

Second Level Master in Power Electronics Devices and Technologies



HEAD OF MASTER PROGRAM

Prof. Mario Cacciato

Department of Electrical, Electronic and Computer
Engineering (DIEE) Università di Catania

Second Level Master in Power Electronics Devices and Technologies

OBJECTIVE

**ACADEMIC
CREDITS**
60 CFU

**NUMBER OF
ADMISSIONS:**

Max. 30 students

**DEADLINE FOR
SUBMISSION OF
APPLICATION:**

30 days after the publication
of the call for applications

**HEAD OF MASTER
PROGRAM**

Department of Electrical,
Electronic and Computer
Engineering (DIEEI)—Università
di Catania

The objective of this academic program is to develop talents able to operate in high-tech industrial manufacturing processes. Competences will include materials and technologies, processing systems, design, production, and testing of power electronics devices at the heart of energy applications like automotive, renewable energy and energy storage.

STMicroelectronics experts will lead several teaching modules and ensure mentoring for the internships, including visits to relevant STMicroelectronics departments and research laboratories.

Some classes will be held at STMicroelectronics premises in Catania. Experts from several companies of major international importance will be invited for seminar lessons.



FINAL ASSESSMENT

The final assessment consists of an oral presentation of a project drafted by the candidate on a specific topic studied during the program and/or during the internship period, following verification of compliance with attendance requirements.

The assessment committee nominated by the Master's Scientific Council will evaluate the project and the presentation with a mark expressed on a 100-point scale.

The assessment results in combination with the final examination will determine the final grade.

SCHOLARSHIPS

A scholarship will be granted to the first 10 applicants ranked on evaluation criteria. Applicants ranked 11th to 20th will receive a grant for tuition fees.

SCOPE AND OBJECTIVE

Sustainable development is a must for modern societies, as declared in the 17 sustainable development goals of the Agenda 2030. Regarding energy, the transition to renewable energy sources must be implemented together with the adoption of energy efficiency techniques. From energy generation to consumption and transport, power electronics is considered the enabling technology for this transition, as it allows the conversion of electrical energy with high flexibility and performance.

Power electronics devices made with semiconductors are central to converters addressing a wide variety of systems ranging from a few milliwatts to gigawatts power.

Furthermore, a new class of devices based on wide-bandgap (WBG) materials has been recently introduced.

Thanks to these devices, power converters are more efficient, more compact and respond faster to all types of transients.

The main objective of the Master in Power Electronics Devices and Technologies is the development of skills and advanced knowledge on solving multidisciplinary problems related to physics, chemistry and engineering, based on the research, development, production and testing of WBG power electronics devices. The program also focuses on the analysis, design and application of WBG devices in electronic systems and converters in modern applications like electric traction and renewable energy.

REQUIREMENTS

The program is open to all applicants, including early career professionals, with a master's degree ("Laurea Magistrale", Master of science, 4-year or 5-year degree) awarded in the last 5 years, in:

Physics (LM17), Electrical engineering (LM28), Electronic engineering (LM29), Automation engineering (LM25), Chemistry (LM54), Computer engineering (LM32), Telecommunication engineering (LM27), Mechanical engineering (LM33), Chemical engineering (LM22), Material science and engineering (LM53), and Industrial chemistry science and technologies (LM71).

Excellent knowledge of English is required.

SCIENTIFIC COUNCIL

Università di Catania

- Prof. Mario Cacciato
Department of Electrical Electronic and Computer Engineering
- Prof. Giuseppe Compagnini
Department of Chemistry
- Prof. Guglielmo Guido Condorelli
Department of Chemistry
- Prof. Salvatore Mirabella
Department of Physics and Astronomy
- Prof. Salvatore Pennisi
Department of Electrical Electronic and Computer Engineering
- Prof. Antonio Terrasi
Department of Physics and Astronomy

STMicroelectronics

- Giuseppe Arena
- Michele Calabretta
- Mario Saggio
- Rosario Scollo
- Filippo Scrimizzi
- Vincenzo Randazzo

ABOUT UNIVERSITÀ DI CATANIA

Founded in 1434, with an average enrolment of 40,000 students, Università di Catania is one of the oldest universities in Italy, offering excellence in didactics and research thanks to synergies and specific collaborations with several research institutes operating in its territory.

ABOUT STMICROELECTRONICS

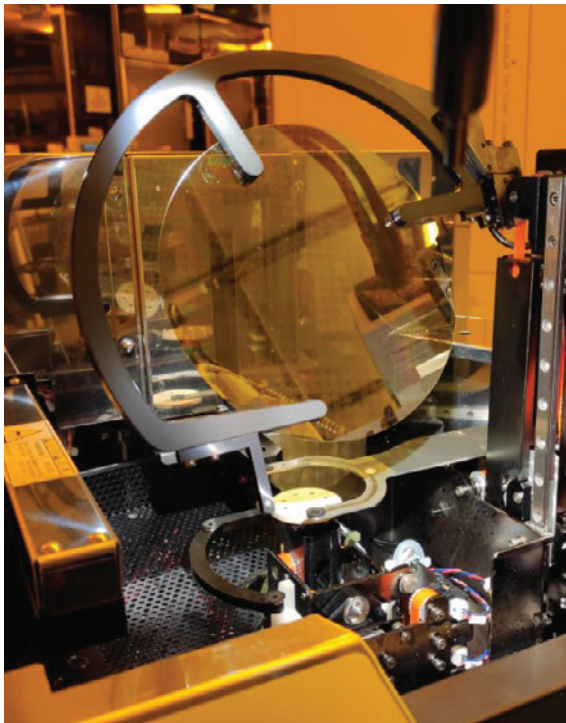
At ST, we are 48,000 creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. An integrated device manufacturer, we work with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges and opportunities, and the need to support a more sustainable world. ST is committed to becoming carbon neutral by 2027.

WHY APPLY

Graduates of this program will develop a technical profile with advanced knowledge on power electronics, and the ability to study materials, learn technologies, and understand manufacturing processes, as well as to design electronic converters with discrete components and systems-on-chip.

Lessons will be held both by university professors and by experts from local and international industrial sectors.

A final internship held at the STMicroelectronics site and the elaboration of a final project work will complete the course.



EDUCATIONAL PROGRAM

The program consists of 15 modules:

- Physics of semiconductors: energy bands and electrical properties
- Physics of semiconductors: optical properties and wide band gap materials
- Crystal growth, thin film deposition, and processing
- Surface and interface analysis
- Structural characterization and microscopy
- Analog IC design
- Digital IC design
- Digital instrumentation
- Measurement uncertainty
- AC/DC and DC/DC converters
- Inverter topologies and applications
- Design of integrated circuits for energy management
- Design of discrete power converters
- Device physics
- Thermal behavior and reliability of power devices

CAREER PATHS

Graduates can pursue their career in semiconductor manufacturing, power electronics systems, and relative applications.



FIND OUT MORE

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