

**First year**

**Core subjects**

Subject	Description	Period/Language
4670 Algebra (5.0 ECTS credits)	Linear algebra. Numerical calculus.	2nd semester
4671 Mathematical Analysis (5.0 ECTS credits)	Infinitesimal calculus. Differential equations.	1st semester
4672 Analogical Electronics (5.0 ECTS credits)	Electronic components. Analogical systems (calculus and design).	2nd semester
4673 Graphic Expression and Computer Aided Design (5.0 ECTS credits)	Representation techniques. Spacial conception. Normalization. Foundations of industrial design. Computer aided applications.	2nd semester
4674 Physical Foundations of Engineering (7.0 ECTS credits)	Mechanics. Electromagnetism. Thermodynamics. Waves. Optics.	Annual
4675 Foundations of Information Science (5.0 ECTS credits)	Structure of computers. Programming. Operative systems.	1st semester
4676 Digital Electronics (5.0 ECTS credits)	Digital systems. Study and design.	1st semester
4677 Electronics Technology (7.0 ECTS credits)	Election criteria and use of electronic devices. Fabrication and design techniques.	Annual
4678 Theory of Circuits (5.0 ECTS credits)	Analysis and sythesis of networks.	1st semester

**Compulsory subjects**

Subject	Description	Period/Language
4679 Structure of Computers (5.0 ECTS credits)	Application of the structure of computers. Introduction to the use of the computer in the control of processes.	2nd semester

**Second year**

**Core subjects**

Subject	Description	Period/Language
4680 Industrial Automation (7.0 ECTS credits)	Conventional, sequential and concurrent automisms. Programmable automats.	Annual
4681 Power electronics (5.0 ECTS credits)	Power devices. Basic configurations. Applications.	2nd semester
4682 Engineering Statistical Methods (5.0 ECTS credits)	Foundations and non-deterministic methods of analysis applied to engineering problems.	1st semester
4683 Industrial Information Science (7.0 ECTS credits)	The microprocessor and the computer in control of processes.	Annual
4684 Electronic Instrumentation I (3.5 ECTS credits)	Measuring equipment.	2nd semester
4685 Technical Office (5.0 ECTS credits)	Methodology, organization and management of projects.	2nd semester
4686 Automatic Regulation (7.0 ECTS credits)	Theory of control. Systems dynamics. Realimentation. Design of monovvariable regulators.	Annual
4687 Mechanical Systems (5.0 ECTS credits)	Foundations of cinematics and dynamics. Mechanisms.	2nd semester

**Second year**

**Compulsory subjects**

Subject	Description	Period/Language
4688 Digital Electronic Systems (5.0 ECTS credits)	Logical families. Commercial circuits. Programmable logical devices. Memories. Microprocessor design. Input/output devices. High level description languages.	1st semester
4689 Analogical Techniques (5.0 ECTS credits)	Operational amplifiers. Power amplifiers. Converters and types. Regulated sources of alimentation.Active filters. Oscillators. PLL. Noise.	1st semester

**Third year**

**Core subjects**

Subject	Description	Period/Language
4690 Business Administration and Production Organization (5.0 ECTS credits)	General and business economics. Business administration. Productive systems and industrial organization.	2nd semester
4691 Electronic Instrumentation II (3.5 ECTS credits)	Measuring systems.	2nd semester

**Compulsory subjects**

Subject	Description	Period/Language
4692 Industrial Communication Networks (6.0 ECTS credits)	Field bases. Networks for industrial environments. Local area networks. Wide area networks.	1st semester

**First and Second cycle**

Subject	Description	Period/Language
4693 End of Degree Project (12.0 ECTS credits)	Elaboration of an end of degree project as an integrating exercise or synthesis.	

**Optional subjects**

**First and Second cycle**

Subject	Description	Period/Language
2342 Social Impact and Professional Ethics of Information Science (5.0 ECTS credits)	Social and historical context. Social impact. Ethics and social responsibility. Legal liability.	
3021 Computer Aided Design of VLSI Circuits (5.0 ECTS credits)	Introduction to computer aided design techniques of integrated electronic circuits (chips) with a high degree of integration (VLSI), mainly custom and semi-custom types, aimed at systems for dealing with and transmitting information.	2nd semester

**Optional subjects**

**First and Second cycle**

Subject	Description	Period/Language
3025 Microelectronic Systems (5.0 ECTS credits)	Properties of the materials used in the fabrication of integrated circuits. Fabrication processes of integrated circuits. Mechanisms and modelling. Integrated electronic circuits, technologies and alternatives.	1st semester
4512 Operating Systems (5.0 ECTS credits)	Organization, structure and operating systems. Management and administration of memory and processes. Input/output management. File systems.	2nd semester
4694 Extended Study of Robotics (5.0 ECTS credits)	Mobile robots. Non industrial applications.	
4695 Pneumatic and Oleo-hydraulic Automation (5.0 ECTS credits)	Principles of fluid mechanics. Generator of compressed air and pressurized oils. Pneumatic and oleo-hydraulic elements. Construction details. Circuit programme.	
4696 Cinematics and Dynamics of Mechanical Systems (5.0 ECTS credits)	Definition and applications. Modelling and analysis of models on plans. cinematic and dynamic equations. Numerical methods for their solution (linear and non-linear). Extension to 3D. Applications to industrial mechanics.	
4697 Circuits and Non-Linear Systems (5.0 ECTS credits)	Elements of dynamic systems. Analysis of non-linear circuits. Non-linear phenomena with amplifiers, electronic oscillators and sources of alimentation. Non-linear resonance. Synchronization.	
4698 Control of Electric Machines (5.0 ECTS credits)	Requirements of electric operations. Direct current engines and their regulation. Control of converters. Regulation of position, speed and torque. Control of asynchronous engines. Regulation of alternating current engines. Protections.	1st semester
4699 Creation and Managment of Technologically Based Enterprises (5.0 ECTS credits)	Entrepreneurship. E-businesses. Company policies. Cooperation mechanisms. Research and cooperation institutes. Development strategies. Management skills.	1st semester
4700 Electro-optical Devices (5.0 ECTS credits)	Physical principles of their workings. Generators and detectors of optical radiation. Electro-optical modulators. Sensors. Gas sensors and analysers. Distance and movement sensors (telemetrics, velocimetrics, gyroscopics). Other devices.	
4701 Designing Inbuilt Systems (5.0 ECTS credits)	Inbuilt systems: design, programming, communication standards, developing tools.	
4702 Electronic Design and Simulation (5.0 ECTS credits)	Analogical simulation. Digital simulation. Computer aided design.	2nd semester
4703 Electro-acoustics (5.0 ECTS credits)	Audio pre-amplifiers. Power amplifiers. Noise and vibration control. Transducers and loudspeakers.	

**Optional subjects**

**First and Second cycle**

Subject	Description	Period/Language
4704 Electrotecnics and Electrical Machines. (5.0 ECTS credits)	Electrotechnics. Electrical machines: basic concepts. Trasmformers. Rotational machines. Testing electrical machines.	
4705 Renewable Energies (5.0 ECTS credits)	Energy sources. Mini-hydraulic power. Solar thermal power and solar photovoltaics. Wind power. Mixed installations. Biomass energy. Geo-thermal power. Marine power. Urban solid waste incineration.	
4706 Writing and Presenting Technical Documents (5.0 ECTS credits)	Characteristics of technical writing. Preparing technical documents. Editing. Preparing audiovisual material. Oral presentations.	2nd semester
4707 Generation and Distribution of Energy (5.0 ECTS credits)	Exploiting and controlling electric power systems. Surges in high voltage networks. Managing and auditing power.	
4708 Quality Control in Engineering (5.0 ECTS credits)	Quality: its reasons. Quality in the cycle of a product. Quality control in an enterprise. Ensuring quality. Quality control techniques.	2nd semester
4709 Basic Industrial Installations (5.0 ECTS credits)	Basic and auxilliary installations. Installations: hydraulic, gas, ventilation, heating, air conditioning, co-generation and auxilliary.	2nd semester
4710 Industrial Instrumentation (5.0 ECTS credits)	Instruments and methods for measuring variables in industrial processes. Characteristics of measurement, use and callibration. Applications.	
4711 Introduction to Optimum Control (5.0 ECTS credits)	Introduction and examples. Formulation of the problem: the Pontryagin minimum principle. Reformulation of Kuhn-Tucker. Numerical optimization methods; Kuhn-Tucker, minimax, simplex, etc. Applications.	
4712 Lasers for Industrial Applications (5.0 ECTS credits)	Principles of laser operation. High power lasers. Characterization, control and automation of laser systems. Industrial applciations; processing material, control and measurement. Low power applications: laser printers, CD, bar code scanners, metrology. Safety conditions.	
4713 Materials for Engineering (5.0 ECTS credits)	Structure-property relationship. Thermic and mechanical properties. Electrical and magnetic properties: use in industrial electronics.	
4714 Industrial Regulations (5.0 ECTS credits)	Quality regulations. Safety regualtions for persons and installations.	
4715 Planning and Control in Robotics (5.0 ECTS credits)	Planning of movement and jobs. Cinematic and dynamic control. Techniques and applications.	
4716 Radiological Protection (5.0 ECTS credits)	ionising radiations. Passage of radiation through matter. Dosimetry. Biological effects of ionising radiations. Dose limitations. Legislation. Shielding.	
4717 Quality and Reliability (5.0 ECTS credits)	Statistical control of processes. Sampling plans. Reliability analysis concepts and techniques.	
4718 Reusing and Recycling waste (5.0 ECTS credits)	Industrial waste: separation. Dealing with toxic waste. Treatment of waters. Solid urban waste: incineration, composting.	

**Optional subjects**

**First and Second cycle**

Subject	Description	Period/Language
4719 Industrial Robotics (5.0 ECTS credits)	Elements of an industrial robot. Programming. Industrial applications.	1st semester
4720 Systems with a Guarantee of Function (5.0 ECTS credits)	Reliable, available, maintainable or safe systems. Design and modelling of systems with a guarantee of function.	
4721 Perception Systems (5.0 ECTS credits)	Modelling the perceptive process. Data interpretation techniques. Recognizing patterns. Sensorial integration.	2nd semester
4722 Electrical Protection Systems (5.0 ECTS credits)	Calculation and design of low voltage lines. Protection elements. Protection against direct and indirect contacts. Protection against surges. Engine protection. EMI. Disorders propagated by the electrical network.	
4723 Power Industrial Systems (5.0 ECTS credits)	Power electronic systems for different applications. Commuted alimentation sources. Conversion systems and distribution of electrical energy (DC). Non interrupted alimentation systems.	2nd semester
4724 Real Time Information Systems (5.0 ECTS credits)	Classification and architecture of real time systems for industrial applications. Modelling and analysis of services. HW/SW implementation. Operative system support.	
4725 Integrated Systems of Fabrication (5.0 ECTS credits)	Flexible fabrication elements. CIM strategies. Implantation criteria.	2nd semester
4726 Real Time Operating Systems (5.0 ECTS credits)	Requirements of a real time operating system. Planning real time jobs. Memory management. Input/output support and communications. Modelling and analysis of performance.	
4727 Advanced Control Techniques (5.0 ECTS credits)	Principles of neuronal networks and diffuse control. Adaptive control.	
4728 Industrial Material Technologies (5.0 ECTS credits)	Phase diagrams and TTT diagrams. Production and processing of metal materials. Production technologies of ceramic materials. Compound materials. Semiconductor technology. Non-conventional technology.	
4729 Thermotechnics (5.0 ECTS credits)	Foundations of technical thermodynamics. Thermic machines.	
4730 Industrial vision (5.0 ECTS credits)	Digital processing and analysis of images. Industrial applications.	1st semester
4731 Digital Signal Processing (5.0 ECTS credits)	Sampling theorem (decimation and interpolation). IIR and FIR techniques. Spectral analysis. Applications for communication systems.	
4732 Numerical Methods (5.0 ECTS credits)	Numerical solution of differential equations. Equations in differences. Numerical integration.	