

Multiscale and mutliphysics modeling for electrical engineering (3MEE)

Master in Electronics, electrical energy, automation



Duration
2 years



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



**Language(s) of
instruction**
English

Presentation

Over the last 25 years, the global population using electricity has increased by 10 points, from 74 to 85%, while the per capita power consumption increased by 50%. This increasing demand for energy and the necessary fulfillment of environmental constraints are driving the development of renewable energies and renewed electrical systems and devices.

On one hand, the integration and use of intermittent energies require profound technological changes of power grids to ensure an optimized, secure and reliable production and distribution in any conditions.

On the other hand, electromagnetic devices are also subject to multiple constraints. Development of electric transportation systems (car, plane ...) impose the use of high-performant and energy-efficient on-board devices. These devices will be submitted to intense multi-physical solicitations (electromagnetic, mechanical and thermal). The rising of the Internet of Things (IoT), key element for the deployment of smartgrids, smarthomes and smartcities, requires energy recovery devices using several physical, storage elements as well as specific sensors and actuators.

In a scientific and industrial context engaged in the search for innovative solutions, it is vital for the modern electrical engineer to model and describe more finely the response of devices and systems, on several scales (from the geographical territory to the microscopic material scale). The 3MEE program is therefore conceived as the convergence between three training areas: electromagnetic modeling and circuit theory, numerical computations, multi-scale and multi-physics studies of a wide range of systems and devices from transmission power grids to electrical actuators. The extensive training provides a multidisciplinary culture that allows students to acquire high-level scientific knowledge and skills for research and development (R & D) in electrical engineering, from the latest theories to their applications.

International education : Internationally-oriented programmes

Organisation

Knowledge check

The grading policy comprises homeworks and lab assessments plus partial and final examinations. The grade of a module is the weighted average of the marks of each assessment, and the overall mark of the Master's exam is

the mean of module grades weighted by the credits of the modules.

Abroad internship : In France or abroad

Admission

Access conditions

- **1st year of master's degree** : The prospective student should have completed at least **three full years of University** studies (180 ECTS)
 - **2nd year of master's degree** : The prospective student should have completed at least **four full years of university** studies (a first year of Master's degree, bachelor or equivalent degree with 240 ECTS), have followed basic classes in Electrical Engineering, prove an English proficiency with CEFR (B2), TOEFL (IBT 87-109), IELTS (5.5-6.5), TOEIC (785-945) or equivalent. Students coming from English-speaking countries or/and who had a University curriculum in English are considered proficient enough. If you don't have the opportunity to take the test in your home University, an English test is organized during the first week of the classes, to check the level of everyone
- For applicants whose country of residence does not fall under the "Study Portal in France" (PEF), the schedule of the application campaigns for the eCandidat application is available here : [eCandidat](#)

Public continuing education : You are in charge of continuing education :

- if you resume your studies after 2 years of interruption of studies
- or if you followed training under the continuous training regime one of the previous 2 years
- or if you are an employee, job seeker, self-employed

If you do not have the diploma required to integrate the training, you can undertake a [validation](#) of personal and professional achievements (VAPP)

For more information, consult the [website](#) of the Directorate of continuing education and learning

Candidature / Application

You want to apply and sign up for a master ? Please be aware that the procedure differs depending on the diploma you want to take, the diploma you have already obtained and, for foreign students, your place of residence. Let us be your guide – simply follow this [link](#)

Target

The master 3MEE is for students wishing to acquire advanced skills in modeling for the study and analysis, design and development in electrical engineering, from the devices to power systems. It prepares students for either PhD studies or various professions in industry and public organizations.

Fees

Tuition fees 2019-2020: 243 €

Prerequisites

Basic knowledges in electrical engineering and electromagnetism

And after

Further studies

The natural follow-up to the Master 3MEE is the Ph.D. degree, which in turn leads to academic teaching-research or full-time research positions (in universities, research bodies, etc.) or to industrial R&Dt in the aforementioned fields.

Useful info

Contacts

Program director

Nicolas Galopin

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Program administration

Registrar's Office for the Master in Electronics,
electrical energy, automation

✉ phitem.master.eea@univ-grenoble-alpes.fr

Program administration

Application

✉ phitem.candidature.etudiant@univ-grenoble-alpes.fr

Partner laboratories

G2Elab

🔗 <http://www.g2elab.grenoble-inp.fr/>

Gipsa-lab

🔗 <http://www.gipsa-lab.fr/>

G-Scop

🔗 <http://www.g-scop.grenoble-inp.fr/>

Course location(s) - City

📍 Grenoble

Campus

🏠 Grenoble - Scientific Polygon

Program

Master in Electrical energy systems (SEE) 1st year

Semester 7

	Nature	CM	TD	TP	Crédits
UE State-space representation	Teaching Unit (UE)	15h	9h	4h	3 credits
UE Entrepreneurial project management	Teaching Unit (UE)		25h		3 credits
UE Automata and embedded systems	Teaching Unit (UE)			35h	6 credits
UE Power networks	Teaching Unit (UE)	15h	10,5h	8h	3 credits
UE Electrical machines	Teaching Unit (UE)	15h	10,5h	8h	3 credits
UE Summary of converters	Teaching Unit (UE)	15h	9h		3 credits
UE Structures of converters	Teaching Unit (UE)	15h	10,5h	8h	3 credits
UE Passive components	Teaching Unit (UE)	15h	6h	4h	3 credits
UE SEE project part 1	Teaching Unit (UE)	6h			3 credits

Semester 8

	Nature	CM	TD	TP	Crédits
UE SISO Feedback control	Teaching Unit (UE)	15h	9h	15h	3 credits
UE Electromagnetic compatibility	Teaching Unit (UE)	15h	15h		3 credits
UE Internship	Teaching Unit (UE)				6 credits
UE Speed variation	Teaching Unit (UE)	9h	9h	8h	3 credits

UE Modelling of power systems	Teaching Unit (UE)	12h	6h	8h	3 credits
UE Advanced power electronics	Teaching Unit (UE)	11h	10h	18,5h	3 credits
UE SEE project part 2	Teaching Unit (UE)	6h			3 credits
UE SEE project part 3	Teaching Unit (UE)	6h			3 credits
UE Transverse teaching of choice	SUBJECT				
UE English	Teaching Unit (UE)				3 credits

Master 2nd year

Semester 9

	Nature	CM	TD	TP	Crédits
UE Dynamic modeling and analysis of electrical systems	Teaching Unit (UE)				6 credits
UE Circuit analysis	Teaching Unit (UE)				3 credits
UE Theory and techniques for computational electromagnetics	Teaching Unit (UE)				6 credits
UE Advanced techniques for computational electromagnetics	Teaching Unit (UE)				6 credits
UE Advanced topological methods for power systems	Teaching Unit (UE)				6 credits
UE Research project	Teaching Unit (UE)				3 credits

Semester 10

	Nature	CM	TD	TP	Crédits
UE Public speaking or french as a foreign language	Teaching Unit (UE)				3 credits
UE Internship	Teaching Unit (UE)				24 credits
UE Humanities and engineering	Teaching Unit (UE)				3 credits

