

# Department of Electrical and Electronic Engineering Science



## DEPARTMENT POSTGRADUATE PROGRAMMES

*The Cutting Edge  
of Industry 4.0*

### 1. INTRODUCTION

The University of Johannesburg (UJ) is strategically positioned in the vibrant, multicultural and dynamic City of Johannesburg, the economic capital of South Africa. The University is a vibrant and cosmopolitan university, anchored in Africa, which is dynamically shaping the future through innovation and the collaborative pursuit of knowledge and striving towards Global Excellence and Stature (GES). The University's academic architecture reflects a comprehensive range of learning programmes, leading to a variety of qualifications, from vocational and traditional academic to professional and postgraduate to meet the fourth industrial revolution challenges referring to a systemic transformation that impacts on civil society, governance structures, human identity, economics and manufacturing. In keeping with the University's comprehensive status, the Faculty of Engineering and the Built Environment (FEBE) is the first in South Africa to offer global education to a full range of professional engineering qualifications.

### 2. DEPARTMENT POSTGRADUATE PROGRAMMES

The Department of Electrical and Electronic Engineering Science at FEBE, offers interdisciplinary postgraduate programmes including, but not limited to, telecommunications, smart grid, power systems, renewable energy, IoT, Artificial Intelligence, Optics, Micro-technology and Bioengineers, which will putting our students in the front line of the fourth industrial revolution leadership. A comprehensive range of postgraduate programmes of Masters and Doctoral degrees by research and more specialized masters by coursework are offered. All postgraduate programmes are offered in English. Following are brief descriptions of the offered programmes.

### 3. ENGINEERING SCIENCE MAGISTER INGENERIAE PROGRAMMES (MENG)

#### 3.1. MEng (Electrical and Electronic Engineering) Research Based

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis, and related principles to specific problems of society at large. One of the main objectives of this process is to develop an advanced capability to conduct fundamental engineering research independently. It also promotes a lifelong learning approach.

#### 3.2. Master's degree in Micro and Nanoelectronics Coursework Based

The purpose of the online Master of Micro- and Nanoelectronic Engineering programme is to develop engineers with advanced abilities in applying fundamental microelectronics within multi- and cross-disciplinary environments of today's workplace. The proposed curriculum is designed to provide advanced knowledge in areas such as analogue, digital and mixed-signal electronic design, RF, Mm-Wave, optics and communications engineering, physics of semiconductor materials, design for testability, and microelectronic processes. Curriculum is designed to assist students in acquiring advanced computer skills,

including the excessive use of online resources and electronic design automation (EDA) tools. The degree includes a minor dissertation, thus promoting research and independent learning from the candidates.

### 3.3. Master's degree in Systems Engineering Coursework Based

The Master of Systems Engineering programme strives to develop professionals with advanced abilities in applying fundamental systems engineering sciences and related interdisciplinary principles enabling them to contribute as advanced Systems Engineers.

The Master of Systems Engineering Programme focus on the development of professionals for System Engineering leadership roles in engineering and related technology fields.

The masters degree will offer, advanced capability to conduct fundamental independent systems engineering research, the ability to apply research tools and techniques on systems engineering problems in the real-world, advanced knowledge and skills to integrate engineering and systems engineering principles to solve complex problems and the skills to conduct systems engineering activities such as systems design, planning, research and problem solution.

## 4. ENGINEERING SCIENCE MAGISTER PHILOSOPHIAE PROGRAMMES (MPHIL) RESEARCH BASED

The MPhil (Electrical and Electronic Engineering) degree aim is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an inter/intra-disciplinary nature independently. Students from different disciplines, Bachelor of Science and other science and technology engineering programmes are welcomed to join the programme.

## 5. ENGINEERING SCIENCE DOCTORAL DEGREE PROGRAMME: DOCTOR OF PHILOSOPHY (PHD)

The aim of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences, design and synthesis, and related principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

## 6. DEPARTMENT RESEARCH GROUPS AND EXPERTISE

The department of Electrical and Electronic Engineering Science offer a variety of research groups and fields of expertise lead by academics with international stand and reputation. The table on the following page depicts, but not limited to, different research areas the department is offering.

RESEARCH GROUP	RESEARCH DESCRIPTION
Control/Power Research group	The group studies the advanced control theory and apply the theory into applications: Big data analysis, Renewable energy and Artificial intelligence.
Control and Dynamics Research Group	The use of control and optimisation to improve the performance of engineering systems.
Group for Electric Energy Processing (GEEP)	Electric energy processing, power electronics, machine control, power systems, electromagnetic compatibility
Centre for Cyber Physical -Food, Energy & Water Systems (CCP-FEWS's)	Development of systems and technologies that will lead to sustainable management of food, energy and water resources
Centre for Telecommunications	Telecommunication, error correction, power-line communication and network coding.
Centre for Smart Systems	Smart Communications Systems, Smart Grid and Smart homes
Centre for Collaborative Digital Networks – Liquid Telecom.	Collaborative digital networks and digital innovation: Internet of Things, Software Defined Networks, Artificial Intelligence and Serious games.
Smart Cities Research Group	Demand Side management and Renewable Energy
TELKOM Centre of Excellence	The research of optical fibre systems and IOT systems for the advancement of society.

## 7. ADMISSION REQUIREMENTS

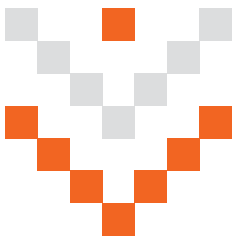
Approved degrees from accredited programmes within the electrical and electronic engineering or related fields at the levels of Bachelor Honours degree, Master's degree or equivalent to NQF level 8. Research topics must be accepted and approved by the supervisors in the department in the case of research dissertation.

## 8. EMPLOYMENT OPPORTUNITIES

Our programmes prepare our students for professional careers in industry, academia and research. Employment opportunities exist at government institutions, Universities, research institutes, banks and the private sector in general.

## 9. GENERAL INFORMATION

- **LINKS:**
  - **Staff details:** <http://tiny.cc/0eqpsz>
  - **PhD, MEng and MPhil:** <http://tiny.cc/2fqpsz>
  - **Micro- Nanoelectronics:** <http://tiny.cc/hgqpsz> and <http://tiny.cc/9gqpsz>
  - **Systems Engineering:** <http://tiny.cc/mxpqsz>
  - **Application:** [www.uj.ac.za/apply](http://www.uj.ac.za/apply)
- **CONTACT DETAILS:**
  - Head of Department: Prof Khmaies Ouahada | [kouahada@uj.ac.za](mailto:kouahada@uj.ac.za), Tel: 011 559 2213
  - Department Research Secretary: Ms Mpho Mabolabola | [mphom@uj.ac.za](mailto:mphom@uj.ac.za), Tel: 011 559 4743



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[www.uj.ac.za](http://www.uj.ac.za)