

Undergraduate and Postgraduate Studies Programs of the School of Electrical, Mechanical and Computer Engineering – EMC

1. Introduction

The electrical engineering undergraduate course has, as a mission, prepare engineers to work within the electrical, electronics, telecommunication, industrial automation, and computing areas. Starting as a generic professional, during their studies, the students can choose, among different disciplines, those which subjects can drive them towards one or more specific fields within their own interest area.

The program has been developed to contribute to the society's transformation by graduating engineers with creative capability, enabling them to insert themselves in a world of constant technological transformation and innovation. They shall also be prepared to produce technical and scientific solution to meet the requirements of a market in constant development. They shall be also prepared to work on the production process considering the technical, political, economic, environmental, social, human, and ethical aspects.

The working field for the electrical engineers graduated at the EMC/UFG (School of Electrical, Mechanical and Computer Engineering/Federal University of Goiás) is of great extent and includes, for instance, electrical energy generation and supply enterprises, telecommunication, automation, electric drives and control system, electrical mobility, designing, consultancy, research and innovation companies or institutions, government agencies, hospitals, and banks.

2. Postgraduate Program

The Postgraduate Program in Electrical and Computer Engineering (PPGEEC) aims to qualify human resources specialized in the Electrical, Electronics, Intelligent System and, Applied Computing. The students are encouraged to work independently, engaged in research and teaching activities with multi-referential vision. The program also encourages the students to develop research and knowledge in the engineering and computer systems areas and, at the same time, qualify researchers committed to the investigation towards the creation of solutions capable to provide better life quality within a sustainable environment. After finishing their research, the students shall be able to design, analyse, and develop creative and adaptable systems in a multi-disciplinary format in the signal processing, computing, teleprocessing, electrical system, and computing areas.

It is expected from the postgraduate students that they are capable to make significant advances in the state-of-the-art within their chosen research field. They shall be aware that their work must be relevant to current social demands. The program offers research and teaching opportunities that drive the students through the development of innovative solutions to the productive sectors.

2.1 Admission process (postgraduate studies)

Information on the required documents and selection process is found at <https://ppgeec.emc.ufg.br/> (in Portuguese).

2.2 Administration Staff

Period/term: 02/2020 a 01/2022

Coordinator: Prof. Dr. Flávio Henrique Teles Vieira

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Secretary: Daiane Cristina Pereira Dionizio and João Antônio dos Reis

2.3 Research Fields:

I. Electrical-electronic Systems (SEE)

- Mathematical modelling, computing simulation, property characterization and study of dielectric, magnetic and semiconductor materials.
- Electrical component, equipment and device design optimization and testing.
- Power System Operation Optimization, Modern and Adaptive Control.
- Distributed Power Generation Systems, Photovoltaic Power Systems.
- Signal and Image Processing.
- Mobile Phone Communication, Wireless Networks, Packet Communications.

II. Intelligent Systems and Applied Computing (SICA)

- Complex Task Solving Semiautonomous and adaptive Systems.
- Optimization algorithms.
- Devices and Systems' Modelling and Simulation.
- Computer and Electrical Engineering applications of Machine Learning and Artificial Intelligence.

III. Biomedical Signals and Systems (SSB)

- Biomedical signal and image processing.
- Biomedical Systems, Materials, and Instrumentation.
- Biomechanical and Neuroscience modelling and simulation.

2.4 Infrastructure:

The Post-graduate studies program at EMC/UFG relies upon several laboratories, which receive funding from large R&D programs from ANEEL, MCT, FINEP, FAPEG, FUNAPE and the Brazilian Informatics Law, as well as from smaller federal and state government supported regional programs.

The Graduate studies program is permanently going after financial support to its research groups and labs, aligned with the program's research fields.

Labs:

- **INCOMM:**

The Communications Research Group (INCOMM) melds academic research and state-of-the-art technology development with support from its team of PhD's, MSc's, graduate and undergraduate students. INCOMM currently has a Simulation Laboratory with 20 seats/workstations, 8 computers, one scanner-laser printer, a meeting room, wireless and wired Internet access as well as air conditioning. In 2004, INCOMM opened a FINEP (Edital CT-INFRA/Institucional 04/2003) and FUNAPE funded Multimedia Engineering Laboratory (ENGEMULTI), offering multimedia equipment and visual collaboration tools.

- **NEPE:**

The Center for Energy and Planning Studies (NEPE) has as goals the study, research and development of heuristic and/or optimization algorithms that facilitate decision-making on strategic, operational and tactical levels. The group has a multidisciplinary nature and leverages its member's hands-on knowledge in fields as diverse as Operational Research, Intelligent Systems, Game Theory, Economics Engineering, Power Systems. NEPE has three computer laboratories: NEPE-1, with an HP server and six Core i7 desktops, and NEPE-2, with another HP server and 10 Core i7 desktops, and the "Prof. Alcir Monticelli" lab, with a Dell server and workstations. Most of the computational resources was acquired with funding from companies in the Electrical Power Systems field (ENEL, CEB, Eletronorte), associated with R&D projects developed since 2001.

- **PEQ:**

The Center for Research and Studies in Energy Processing and Quality (PEQ) assimilates, develops and shares scientific and technological knowledge in the following fields: Electrical Machines and Power Devices; Industrial Electronics, Electronic Systems and Controls, Magnetic Materials and Devices, Electrical, Magnetic and Electronic Measurements, Instrumentation, Co-generation, Power Regulation, Power Quality. PEQ currently has several top-of-the-line laboratories, funded by Power Systems companies (ENEL, CHESP) and R&D funding agencies (CNPq, FINEP).

- **Special Machines:**

Involved in basic and advanced research and development, targeting novel electrical motors, and associated control systems, and equipment and devices used by renewable energy power sources.

- **LAMCE:**

An air-conditioned 85 square meter lab offering 12 workbenches and supporting data and power infrastructure. Equipment available include power sources, power amplifiers, function generators, thermal camera, oscilloscopes, data acquisition units/systems, VA-Watt meters, impedance analyzers (including permittivity and permeability), Epstein device, DISPOSITIVO DE ENSAIO A CHAPA UNICA, transducers, differential voltage tips, GPIB AND DAQ boards, licensed specialized computer programs and computers. All the equipment are computer controllable through a GPIB interface. LAMCE also has an Industrial Automation Lab, founded in 2001, with the support of WEG (donation of equipment and personnel training), under

the Lei da Informatica funding program. Last but not least, LAMCE has the top-of-the-line Transformer Testing Lab, founded in 2004.

▪ **Biomechanics and Bioengineering Lab:**

This lab offers highly specialized equipment, such as a Motion Capture system (Natural PointOptitrack), ARENA Motion Capture software, C-Motion's Visua3D kinematics analysis software, dinamometrics system composed of two AMTI OR6 force platforms, a electromiography system (16 channel signal conditioners, 100x amplifiers, 20-500 Hz band-pass analog filters, 16 bit 16 channel ADC board, AQDados software, an electrocardiograph, a 4 channel 60 MHz color screen oscilloscope, a MINIPA multimeter, a 32 channel 16 bit National Instruments ADC board, a CORRENTE RUSSA electrostimulation equipment, a Tens/Fens electrostimulation equipment, as well as a server and 12 computers and an extensive library with more than 200 books and journal access.

2.5 Research Staff

The postgraduate studies lecturers involved with the graduate studies program are as follows:

Lecturer/researcher	Email address
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Next the set of disciplines which has been offered recently in the postgraduate program:

Course	Credits
Machine learning	4
Fuzzy and Flexible Computing	4
Digital Communications	4
Guided Research I	4
Guided Research II	4
Engineering Economics	4

Modern Heuristics	4
Artificial Intelligence	4
Scientific Research Methodology	4
Electrical Machines Modelling	4
Finite Element Methods for Electrical Engineering	4
Biomechanical movement analysis	4
Linear Analysis	4
Neurofisiology - Mathematical Methods	4
Electrical Power Systems Planning	4
Signal Processing I	4
Signal Processing II	4
Biological Signals Processing	4
Stochastic Processes	4
Linear Programming	4
Non-linear Programming	4
Qualification Seminars	4
Topics in Electrical-electronic Systems	4
Topics in Intelligent Systems and Applied Computing	4

Translation: Prof. Wander Gonçalves da Silva (2021)
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