

Ponent: Vega Pérez Gracia
Titulació: All degrees
**Títol:** Disseny d'un collar identificador pel Linx // Design of an identifying collar for the Linx  
**Descripció:** L'estudiant dissenyarà un collar per a la identificació i localització del Linx, mamífer protegit i en perill d'extinció. El collar disposarà de dispositius de seguiment via ràdio, GPS, integrant les diferents tecnologies i buscant una eficiència de consum que permeti una vida útil del dispositiu d'uns 3 anys.  
**Competències genèriques proposades:** Innovació, tercera llengua, autoaprenentatge  
**Ponent:** Jordi Pons i Prats (jpons@cimne.upc.edu), Jordi Jiménez (jimenez@cimne.upc.edu), Eduardo Soudah (esoudah@cimne.upc.edu)  
**Titulació:** Totes les titulacions

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**Títol:** Realidad Aumentada para técnicas Quirúrgicas // Augmented Reality for Surgical Techniques  
**Descripció:** Desarrollar un modelo de realidad aumentada basada en imágenes médicas para la su aplicación en técnicas quirúrgicas. Colaboración con el Hospital El Pilar.  
**Competències genèriques proposades:** Aprendizaje autónomo. Tercera lenguaje. Realidad Aumentada  
**Ponent:** Eduardo Soudah  
**Titulació:** Todas las titulaciones

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**Títol:** Aplicación de técnicas d'aprenentatge automàtic (machine learning) al diagnòstic de danys en aerogeneradors de gran escala (5MW). // Application of machine learning techniques to the diagnosis of damages in large-scale wind turbines (5MW).  
**Descripció:** A causa de la creixent demanda en la seguretat i fiabilitat dels aerogeneradors de gran escala, l’estudi sobre el diagnòstic de danys és un tema de gran interès. És vital i necessari incorporar solucions que detectin i localitzin l’aparició dels danys.  
En el treball que es proposa desenvolupar, s’utilitzarà el software FAST (Fatigue, Aerodynamics, Structures and Turbulence) desenvolupat pel NREL (National Renewable Energy Laboratory, USA) per simular el funcionament en règim saludable i davant de diversos danys d’un aerogenerador de 5MW. Les dades obtingudes de les simulacions s’utilitzaran per estudiar diferents tècniques de machine learning amb l’objectiu de desenvolupar un mètode pel diagnòstic dels danys estudis.  
Cal destacar que el software FAST és utilitzat per investigadors i enginyers d’arreu del món ja que està certificat pel disseny d’aerogeneradors. És el simulador open-source de més alt grau de fiabilitat per a la simulació i disseny d’aerogeneradors industrials.  
Aquest projecte s’emmarca dins del projecte d’investigació “Desarrollo y validación de sistemas de detección de daños y diseño de estrategias de control tolerante a daños con aplicación a plantas de energía eólica offshore (WinTurCoM)” del Ministerio de Ciencia e Innovación i, per tant, un dels objectius d’aquesta proposta és enviar una contribució en un congrés internacional de l’àrea de Health Monitoring i/o una publicació a la revista científica Structural Control & Health Monitoring.  
**Competències genèriques proposades:** A convenir entre les següents: ús solvents de recerca d’informació, idioma anglès, comunicació eficaç oral i escrita, aprenentatge autònom.  
**Ponent:** Yolanda Vidal, Francesc Pozo (e-mail de contacte: yolanda.vidal@upc.edu, francesc.pozo@upc.edu)  
**Titulació:** Totes les titulacions (convé tenir interès per la programació)