

Parcours Multiscale and Multiphysics Modeling for Electrical Engineering (3MEE)

Présentation

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.

Admission

Conditions d'admission

- 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](#)

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 \(VAPP\)](#)

Candidature

Would you like to apply and register ? Be aware that the procedure differs depending on the diploma, the degree obtained, or the place of residence for foreign students. Let yourself be guided by following this [link](#)

Pré-requis obligatoires

Basic knowledges in electrical engineering and electromagnetism

Public cible

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.

Poursuite d'études

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 Research and Development in the aforementioned fields.

Infos pratiques :

- > Composante : UFR PhITEM (physique, ingénierie, terre, environnement, mécanique)
- > Durée : 2 ans
- > Type de formation : Formation initiale / continue
- > Lieu : Grenoble - Polygone scientifique

Contacts

Responsable pédagogique

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Secrétariat de scolarité

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Responsable formation continue

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Programme

Master Systèmes d'énergie électrique (SEE) 1re année

Semestre 7

UE Représentation d'Etat	3 ECTS
UE Gestion de projet entrepreneurial	3 ECTS
UE Automates et systèmes embarqués	6 ECTS
UE Réseaux de puissance	3 ECTS
UE Machines électriques	3 ECTS
UE Synthèse de convertisseurs	3 ECTS
UE Structures de convertisseurs	3 ECTS
UE Composants passifs	3 ECTS
UE Projet SEE part 1	3 ECTS

Semestre 8

UE SISO Feedback control	3 ECTS
UE Compatibilité électromagnétique	3 ECTS
UE Stage	6 ECTS
UE Variation de vitesse	3 ECTS
UE Modélisation des systèmes de puissance	3 ECTS
UE Electronique de puissance avancée	3 ECTS
UE Projet SEE part 2	3 ECTS
UE Projet SEE part 3	3 ECTS
1 option(s) au choix parmi 1	
UE Anglais	3 ECTS
UET	

Master 2e année

Semestre 9

UE Dynamic modeling and analysis of electrical systems	6 ECTS
UE Optimal Design and Circuit Analysis	3 ECTS
UE Theory and Computation of Electromagnetic Fields	6 ECTS

UE Advanced techniques for computational electromagnetics	6 ECTS
UE Advanced topological methods for power systems	6 ECTS
UE Research project	3 ECTS

Semestre 10

UE Humanities and engineering	3 ECTS
UE Internship	24 ECTS
1 option(s) au choix parmi 1	
UE Anglais	3 ECTS
UE FLE	3 ECTS