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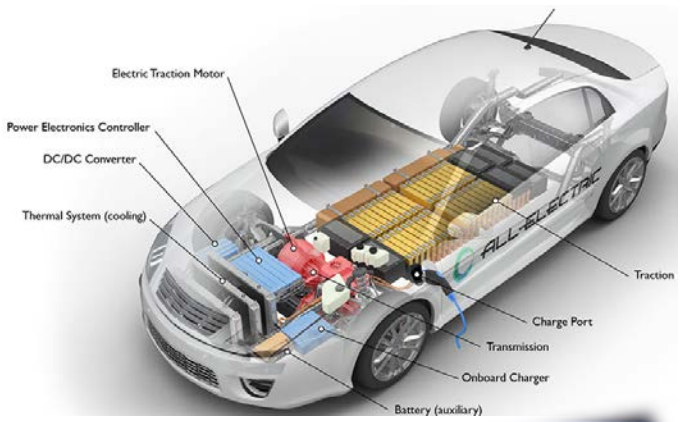
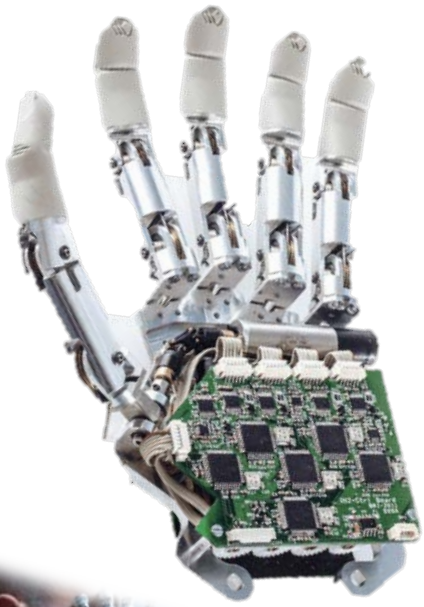
SCUOLA DI INGEGNERIA
INDUSTRIALE E DELL'INFORMAZIONE

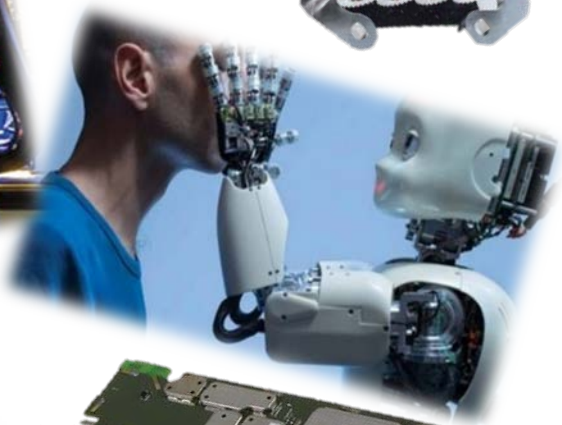
Master Degree in

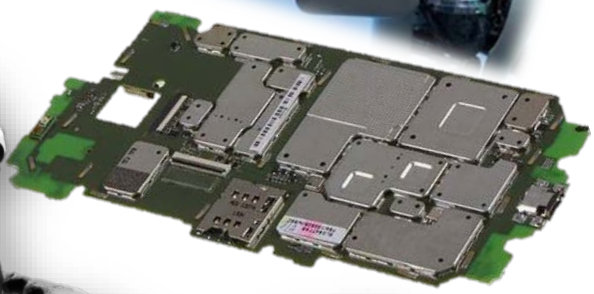
ELECTRONICS Engineering

The world of ELECTRONICS Engineering









Why choosing ELECTRONICS Engineering?

Electronics is pervasive, everywhere around us, and represents the enabling base of all current and future technologies of Information, Communication, Control, Automation, Energy and Electric Mobility and Avionics. Research in Electronics is incessant and stimulated by the most diverse needs. For example, increasingly fast and low-power microprocessors and increasingly dense and defect-free memories are the essential constituents of any processing system. Without such electronic circuits, intelligent machines would not be implementable and would remain only science fiction. Semiconductor, ultra-sensitive and miniaturized sensors that communicate with each other and with the outside world, in the most refined robotic systems and in ubiquitous and extensive distributed networks, are fundamental for acquiring the real world, understanding it, managing it, controlling it and intervening in it; without such electronic devices, machines would not be autonomous and interaction with them would remain only virtual. Electronic devices, from simple consumer entertainment and gaming products to advanced avionics systems, have become so fundamental that their existence and performance are taken for granted. Without such devices, automation, communications, information systems, biomedical instrumentation, mechatronics, satellites would not exist and neither would the modern world.

What career opportunities after graduation?

There are many career opportunities, including the following:

- design electronic devices and components and Cyber-Physical-Systems;
- miniaturize embedded systems with sensors, microprocessors, power actuators, power supply, transceiver, and human-machine interfaces in System-on-Chip (SoC), System-in-Package (SiP), and Lab-on-Chip (LoC) systems;
- configure programmable devices such as microcontrollers, FPGAs and DSPs;- define performance, constraints, costs and environmental impact of complex systems;
- manage the production, installation and validation of systems;- manage process and product quality control and evaluate reliability, maintenance, performance aspects;- collaborate in the design of mixed, mechanical, aerospace, energy, electrical, nuclear, transport, environmental, etc. systems;
- design, manufacture and integrate electronic equipment in the medical, bioscience and nano-biotechnology fields (diagnostic imaging, genetic diagnostics, molecular medicine, nuclear medicine);
- transfer innovation towards application in the fields of advanced technologies;
- conduct scientific experiments of high complexity, solving engineering problems that frequently require an interdisciplinary approach.

What subjects?

The training course is taught in English. Its structure is extremely linear to make clear the choices possible and offer maximum freedom in the customization of a personalized Study Plan. In the first year there are some lessons considered fundamental for the preparation of every electronic student and suitable to deepen the fundamentals of circuit design and electronic systems and electronic signal processing: these are "Analog Circuit Design", "Electronic Systems" and "Signal Recovery". In addition, already from the first semester, there are various options of choice: each student can personally modulate the Study Plan in order to acquire a professional preparation targeted and appropriate to their specific interests. Some specific preparations are for example: design of advanced electronic systems; development of microelectronic, photonic, biochip and nanotechnology devices; design of microelectronic integrated circuits; electronics for medicine and biotechnology. In addition to the teachings "characterizing" the Electronic path, there are other "related" teachings, organized in two groups listed in tables TAB1 and TAB2, with teachings of your choice.

More info on www.elettronica.polimi.it and in the Regolamento Didattico.

Cross-disciplinarity of Electronics

The Electronic Engineer invents products and equipment and integrates them into avionics, mechanical, energy, information, biological, clinical, physical, chemical, mechatronic, etc. systems. He is a multifaceted professional figure, transversal and oriented to a continuous interaction with the users of such systems and to a propulsion to innovation aimed at improving the performance not only of what is electronic (the device, the circuit, the apparatus, the system, the instrumentation, etc.) but of the whole macro ecosystem of the application context.

The technological innovation capabilities of electronics, combined with solid physical/chemical/biological knowledge, allow the Electronics Engineer to develop scientific instrumentation, innovative micro- and nano-electronic sensors, biomedical equipment, and control systems capable of supporting the evolution towards a sustainable society focused on man and his quality of life.

HARDWARE MICROPROCESSORS PHOTONICS

SMART SENSORS EMBEDDED SYSTEMS WEARABLE

NANO- MICRO-DEVICES

INTEGRATED CIRCUITS IoT

Courses List

Legend:

B – a course "characterizing" Electronics.
C – a course "related" to Electronics or an "integrative" activity.
D.I. – innovative teaching (flipped-classroom, blended learning, company involvement, soft skills or Massive Open Online Courses).
SSD – Academic Scientific Sector (for example "ING-INF/01" is "Electronics").
CFU – University Education Credits (1 CFU corresponds to 10 hours in classroom and 15 hours of home study).

1st Year Courses

Pre-approved study plan PSS - ELECTRONICS ENGINEERING

Code	Type	SSD	Course Name	Language	Sem	CFU	Group CFU
052427	B	ING-INF/01	ANALOG CIRCUIT DESIGN		1	10 [1 D.I.]	10
054654	B	ING-INF/01	ELECTRONIC SYSTEMS		1	10	10
095155	B	ING-INF/01	ELECTRON DEVICES		1	10	10
095162	B	ING-INF/01	MEMS AND MICROSENSORS		1	10	
095251	B	ING-INF/01	SIGNAL RECOVERY		2	10	10
095264	B	ING-INF/01	DIGITAL INTEGRATED CIRCUIT DESIGN		2	10	10
095274	B	ING-INF/01	RF CIRCUIT DESIGN		2	10	
054085	B	ING-INF/01	BIOCHIP		2	5 [2 D.I.]	5
054083	B	ING-INF/01	DIGITAL ELECTRONIC SYSTEMS DESIGN		2	5 [3 D.I.]	
--	--	--	Course of your choice from TAB1	--	--	--	5

2nd Year Courses

Pre-approved study plan PSS - ELECTRONICS ENGINEERING

Code	Type	SSD	Course Name	Language	Sem	CFU	Group CFU
095380	B	ING-INF/01	MIXED-SIGNAL CIRCUIT DESIGN		1	10	10
090918	B	ING-INF/01	POWER ELECTRONICS		1	10	
--	--	--	Course of your choice from TAB1	--	--	--	10
054081	B	ING-INF/01	MICROELECTRONIC TECHNOLOGIES		2	5 [1 D.I.]	10
055519	B	ING-INF/01	RADIATION DETECTION SYSTEMS		2	5	
090935	B	ING-INF/01	ELECTRONICS DESIGN FOR BIOMEDICAL INSTRUMENTATION		2	10	
--	--	--	Course of your choice from TAB2	--	--	--	10
--	--	--	Course of your choice from TAB1	--	--	--	
090921	--	--	THESIS AND FINAL EXAM	--	1	20	20
090921	--	--	THESIS AND FINAL EXAM	--	2	20	

Courses List

Courses of Group **TAB1**

Code	Type	SSD	Course Name	Language	Sem	CFU
052471	C	ING-INF/03	ADVANCED DIGITAL SIGNAL PROCESSING	EN	1	10 [1 D.I.]
097589	C	FIS/03	ADVANCED OPTICS AND LASERS	EN	1	10
099282	C	BIO/10	BIOINFORMATICA E GENOMICA FUNZIONALE	IT	1	5
083042	C	ING-IND/34	BIOINGEGNERIA CELLULARE	IT	1	10
073011	C	ING-INF/06	BIOINGEGNERIA DEL SISTEMA MOTORIO	IT	1	5
090914	C	ING-INF/04	CONTROL OF INDUSTRIAL ROBOTS	EN	1	5
055520	B, C	ING-INF/04 ING-INF/07	OPTICAL MEASUREMENTS	EN	1	5
096617	C	FIS/03	PHYSICS OF PHOTOVOLTAIC PROCESSES	EN	1	5
055552	C	ING-INF/03	RADAR IMAGING	EN	1	5 [1 D.I.]
052577	C	ING-IND/32	SISTEMI PER L'AUTOMAZIONE E LA COMUNICAZIONE INDUSTRIALE	IT	1	5
054312	C	ING-INF/03	DIGITAL COMMUNICATION	EN	1	10 [2 D.I.]
095907	C	ING-INF/05	EMBEDDED SYSTEMS	EN	1	10
052351	C	ING-INF/04	MODEL IDENTIFICATION AND DATA ANALYSIS	EN	1	10
096532	C	ING-IND/31	ADVANCED CIRCUIT THEORY	EN	2	5
088949	C	ING-INF/05	ADVANCED COMPUTER ARCHITECTURES	EN	2	5
093062	C	ING-INF/04	AUTOMATION AND CONTROL IN VEHICLES	EN	2	5
095947	C	ING-INF/05	CRYPTOGRAPHY AND ARCHITECTURES FOR COMPUTER SECURITY	EN	2	5
055521	C	ING-IND/31	ELECTROMAGNETIC COMPATIBILITY C	EN	2	5 [2 D.I.]
096660	C	MAT/08	NUMERICAL METHODS IN MICROELECTRONICS	EN	2	5
052470	C	ING-INF/03	QUANTUM COMMUNICATIONS	EN	2	5
096081	C	FIS/03	QUANTUM OPTICS AND INFORMATION	EN	2	5
089480	C	FIS/03	SOLID STATE PHYSICS A	EN	2	5
083047	C	ING-IND/34	BIOMATERIALI [C.I.]	IT	2	10
095942	C	ING-INF/05	DIGITAL SYSTEMS DESIGN METHODOLOGIES	EN	2	10

Courses of Group **TAB2**

Code	Type	SSD	Course Name	Language	Sem	CFU
095155	B	ING-INF/01	ELECTRON DEVICES	EN	1	10
095162	B	ING-INF/01	MEMS AND MICROSENSORS	EN	1	10
095380	B	ING-INF/01	MIXED-SIGNAL CIRCUIT DESIGN	EN	1	10
090918	B	ING-INF/01	POWER ELECTRONICS	EN	1	10
054184	B, C	ING-INF/07	RELIABILITY DESIGN	EN	1	5
052484	B, C	ING-INF/02	RF SYSTEMS	EN	1	10 [1 di D.I.]
054092	B	ING-INF/01	SENSOR SYSTEMS	EN	1	5 [3 di D.I.]
054321	B, C	ING-INF/02	ANTENNAS	EN	2	5 [1 di D.I.]
054085	B	ING-INF/01	BIOCHIP	EN	2	5 [2 di D.I.]
054083	B	ING-INF/01	DIGITAL ELECTRONIC SYSTEMS DESIGN	EN	2	5 [3 di D.I.]
095264	B	ING-INF/01	DIGITAL INTEGRATED CIRCUIT DESIGN	EN	2	10
090935	B	ING-INF/01	ELECTRONICS DESIGN FOR BIOMEDICAL INSTRUMENTATION	EN	2	10
054081	B	ING-INF/01	MICROELECTRONIC TECHNOLOGIES	EN	2	5 [1 di D.I.]
094791	B, C	ING-INF/02	MICROWAVE ENGINEERING	EN	2	5
096115	B, C	ING-INF/02	PHOTONIC DEVICES	EN	2	10
055519	B	ING-INF/01	RADIATION DETECTION SYSTEMS	EN	2	5
095274	B	ING-INF/01	RF CIRCUIT DESIGN	EN	2	10
052834	B	ING-INF/01	ELECTRONICS AND ELECTROACOUSTICS FOR SOUND ENGINEERING	EN	2	10

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