Bachelor 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 **Bachelor 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 program strive to encompass 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:

- Graduate engineering students as practicing professionals in electrical engineering by utilizing the acquired technical knowledge, intellectual skills, and professional skills that are nurtured within the study programs offered by the faculty.
- Contribute to the society and profession by handling the analysis, design, and assessment of complex electrical devices/circuits, communications systems and information networks.
- Demonstrate and teach good work ethics, communication abilities, and the utilization of information technology for the welfare of multicultural and increasingly changing societies.
- Train students on how to work effectively and grow as graduates to become responsible professionals alone or in teams.
- Prepare graduates with the motivation to pursue post graduate studies while equipping them with the academic and research skills that promise them excellent opportunities in different disciplines of electrical engineering at German as well as top tier International academic institutions.

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 along with telecommunication 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 undergraduate study program in information engineering and technology are:

- Apply analytical and numerical methods in investigating electrical and electronics' systems performance, and for the solution of complex engineering problems.
- Use state of the art techniques and modern tools for the simulation of analog and digital electrical systems.
- Identify methodologies of solving engineering problems and data collection, as well as recognize current engineering technologies as related to electrical engineering.
- Discuss contemporary issues related to the electrical engineering profession.
- Recognize the professional and ethical responsibility, legislation issues related to electrical engineering, and impact of electrical engineering solutions in a global and societal context.

- Apply knowledge of mathematics through differential equations, probability and statistics, and science including physics and chemistry.
- Conduct laboratory experiments safely and analyze experimental/field data related to electrical and electronic circuits, communication systems and networking systems.
- Perform electrical engineering designs by means of design experiences integrated throughout the professional component of curriculum and practice the aesthetics in design.
- Use a wide range of analytical tools, techniques, equipment, and software packages for modeling and solving electrical engineering problems.
- Function on teams for integrating contributions from different disciplines of engineering towards the solution of multi-disciplinary projects.
- Formulate and solve electrical engineering problems of interest to industry and society.
- Prepare and present technical reports.
- Manage effectively tasks, time, and resources.
- Work effectively individually or within multidisciplinary teams, and work in stressful environment and within constraints.

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:

Code	Course Name	L	E	P	ECTS
CSEN	Introduction to Computer Programming	4	4	4	12
EDPT	Engineering Drawing and Design	1	2	0	3
MATH	Mathematics I	4	4	0	8
PHYS	Physics I	2	2	0	5
HUMA	Critical Thinking & Scientific Methodology	0	2	0	2
	Total	**11**	**14**	**4**	**30**

Semester 2:

Code	Course Name	L	E	P	ECTS
MATH	Mathematics II	4	4	0	7
PHYS	Physics II	2	2	2	5
ELCT	Electric Circuits I	2	2	2	5
ELCT	Digital Logic Design	2	2	0	5
CSEN	Data Structure & Algorithms	2	2	2	6
HUMA	Communication & Presentation Skills	0	2	0	2
	Total	**12**	**14**	**6**	**30**

Semester 3:

Code	Course Name	L	E	P	ECTS
MATH	Mathematics III (Probability and Statistics)	2	2	0	4
COMM	Signals & Systems Theory	2	2	2	5
ELCT	Electric Circuits II	2	2	2	5
COMM	Electromagnetics	2	2	0	5
NETW	Communication Networks	2	0	2	4
CSEN	Computer Programming Lab	2	0	2	5
HUMA	Research Paper Writing	0	2	0	2
	Total	**12**	**10**	**8**	**30**

Semester 4:

Code	Course Name	L	E	P	ECTS
MATH	Discrete Math and Numerical Methods	2	2	0	5
COMM	Systems and Control	2	2	2	5
CSEN	Computer Organization & System Programming	2	2	0	5
Communications					
COMM	Communication Theory	2	2	1	5
NETW	Communication Engineering	2	2	1	5
ELCT	Communication Microelectronics	2	2	0	5
	Total	**12**	**12**	**4**	**30**
Electronics					
ELCT	Optical Materials and Devices	2	2	0	5
ELCT	Semiconductors	2	2	2	5
NETW	Communication Engineering	2	2	1	5
	Total	**12**	**12**	**5**	**30**
Networking					
NETW	Random Signals & Noise	2	2	0	5
NETW	Internet	2	2	0	5
COMM	Communication Theory	2	2	1	5
	Total	**12**	**12**	**3**	**30**

Semester 5:

Code	Course Name	L	E	P	ECTS
MGMT	Introduction to Management	2	0	0	2
Communications					
COMM	Modulation I	2	2	0	5
COMM	Digital Signal Processing	2	2	0	5
COMM	Radio Frequency Engineering	2	2	0	5
COMM	Channel Coding	2	2	0	5
NETW	Transmission and Switching	2	2	0	4
COMM	Communication Lab	0	0	4	4
	Total	**12**	**10**	**4**	**30**
Electronics					
ELCT	Digital System Design	2	2	0	4
ELCT	Solid State Electronics	2	2	0	5
ELCT	Optoelectronics	2	2	0	5
ELCT	Electronic Circuits	2	2	0	5
COMM	Radio Frequency Engineering	2	2	0	5
ELCT	Microelectronics Lab	0	0	4	4
	Total	**12**	**10**	**4**	**30**
Networking					
NETW	Transmission and Switching	2	2	0	4
NETW	Modelling and Simulation	2	2	0	5
NETW	Network Protocols	2	2	0	5
COMM	Channel Coding	2	2	0	5
CSEN	Computer System Architecture	2	2	2	5
NETW	Network Lab	0	0	4	4
	Total	**12**	**10**	**6**	**30**

Semester 6:

Code	Course Name	L	E	P	ECTS
Communications					
Code	Course Name	L	E	P	ECTS
COMM	Modulation II	2	2	0	5
COMM	Wave Distribution	2	2	0	5
COMM	Communication Systems	2	2	0	5
NETW	Optical Fibre Communication Systems	2	2	0	5
NETW	Wireless Communication	2	2	0	5
COMM	Communication Lab	0	0	4	5
	Total	**10**	**10**	**4**	**30**
Electronics					
Code	Course Name	L	E	P	ECTS
ELCT	Integrated Circuits Design	2	2	0	5
ELCT	Microelectronics	2	2	0	5
ELCT	Power Electronics	2	2	0	5
ELCT	Semiconductor Technology	2	2	0	5
ELCT	Microcomputer Applications	2	2	0	5
ELCT	Microelectronics Lab	0	0	4	5
	Total	**10**	**10**	**4**	**30**
Networking					
Code	Course Name	L	E	P	ECTS
NETW	Performance Modelling	2	2	0	5
NETW	Signaling and Network Control	2	2	0	5
NETW	Mobile Communication Networks	2	2	0	5
CSEN	Analysis and Design of Algorithms	2	2	0	5
ELCT	Communication Microelectronics	2	2	0	5
NETW	Network Lab	0	0	4	5
	Total	**10**	**10**	**4**	**30**

Semester 7 IET Communications/Electronics/Networking:

Code	Course Name	Duration	ECTS
COMM/NETW/ELCT	Internship /training	3 months	15
COMM/NETW/ELCT	Bachelor Thesis & Seminar	3 months	12 + 3
	Total	**6 months**	**30**