

Master of Science in Information Engineering and Technology

Profile of the Study Program

The **GIU Faculty of Engineering** positions itself as a progressive educational environment that mirrors the continuous evolution of engineering technologies in order to offer state-of-the-art study programs. The faculty is pillared on integrating theoretical and practical engineering studies to achieve excellence in teaching with the perspective of pioneering in research and development. The diverse expertise within the faculty complemented by a partnership with the faculty of engineering at the German University in Cairo sets the path for the vision of establishing within the GIU faculty of engineering a multitude of diverse research chairs with internationally recognized centers of research excellence.

The study program **Masters of Information Engineering and Technology** contributes to the university's mission of providing an anchor for cooperation with German partners and partner universities abroad through research-oriented professorships and contemporary study programs, thus opening new possibilities for knowledge transfer, students' exchange, making significant contributions to international cooperation between science and industry. The curriculums and study programs are oriented to conduct state-of-the-art research and development that span the full breadth of the spectrum of information technologies from device-level up to the full-scale of information technology building blocks that are integrated to design and implement complete systems. The overall study program objectives are to:

- Deepen the fundamental scientific and engineering principles of graduate students in the field of electronics and telecommunication networks engineering.
- Build and refine personal skills of graduate students in critical thinking, problem analysis and problem solving.
- Enhance the graduate students' capabilities in independent work and planning.
- Strengthen the communication skills of graduate students particularly in academic as well as thesis writing.
- Prepare graduate students to pursue further studies (i.e., PhD programs) at top tier German and international universities.
- Nurture collaborative integrative research studies within the scope of pioneering centers of excellence.

Within the program students can chose between three majors:

- *Networking engineering*: is designed to equip students with software and hardware tools necessary to design, analyze maintain and administer telecommunication networks. The students also master technologies for data engineering including data storage, processing and analysis. The curriculum is divided into study tracks that cover applications programming, network design and analysis and communication fundamentals The role of graduates varies from firm to firm, but it often includes troubleshooting hardware and software, providing software support and performing system design and analysis. Other increasingly demanded job titles with similar responsibilities include mobile communication network administrator, IoT network design, security engineer and network architect.
- *Communication Engineering*: is designed to prepare students for designing, developing, testing as well supervising the production of telecommunication systems, radar and navigation systems and wireless communication networks. The curriculum is divided into study tracks that cover radio frequency engineering and supporting electronics, digital signal processing, digital communication along with Networking fundamentals. Graduating engineers are involved in designing new products, writing requirements for their performance, as well as developing maintenance schedules and charts. Testing equipment and machinery, solving operation problems, estimating time and cost of electrical and electronic products also come under their job.
- *Electronics Engineering*: is oriented for students interested primarily in electronics hardware of diverse state-of-the-art technologies. The curriculum is divided into study tracks that cover physics of electronic devices, analog and digital circuits design, electronic systems design along with fundamentals of radio frequency engineering. Electronics graduates have excellent chances in development and research, design, testing and verification of electronic circuits, embedded systems, or in automation engineering areas.

The **qualification goals** of the graduate study program in information engineering and technology are:

- Identify and accurately define scientific questions.
- Analyze and criticize state-of-the-art of existing research and to be able to identify research gaps.
- Propose novel methodologies of solving engineering research problems.
- Apply scientific methods for data collection as well as analysis of theoretical, simulation and experimental results.
- Document research findings both in a clear understandable and professionally written thesis as well as using an oral presentation.
- Function in teams, supervising undergraduate students for integrating contributions from different disciplines of engineering towards the solution of multi-disciplinary projects.

The **teaching method** emphasizes learning, interaction, teamwork and personal guidance in small groups (max. 25 participants). Therefore, all modules with lectures include also tutorials and/or practical applications. Multiple lab modules that are completely devoted for experimental and practical studies are also offered. The teaching language is English throughout the whole curriculum.

Curriculum

L = Lecture, E = Exercise (Tutorials), P = Practical (all in contact hours)

Semester 1

Communications					
Code	Course Name	L	T	P	ECTS
COMM	Source Coding and Compression	2	2	0	5
COMM	Microwave Technology	2	2	0	5
NETW	Random Signals and Noise	2	2	0	5
COMM	Advanced Communication Lab	0	0	4	5
COMM	Elective I	2	2	0	5
COMM	Elective II	2	2	0	5
	Total	10	10	4	30
Electronics					
Code	Course Name	L	T	P	ECTS
ELCT	Programmable Logic Circuits	2	2	0	5
ELCT	Sensor Technology	2	2	0	5
ELCT	Very Large Scale Integration	2	2	0	5
ELCT	Advanced Microelectronics Lab	0	0	4	5
ELCT	Elective I	2	2	0	5
ELCT	Elective II	2	2	0	5
	Total	10	10	4	30
Networking					
Code	Course Name	L	T	P	ECTS
NETW	Internet Technology	2	2	0	5
NETW	Network and Services	2	2	0	5
NETW	Linear and Non-Linear Optimization	2	2	0	5
NETW	Advanced Networks Lab	0	0	4	5
NETW	Elective I	2	2	0	5
NETW	Elective II	2	2	0	5
	Total	10	10	4	30

Electives are to be selected from updated list per semester.

Semester 2

Communications					
Code	Course Name	L	T	P	ECTS
COMM	Modulation and Coding	2	2	0	5
COMM	Adaptive Antennas	2	2	0	5
NETW	Information Theory	2	2	0	5
COMM	Advanced Communication Lab	0	0	4	5
COMM	Elective III	2	2	0	5
COMM	Elective IV	2	2	0	5
	Total	10	10	4	30
Electronics					
Code	Course Name	L	T	P	ECTS
ELCT	Optoelectronic Devices and Circuits	2	2	0	5
ELCT	Systems on a Chip	2	2	0	5
ELCT	High Speed Electronic Circuits	2	2	0	5
ELCT	Advanced Microelectronics Lab	0	0	4	5
ELCT	Elective III	2	2	0	5
ELCT	Elective IV	2	2	0	5
	Total	10	10	4	30
Networking					
Code	Course Name	L	T	P	ECTS
NETW	Network Management	2	2	0	5
NETW	Systems and Network Security	2	2	0	5
NETW	Network Planning	2	2	0	5
NETW	Advanced Networks Lab	0	0	4	5
NETW	Elective III	2	2	0	5
NETW	Elective IV	2	2	0	5
	Total	10	10	4	30

Semester 3

Code	Course Name	Duration	ECTS
COMM/NETW/ELCT	Master Thesis	6 months	30