DIPLOMA IN ADVANCED APPLIED TECHNOLOGIES FOR INDUSTRY

General Description

The Diploma in Advanced Applied Technologies for Industry is taught by University of Cantabria faculty staff, who have wide teaching and research experience in Industrial Engineering in an International context together with guest professors from other universities. It allows international students to embrace both Spanish culture and language, while studying entirely in English.

Program details

The University of Cantabria Diploma in Advanced Applied Technologies for Industry offers 30 ECTS credits distributed in courses taught in English in disciplines such as Electronic Circuits, Machine Design, Dynamic Systems Modelling, Perception Systems and Digital Electronics.

Students coming to Santander in the frame of an exchange program may select any number of unit courses appropriate for their curricula with the approval of academic coordinators at home institutions and the consent of the Diploma Director but in order to obtain the Diploma they need to successfully complete all the courses that make up the program, including the course: “Spanish Language for Engineers”.

Teaching will be carried out in small international groups. All Unit courses are taught during Spring Semester (mid-February through to June). The grading system is based on continuous evaluation, including mid-term and final exams.

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VICERRECTORADO DE RELACIONES INTERNACIONALES. Edificio de las Facultades de Derecho y Ciencias Económicas y Empresariales
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Unit Courses

Electronic Circuits and Devices

Spring. 6 ECTS credits

The aim of 'Electronic Circuits and Devices' is to present theoretical and practical approaches in order to give the basic knowledge to the future engineers to adopt decisions about design, characterization and optimization of electronic systems. Students completing this course will be able to analyse and design electronic circuits, understand the principles and operation of the semiconductor devices used in them and apply this knowledge to solve a wide range of problems that can appear during their professional activities.

Textbook

K. C. Microelectronic Circuits, Sedra, A.S., Smith. *Design of Analog CMOS Integrated Circuits*, Razavi, B. *CMOS Analog Circuit Design,* Allen, E.Ph., Holberg, R.D. *Design with Operational Amplifiers and Integrated Circuits,* Franco, S. *Analysis and Design of analog integrated circuits,* Gray, P.R., Meyer, R.G. *Design of analog integrated circuits and systems,* Laker, K., Sansen, W. *Analog design for CMOS VLSI systems,* Maloberti, F. *Operation and modeling of the MOS transistor,* Tsividis, Y. *Mixed Analog-Digital VLSI devices and technology,* Tsividis, Y. *Semiconductor devices: An introduction,* Singh, J.

Digital Electronic System

Spring. 6 ECTS credits

Digital Electronic System will take a practical approach to design digital electronics circuits described in VHDL and implemented in a CPLD or FPGA. After a few theoretical classes on VHDL language and the design sequence, students will solve different low complexity practical circuits that will constitute building blocks for a final, more complex circuit. Using the different practical cases students will describe, simulate, synthesize and implement digital circuits of interest for real industry applications.

Textbook

Logic Design Principles, Edward J. Mc Cluskey. *Introduction to digital Logic Design,* John P. Hayes. *VHDL Second Edition,* Douglas Perry. *VHDL Made Easy*, David Pellerin, Douglas Taylor. *Designing with FPGAs y CPLDs*, Jesse H. Jenkinns. *Digital Design Using Field Programmable Gate Arrays,* P.K. Chan and S. Moured. *FPGA Prototyping by examples. Xilinx Spartan-3 Version,* Pong P. Chu, Wiley Interscience, 2008.

Advanced Machine Design

Spring. 6 ECTS credits

This course presents theoretical and practical approaches in order to acquire the basic knowledge in structural dynamics problems that appears in mechanical machine design. The aims of the course are: to cover more of the typical engineering problems in structural machine dynamics, provide a broad overview of the definitions, concepts and professional techniques that includes two main areas of study, theoretical and experimental and to offer a complete vision of the techniques involved around dynamics machine design.

Textbook

Dynamics of structures, Clough, R.W.; Penzien, J. *Dynamics of structures,* Humar, J. L. *The Finite Element Method in Mechanical Design,* Knight, C.E., *Finite Element Handbook,* Kardestuncer, H. *Introduction to finite element vibration analysis,* Petyt, M. *Finite element procedures in engineering analysis,* Bathe, K.J. *An introduction to random vibrations, spectral and wavelet analysis,* Newland, D.E.

Perception Systems

Spring. 6 ECTS credits

This course presents theoretical and practical approaches in order to acquire the basic knowledge in the principal sensors present in control systems. This module is structured in two parts: one dedicated to the principles and applications of the most important sensors, including signal conditioning techniques; the second one presents an overview of concepts and professional techniques of artificial vision as the most powerful tools for perception system. The student will be introduced to the basic techniques of the field of Computer Vision. He/She will learn to apply Image Processing techniques.

Textbook

Digital image processing, Castleman, Kenneth R. *Measurement systems: application and design,* Ernest O. Doebelin. *Sensors for measurement and control,* Elgar, Peter. *Computer vision: a modern approach,* Forsyth, David, A.

Modelling and Simulation of Dynamical Systems

Spring. 6 ECTS credits

Through this course students will obtain a clear review from different types of dynamic systems, their classification and their properties. They will be capable of distinguishing among event-driven systems, discrete-time and continuous-time systems, linear and non-linear systems, concentrated parameter and non-concentrated parameter systems, deterministic and non-deterministic systems, etc. The course will consist of lectures on the basic material, practical examples and exercises, and real processes modelling at the laboratory

Textbook

System Dynamics. An introduction, Derek Rowell and David N.; *Discrete Event Systems: Modelling and Performance Analysis,* Christos G.; *Cassandras System Identification: Theory for the user,* Lenard Lunj.

Spanish History and Culture for Engineers

Spring. 6 ECTS credits

Students will be encouraged to understand and make their own historical perspective on Spanish reality wherever possible. This will include: a critical and rational view of Spanish history, understanding and respect for viewpoints molded by different historical backgrounds on Spanish history, a general idea of the diachronic framework of major historical periods or events in Spain and direct contact with the Spanish historian's craft, that is, even in a circumscribed context, contact with original Spanish sources and texts produced by professional history-graphical research.

Textbook

Prehistoria de la Península Ibérica, Barandiarán Maestu, I., Rincón, M.A. del and Maya González, J.L.; *Iberia before the Iberians. The Stone Age Prehistory of Cantabrian Spain,* Straus, L.G.; *Roman Spain: Conquest and Assimilation,* Curchin, L.A.; *Hispania y el Imperio,* Bravo, G.; *The medieval Spains,* Reilly, B. F.; *La España medieval,* Valdeón Baruque, J.; *Modern Spain,* Carr, R. *Democracy in Modern Spain,* Gunther, Montero and Botella.

Spanish Language for Engineers

Spring. 6 ECTS credits

To understand and build complex sentences in Spanish. To develop specific skills related to the use of the oral and written language in a professional context. To express opinions, preferences and wishes in Spanish. To build arguments in Spanish. To develop personal judgement and criteria in Spanish.

Textbook

Al dí@. Curso superior de español para los negocios, Prost, G., Noriega A.; *Español de Negocios,* Rodríguez, Jose Luis y Ana Krenn.

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