



Università
degli Studi
di Palermo



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dipartimento
di ingegneria
unipa

MASTER DEGREE IN ELECTRONICS ENGINEERING

EDUCATIONAL OBJECTIVES

The **Master Degree in Electronics Engineering** at the University of Palermo (Italy), with more than **60 years of history**, offers an interdisciplinary training program, organized in two years, and articulated in four curricula: “**Modern Electronics**”, “**Telecommunications**”, “**Bioelectronics**” and “**Robotics and Mechatronics**”.

Graduates in Electronics Engineering provide the answer to the need for transversal skills, nowadays more and more required in the fields of **smart cities**, **Internet of Things**, **big data**, **secure and ultra-broadband telecommunications networks**, last generation **electrical networks**, smart and electrical vehicles, **domotics**, **mechatronics**, **robotics**, but also of **diagnostic medicine**, **new production technologies** and **modern power plant engineering**.

The educational programme is characterized by a number of mandatory common teachings, providing knowledge in several fields, such as Power Electronics, Microwave Electronics, Programmable Electronics, Photovoltaics, etc.

After this common path, the course is divided into different curricula, enabling students to choose the profile which best fits their attitudes as well as the professional and market contexts.

- The **MODERN ELECTRONICS curriculum** provides a broad spectrum of knowledge, ranging from physics of semiconductors, to the technologies for designing and producing devices and circuits, to the electronic characterization methodologies and measurement equipment.
- The **TELECOMMUNICATIONS curriculum** allows the students to acquire knowledge and skills on the following topics: broadband communication systems, 5G, Internet of Things (IoT), innovative modulation techniques, signal processing, Internet and wireless networking technologies and services, optical fibers, mm-Wave transmission systems, wireless sensor networks (WSN), vehicular networks, underwater communications and sensors, communications for unmanned vehicles (e.g. drones, autonomous vehicles), artificial intelligence, software defined radios, network function virtualization, 5G edge computing, cloud and fog network offloading, content delivery networks, radar, antennae, satellite, wireless localization, body area networks, cyberphysical systems, blockchains, and system management.
- The **BIOELECTRONICS curriculum** provides a strong basic training in the electronic field, with specialized skills in the fields of sensors and diagnostic equipment, of electronics and Internet of Things (IoT) for biomedical applications (i.e. for acquiring, storing, handling and transferring biomedical data and signals), and of analysis, modeling and post-processing of signals, images and medical-biological data.
- The **ROBOTICS AND MECHATRONICS curriculum** employs the approach of control and systems engineering to deal with complex systems, managing the interaction among the various components of a system and optimizing its operation. The main knowledge and skills acquired will deal with the

identification and filtering of dynamical systems, the modeling, analysis, simulation and control of the main mobile robotic platforms available nowadays, with specific reference to robotics architectures and to control algorithms for vehicles and aircrafts.

PROFESSIONAL OPPORTUNITIES

Thanks to the acquired skills, especially through laboratory activities, graduates in Electronics Engineering can easily find a job.

- The **MODERN ELECTRONICS** curriculum allows to work on the design, development and realization of electronic devices and systems, in different contexts including micro/nano electronics, electronic design, electronics for industry, energy and automotive.
- The **TELECOMMUNICATIONS** curriculum allows to find a job on the design, development, production, operation and maintenance of telecommunications systems, network operators and ICT service providers offering wired and wireless communications, remote sensing and teletraffic control, network security, cryptography, cybersystems, smart grids and network data services.
- The **BIOELECTRONICS** curriculum allows to work both in industries, healthcare facilities, specialized clinical laboratories, and also in research centers and universities, with tasks concerning the design, production, management, testing and employment of biomedical sensors, instrumentation and medical software for monitoring of healthy or impaired people (also directly at home, i.e. ambient assisted living environment), for therapy or diagnostic support, and also for e-health and telemedicine.
- The **ROBOTICS AND MECHATRONICS** curriculum allows to find a job in the automotive, nautical, avionic, railway and electromechanical sector, also for companies dealing with industrial or mobile robotics, or in research and development centers specialized in the automation sector.

LIST OF SUBJECTS

MODERN ELECTRONICS curriculum

First year	credits
19700 - HETEROSTRUCTURE DEVICES	6.0
20516 - APPLIED AND INDUSTRIAL ELECTRONICS - INTEGRATED COURSE	15.0
APPLIED ELECTRONICS AND LABORATORY	9.0
INDUSTRIAL ELECTRONICS AND LABORATORY	6.0
20521 - OPTOELECTRONICS	6.0
21172 - PHOTONICS: PRINCIPLES AND APPLICATIONS	6.0
20513 - ELECTRONIC PROGRAMMABLE SYSTEMS	9.0
20515 - ELECTRONIC INSTRUMENTS AND MEASUREMENTS FOR AUTOMATION AND TELECOMMUNICATIONS	9.0
20525 - MICROWAVE ELECTRONICS - INTEGRATED COURSE	12.0
MICROWAVE COMPONENTS	6.0
MICROWAVE CIRCUITS	6.0
Optional subjects	6.0

Second year	credits
19698 - MICROWAVE INSTRUMENTS AND MEASUREMENTS	6.0
20519 - NANOELECTRONICS	6.0
05917 - FINAL EXAMINATION	24.0
Stage and others	6.0
Free subjects (suggested)	9.0

Optional subjects	credits
19641 - PHOTOVOLTAIC DEVICES AND TECHNOLOGIES	6.0
20512 - OPTOELECTRONIC DEVICES	6.0
17878 - MACHINE LEARNING	6.0
17883 - EMBEDDED SYSTEMS ELECTRONICS	6.0

TELECOMMUNICATIONS curriculum

First year	credits
20516 - APPLIED AND INDUSTRIAL ELECTRONICS - INTEGRATED COURSE	15.0
INDUSTRIAL ELECTRONICS AND LABORATORY	6.0
APPLIED ELECTRONICS AND LABORATORY	9.0
19220 - CYBERSECURITY	6.0
20513 - ELECTRONIC PROGRAMMABLE SYSTEMS	9.0
20515 - ELECTRONIC INSTRUMENTS AND MEASUREMENTS FOR AUTOMATION AND TELECOMMUNICATIONS	9.0
20520 - ANTENNAS AND WIRELESS SYSTEMS	6.0
20525 - MICROWAVE ELECTRONICS - INTEGRATED COURSE	12.0
MICROWAVE COMPONENTS	6.0
MICROWAVE CIRCUITS	6.0
Optional subjects	6.0
Optional subjects II	6.0

Second year	credits
19694 - WIRELESS NETWORKS	6.0
20511 - DIGITAL COMMUNICATIONS	6.0
05917 - FINAL EXAMINATION	24.0
Stage and others	6.0
Free subjects (suggested)	9.0

Optional subjects	credits
19641 - PHOTOVOLTAIC DEVICES AND TECHNOLOGIES	6.0
20512 - OPTOELECTRONIC DEVICES	6.0
17878 - MACHINE LEARNING	6.0
17883 - EMBEDDED SYSTEMS ELECTRONICS	6.0

Optional subjects II	credits
05034 - METODI DI ELABORAZIONE DEI SEGNALI	6.0
20523 - DIGITAL SIGNAL PROCESSING	6.0

BIOELECTRONICS curriculum

First year	credits
20516 - APPLIED AND INDUSTRIAL ELECTRONICS - INTEGRATED COURSE	15.0
INDUSTRIAL ELECTRONICS AND LABORATORY	6.0
APPLIED ELECTRONICS AND LABORATORY	9.0
20513 - ELECTRONIC PROGRAMMABLE SYSTEMS	9.0
20515 - ELECTRONIC INSTRUMENTS AND MEASUREMENTS FOR AUTOMATION AND TELECOMMUNICATIONS	9.0
20525 - MICROWAVE ELECTRONICS - INTEGRATED COURSE	12.0
MICROWAVE CIRCUITS	6.0
MICROWAVE COMPONENTS	6.0
21234 - STATISTICAL ANALYSIS OF BIOMEDICAL SIGNALS	6.0
Optional subjects	6.0

Second year	credits
20251 - ELECTRONICS AND IOT FOR BIOMEDICAL APPLICATIONS - INTEGRATED COURSE	12.0
PERSONAL AREA NETWORK	6.0
BIOMEDICAL ELECTRONICS	6.0
20510 - INDUSTRIAL ROBOTICS	6.0
21237 - SENSORS AND SIGNAL CONDITIONING FOR DIGITAL MEASUREMENTS	6.0
05917 - FINAL EXAMINATION	24.0
Stage and others	6.0
Free subjects (suggested)	9.0

Optional subjects	credits
19641 - PHOTOVOLTAIC DEVICES AND TECHNOLOGIES	6.0
20512 - OPTOELECTRONIC DEVICES	6.0
17878 - MACHINE LEARNING	6.0
17883 - EMBEDDED SYSTEMS ELECTRONICS	6.0

ELECTRONICS FOR ROBOTICS AND MECHATRONICS curriculum

First year	credits
20509 - MOBILE AND DISTRIBUTED ROBOTICS	6.0
20516 - APPLIED AND INDUSTRIAL ELECTRONICS - INTEGRATED COURSE	15.0
INDUSTRIAL ELECTRONICS AND LABORATORY	6.0
APPLIED ELECTRONICS AND LABORATORY	9.0
20513 - ELECTRONIC PROGRAMMABLE SYSTEMS	9.0
20515 - ELECTRONIC INSTRUMENTS AND MEASUREMENTS FOR AUTOMATION AND TELECOMMUNICATIONS	9.0
20525 - MICROWAVE ELECTRONICS - INTEGRATED COURSE	12.0
MICROWAVE CIRCUITS	6.0
MICROWAVE COMPONENTS	6.0
Optional subjects	6.0
Optional subjects II	6.0

Second year	credits
20510 - INDUSTRIAL ROBOTICS	6.0
21237 - SENSORS AND SIGNAL CONDITIONING FOR DIGITAL MEASUREMENTS	6.0
05917 - FINAL EXAMINATION	24.0
20508 - AUTOMOTIVE CONTROL SYSTEMS	6.0
Stage and others	6.0
Free subjects (suggested)	9.0

Optional subjects	credits
19641 - PHOTOVOLTAIC DEVICES AND TECHNOLOGIES	6.0
20512 - OPTOELECTRONIC DEVICES	6.0
17878 - MACHINE LEARNING	6.0
17883 - EMBEDDED SYSTEMS ELECTRONICS	6.0
Optional subjects II	credits
05034 - METODI DI ELABORAZIONE DEI SEGNALI	6.0
20523 - DIGITAL SIGNAL PROCESSING	6.0

COURSE COORDINATOR
Prof. Alessandro BUSACCA - alessandro.busacca@unipa.it

University of Palermo

Department of Engineering

Viale delle Scienze, Building n. 9

90128 – Palermo

For more information: <https://www.unipa.it/electronics>

Link of department: <https://www.unipa.it/dipartimenti/ingegneria/en/index.html>

unicore@unipa.it