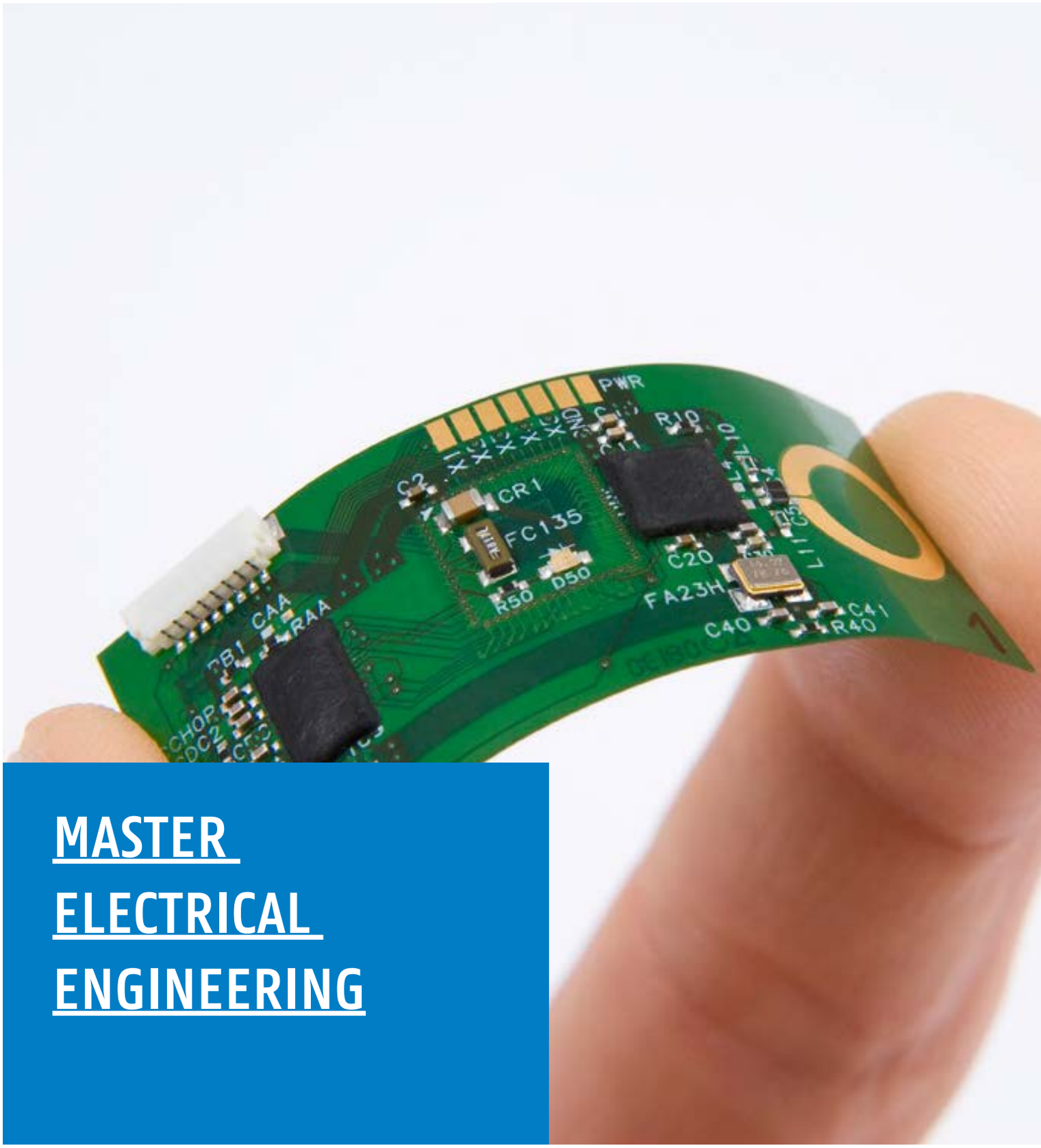
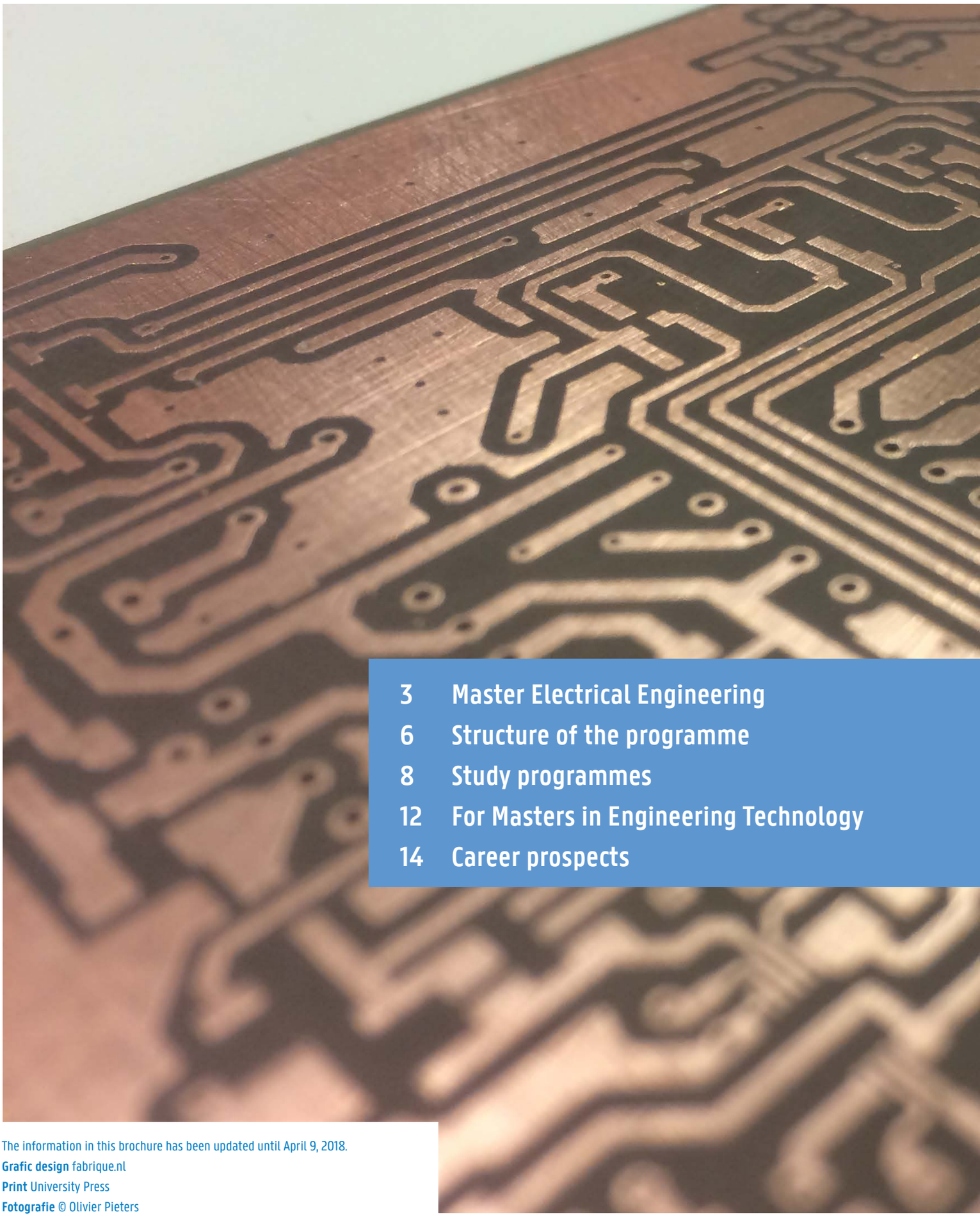
FACULTY OF ENGINEERING AND ARCHITECTURE



MASTER ELECTRICAL ENGINEERING

UNIVERSITEIT GENT



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MASTER ELECTRICAL ENGINEERING

The electrical engineer analyses, designs, builds and programs the beating heart of every smart device. These smart devices are drastically changing society, increasing life comfort, safety and even people's life chances. Soon all these smart devices will also be connected through the Internet of Things (IoT) Would you like to contribute to the rise of the new generation of communicating systems?

The Master of Science in Electrical Engineering offers an in-depth training in the domains of electrical and electronics engineering. Learn how GPS systems keep working in a city full of tunnels and buildings of steel and concrete, how to contribute to the rise of the new generation of "smart factories" and even how a new medical progress was enabled by non-invasive diagnostic techniques, microsurgery, implants and brain stimulation.

ELECTRONICS, THE BEATING HEART OF OUR WORLD

Electronic systems form the building blocks of all kinds of smart devices: computer and telecommunications systems, robots, medical scanners, game consoles, etc. They have become indispensable for solving important environmental problems. These devices are electronic systems which make electronics really the beating heart of our world and soon they all will be connected to the Internet of Things (IoT).

When you successfully finish the programme, you will be able to analyse, design, build and program complex electronic systems in an efficient and methodical way.

The applications of electrical engineering have become endless and this makes electrical engineering essential in virtually every company and sector, ranging from telecommunication and consumer electronics to the chemical industry and the building and construction sector.

SPECIALISATION IN HARDWARE AND COMMUNICATION

Electronic system design typically focuses either on the design of circuits and systems that form the basis of smart devices or on the connectivity between those devices and how communicating devices build much more powerful systems that push the Internet of Things forward.. Ghent University gives you the opportunity to specialise in one of the two approaches to create electronic systems:

ELECTRONIC CIRCUITS AND SYSTEMS (ECS)

The emphasis here is on the design of hardware. The hardware aspect focuses on the study, design, manufacturing and use of semiconductors, chips, microsystems, sensors, antennas, displays, complex analog and digital electronic circuits, cable networks, wireless and optical communication systems, etc.

COMMUNICATION AND INFORMATION TECHNOLOGY (CIT)

The emphasis here is on the design of communication channels and the interface between hardware and software. Modern hardware no longer stands by itself but has to work in a connected environment. It also has become increasingly more programmable and only achieves its final functionality after it is augmented with the suitable software. This software enables efficient algorithms for the processing of signals (music and video coding, speech recognition, interpretation of brain signals, ...), protocols for the exchange of information (channel coding, modulation, synchronisation of sources, ...) and algorithms for the processing of data (search algorithms, encryption, pattern recognition,...).

A DOMAIN IN CONSTANT AND RAPID EVOLUTION

It goes without saying that the field of electrical engineering evolves very quickly. The 50-year-old telephone was an electromechanical device that could transmit speech through a copper wire connection. The smartphone today is wireless, digital and multi-functional (voice, email, WiFi, GPS, photo and video, ...), and much smaller than the electromechanical telephone.

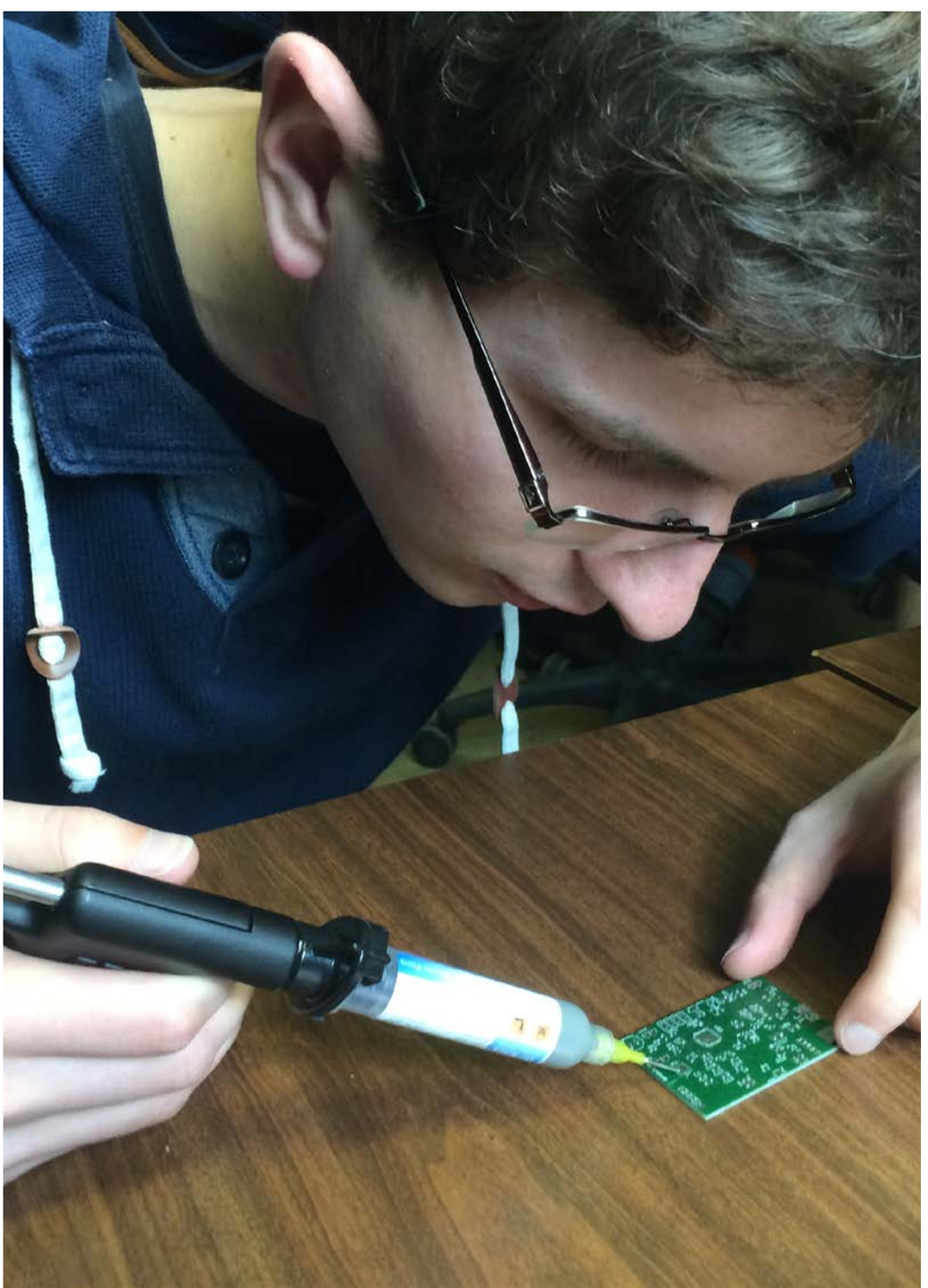
Such revolutionary developments have been made possible by a thorough miniaturisation of technology. Electronic circuits with increasing complexity are now on smaller pieces of silicon, and digital components with increasing computing power offer the possibility to enable even more complex algorithms for the processing of signals (as carriers of information). An electrical engineering curriculum will therefore not only focus on what exists today, but will provide a good foundation that will allow you to conceptually invent new developments and learn how to apply them in the future.

The evolution of electronics is so fast that every new project takes place in new circumstances: new components and new Computer Aided Engineering (CAE) tools that are available for the design, new measurement techniques that can be used for checking the proper functioning of systems, new regulations on electromagnetic compatibility (EMC) to which the design must comply, etc.

Thanks to the solid theoretical training in this programme you will quickly understand new developments in this field and you will be able to apply them to current and future problems in a creative way.

TEAMWORK

Because electronic systems are so complex, successful new developments often require a dynamic and creative team: a master of science in electrical engineering must therefore be a team player who can help solve problems that transcend the individual. Hence the importance of project courses and a Master's Dissertation. These are carried out within the scope of a scientific research group, but often result from an industrial problem.



MASTER'S DISSERTATION

As a student, you select a topic for your Master's Dissertation in the second semester of your first Master year. You then conduct the research related to your dissertation during the complete second Master year. Given the many researchers active in Electrical Engineering within the different departments, you will be able to choose between an overwhelming number of potential research topics. Some proposals will originate from, or be based on, ongoing collaborations with companies or research institutions. If you want, you can also define your own topic. This requires the approval by a promoter who finds your research proposal suitable and who is willing to take up its supervision.

MONITORING

Your promoter will monitor the progress of your research at regular times. In most cases, the daily supervision is performed by one or more researchers who are directly active in your research topic. Moreover, all researchers working in your research group will be directly interested in your research, as you will typically be investigating a hot topic in their research domain. This guarantees the relevance and timeliness of your research, as well as high-quality supervision and guidance by many different researchers.

STARTING POINT OF PROFESSIONAL CAREER

Often, your Master's Dissertation will be the starting point of your professional career in industry or at the university. The different departments involved in the Master of Science in Electrical Engineering programme are the largest of the Faculty of Engineering and Architecture. Each academic year, they attract dozens of new researchers, who will typically start research activities that lead towards a PhD degree. In some cases, the research you perform will be a continuation or extension of your Master's Dissertation research. When applying for a job in a company, you will typically be asked about the research you have carried out for your dissertation. Therefore, the specific topic of your Master's Dissertation may have profound consequences on the rest of your professional life. Hence, it is important to carefully evaluate the different opportunities that you are offered, to consult the different members of the research groups that propose appealing topics and to discuss each topic's possibilities and challenges with potential promoters and supervisors.

EXAMPLES OF TOPICS

The list below contains some representative titles of Master's Dissertations that were recently defended successfully. Note again the wide variety in potential topics:

- Driver circuit for an artificial iris embedded in a smart contact lens
- Design and implementation of an active opto-electric antenna for 5G wireless communication
- Chip design of high-speed transceiver circuits for next generation optical networks
- Localisation and tracking of athletes using Ultra Wide Band (UWB) technology
- Sign Language Recognition using Machine Learning
- Creation of a dynamic acoustic map based on superdirective microphone arrays
- Focus assist for operators of professional broadcast cameras
- Going Beyond HD: optimized encoding of personalized views from Beyond HD content
- Design of a monolithic high-speed driver chip for GaN HEMTs
- Drone Laser Tag – A dynamic real-time showcase of coordinated flight patterns using drones

INTERNATIONALISATION

All courses of the core curriculum are taught in the first Master year, except two. This makes it easier for you to broaden your experience by going on an Erasmus exchange in the second Master year. This is a unique opportunity to get to know other cultures and develop other competences.

If you want to study abroad, you can select a partner institution having a bilateral agreement with UGent in the area of electrical engineering. Then, you will need to compose a programme of courses at the partner institution in consultation with the study programme committee of Electrical Engineering. This programme must have a suitable size (usually containing 60 credits), and together with the curriculum followed at Ghent University comply to all conditions of the Master programme at the university.

This implies that an equivalent must be found for the two compulsory courses from the second master year and that the selected elective courses must fit within the earlier mentioned scenarios. To give the student maximal opportunity to study abroad, the rules will be interpreted in a flexible way.

As composing a programme at the partner institution requires a lot of preparation time, we suggest you start early enough in looking around and contacting us for more information on the Erasmus exchange.

To be allowed for an Erasmus exchange, all courses of the Bachelor programme must be completed successfully. Further, as most compulsory courses are taught in the first master year, we discourage an Erasmus exchange in the first Master year.

AN (INTERNATIONAL) INTERNSHIP

We also provide you the opportunity to do an internship in a company or a research institution outside Ghent University. This internship is preferably practical or experience oriented. The internship is usually done between the first and second Master year, but can also take place in the Summer before the first Master year. An internship of at least 4 weeks counts for an elective course of 3 credits, while an internship of at least 6 weeks counts for 6 credits. You can also combine two internships of 3 credits.

To get credits for an internship, you must find a supervisor among the professors teaching in the Electrical Engineering programme before the start of the internship. This supervisor will check if the technical/scientific level of the internship is sufficiently high. After the internship, you decide in consultation with the supervisor whether the internship will count as elective course or not. If you want credits for the internship, you will have to write a report on the internship, which will be evaluated by the supervisor and the mentor in the company.

An internship is an added value to your education, as it allows you to apply your knowledge to a practical situation, and you will become acquainted with the tasks of an engineer in a company.

By doing an internship abroad, you can combine the practical experience with an international experience.

STRUCTURE OF THE PROGRAMME

Since the Electrical Engineering programme covers both the circuits and systems that form the basis of smart devices as well as the communication principles that push the Internet of Things forward, we offer two different specialisations: Electronic Circuits and Systems (ECS) and Communication and Information Technology (CIT). Both fields of study are strongly connected, but the ECS specialisation focuses more on the hardware of the systems themselves, while the CIT specialisation focuses more on the communication aspects and on the interplay between hardware and software.

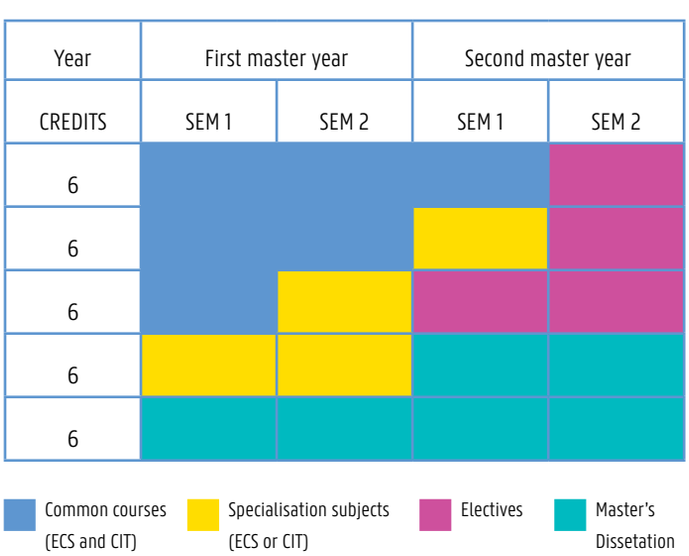
It is impossible to incorporate all this diversity with sufficient depth into the study programme of each student. Therefore, both specialisations (ECS and CIT) also contain a large elective component (36 out of 120 credits), so that students can determine the direction in which they wish to further specialise themselves the most.

STRUCTURE OF THE PROGRAMME

Both specialisations (ECS and CIT) offer a study programme consisting of a core curriculum of 60 credits compulsory courses (50% of the program), an elective curriculum of 36 credits (30% of the program) and a Master's Dissertation of 24 credits (20% of the program) which is carried out within the scope of a research group that is active in one of the domains of electrical engineering. The programme strives for a good balance between having a clear identity and leaving a lot of room for personal choices of the student in the light of his or her study interest and career plans.

The core curriculum consists out of 36 credits of common courses that are compulsory in both specialisations and out of 24 credits of specialisation subjects that are specific to the chosen specialisation. The majority (48 out of 60 study points) of the core curriculum will be scheduled in the first Master year. In this way, international mobility (Erasmus) becomes an attractive option in the second year.

The elective curriculum can be spread over the two Master years, but it is the intention to concentrate it mainly in the second Master year. Normally, 12 credits are provided in the first year and 24 credits in the second year.



THE CORE CURRICULUM

The core curriculum builds on the curriculum of the last Bachelor year in electronics and contains the main topics any electrical engineering student should have a basic understanding of. More detailed information on the courses can be found on page 8. The common courses of the core curriculum focus on design (Design Methodology for FPGAs and Electromagnetic-aware High Frequency Design), on the interface between design and communication (Antennas and Propagation and High-speed Electronics), and on communication and information theory (Information Theory and Modulation and Detection).

The specialisation subjects in the core curriculum then focus on the specific subjects of the two specialisations. In the Electronic Circuits and Systems (ECS) specialisation, the technology behind electronic circuits is further elaborated upon in the courses VLSI Technology and Design, Sensors and Actuators in Electronic Systems, and Technology of Integrated Circuits and Microsystems. In the second semester of the first year, the course Hardware Design Project is aimed at the actual application, in a team of 3 to 4 students, of the design principles applied in the compulsory subjects, and the detailed design knowledge applied in the specialisation subjects.

In the Communication and Information Technology (CIT) specialisation, the focus moves more to theoretical and practical communication aspects as well as the interface between hardware and software with as specialisation subjects Robotics, Mobile and Broadband Access Networks, and Queueing Analysis and Simulation. Again, the knowledge obtained in these subjects is applied in specific topics and in teams in the course Hardware Design Project.

Both this project course and the Master's Dissertation are specific to the chosen specialisation as they focus on a practical implementation of a solution in the chosen specialisation.

THE ELECTIVE CURRICULUM

The elective curriculum can be combined with a minor in Business Administration and Operational Management, Photonics or Biosystems. In that case, a total of 18 credits have to be chosen from the courses offered by the minor and the remaining 12 credits from a fixed list of courses that aim to further deepen the specialisation. However, most students choose to further deepen their specialisation by selecting the option in which the electives are put together as follows (36 to maximally 38 credits):

- a minimum of 16 credits from a fixed list of courses that aim to further deepen the specialisation
- a minimum of 6 credits from a faculty list of social subjects
- a maximum of 16 credits taken from the training programs of UGent (and after approval by the faculty).

The fixed list of elective courses for a specialisation is specific to that specialisation, except for a number of elective courses that appear in the lists of both specialisations. Most elective courses are closely related to scientific research of the various research groups. They therefore give students a good

impression of current scientific research in electrical engineering. Often they also arouse the interest in starting doctoral research after obtaining the diploma.

In the context of the social subjects you can also do one or two short internships or one long internship in a company. You can find more information about internships on page 3.

ENGLISH TAUGHT

The Master's programme in Electrical Engineering is offered in English. This underlines the international ambition of the faculty, as well as the importance of international education and multiple language skills for students.

I started my study programme in September of 2012, aiming to become a computer scientist. However, during my first year at the university, my interests shifted to electrical engineering. I thus chose for the latter, with the main subject being CIT.
I already started to look out for my future job as a software engineer during my last year. As I wanted to keep in touch with hardware too, rather than software only, I eventually chose to work as an embedded engineer.
Even though I only graduated last year, I can say that I am still very proud to be an alumnus of the Electrical Engineering programme, especially because of the broad spectrum that the programme covered. My current job as an embedded engineer is only one of the many possibilities, I could also have chosen for a job in power electronics, electronics or even management. It's only during my job interviews that I recognised the true value of my degree: the broad knowledge spectrum with which you can end up anywhere you like!

Nicolas Devos (CIT, graduated in 2017)

STUDY PROGRAMMES IN DETAIL

THE CORE CURRICULUM

The six compulsory courses that are common to the two specialisations continue to build on the electrical engineering courses that were taught in the final year of the Bachelor programme.

Antennas and Propagation teaches you how to design antennas and provides insight into radiowave propagation in wireless communication networks. You learn about the operating principles of wire antennas, horn antennas, planar antennas and reflector antennas. You also learn how to shape the radiation pattern of antenna arrays and how to improve the quality in a mobile communication system through diversity. In a computer-aided antenna design project, you implement practical wire antennas. In the antenna lab, you get acquainted with standard antenna measurementss.

Design Methodology for FPGAs familiarises you with the different aspects and phases in the design of complex embedded systems (such as a smartphone or an intelligent video camera). These systems often contain FPGAs as the basic hardware blocks. The design on FPGAs at the architectural level is discussed first, but afterwards we focus on the specification of the system and the exploration of the system design space.

Electromagnetic-aware High Frequency Design first discusses the fundamental principles of microwave circuits: you discover the properties of isolators, three-port circulators and four-port directional couplers. You alsolearn how to design filters with discrete or distributed elements. Second, you get acquainted with the basic principles of electromagnetic-aware design, by taking into account the emission and interference caused by conducted and radiated signals to ensure signal and power integrity in electronic circuits. You will achieve electromagnetically compatible design by limiting the emission of and susceptibility to parasitic signals. This requires, among others, including the exact electromagnetic behaviour of all components in your system and by designing a correct reference and powering system.

High-speed Electronics deals with the design and modeling of microwave circuits and building blocks to create for example transmitters and receivers for mobile communication, GPS, and wireless and optical networks. The course builds on the acquired basic knowledge of electronic circuit analysis and analog electronics, but it confronts the designer with the challenges that originate from the high frequency at which the circuit elements and their interconnections work. This course provides insight in the underlying theory and presents practical hands-on approaches using professional design software and laboratory equipment.

Information Theory provides in-depth knowledge and insight into the safe and efficient coding of information. We focus on both source coding (compression and quantisation) and channel coding (protection against transmission errors) and theoretical performance limits are derived. Finally, you also learn a number of important classes of practical codes in detail.

Modulation and Detection deals with digital communication about dispersive channels that are subject to fading. During this course we focus on the transmission of signals from different users over the same channel (multi-user communication). In addition to combining conventional modulation with equalisation, you also study more advanced techniques such as CDMA, OFDM and the use of diversity. Such techniques are used in modern communication systems (mobile telephony, WLAN, etc.).

CORE CURRICULUM	SEM	CRDT
Antennas and Propagation	1	6
Design Methodology for FPGAs	1	6
Electromagnetic-aware High Frequency Design	1	6
High-speed Electronics	2	6
Information Theory	2	6
Modulation and Detection	3	6

When I started my engineering studies in September of 2008, I already knew that Electrical Engineering would be the way to go for me. During the programme, we were overwhelmed with abstract and strongly mathematically oriented courses. The many theoretical derivations in e.g. “Antennas and Propagation” and the many electrical circuit schemes in a more concrete course like e.g. “High-speed electronics” are not of much use to me today anymore. What I do use, however, are the many techniques and insights that I gained during this study programme. Being a development engineer for Dekimo for almost 5 years now, my main activities include drawing electrical circuits and doing PCB layouts. This is only a small part of my daily routine, however, as I also have to write firmware to drive these circuits. I mainly do this in (embedded) C and VHDL. In doing all these things, I use my fundamental knowledge from courses like “Advanced Analog Design”, “Digital Building Blocks” and “Signal Processing”. I got my first experience in designing electrical circuits with courses like “Hardware-design Project” and my master’s dissertation. I use all this knowledge on a daily basis to come up with good solutions for solving concrete electronic challenges..

Sander Lybeert (ECS, graduated in 2013)
Hardware/software engineer for Dekimo

ELECTRONIC CIRCUITS AND SYSTEMS (ECS)

SPECIALISATION COURSES

In the specialisation ECS, the emphasis is on the design of hardware so the four specialisation subjects focus on the design of different hardware components.

VLSI Technology and Design consists of a descriptive section focusing on VLSI technology and a part in which you learn to design electronic systems. A number of design assignments are part of this last part.

Sensors and Actuators in Electronic Systems is an intermediate course about sensors and actuators that assumes a good initial knowledge of physics and electronics. It aims at giving you a good understanding of the possibilities and limitations of the different sensor and actuator types and the different ways they can be interfaced. Furthermore, it provides some hand-on experience of how to use them in practice.

Hardware Design Project focuses on the actual application of the design principles applied in the compulsory subjects, and the detailed design knowledge applied in the specialisation courses. You will learn in a team of 3 to 4 students how to carry out a design through a suitable range of design assignments. This means: realisation, evaluation and debugging of the hardware.

Technology of Integrated Circuits and Microsystems covers the technology for the realisation of microsystems integrated in CMOS, using pre-CMOS, intra-CMOS and post-CMOS solutions. In addition to the technology description, concrete realisations are analysed on the basis of case studies.

The first three specialisation courses are programmed in the first Master year, the last one in the second Master year.

SPECIALISATION SUBJECTS	SEM	CRDT
VLSI Technology and Design	1	6
Sensors and Actuators in Electronic Systems	2	6
Hardware Design Project	2	6
Technology of Integrated Circuits and Microsystems	3	6

ELECTIVE COURSES

The table below contains the electives of the specialisation CIT, the semester in which they are offered and the number of credits they represent. As you can see, there is a wide range of subjects and it is not so difficult to select a package of at least 16 credits that suits your interests.

High Frequency Systems	1/3	6
Design of Microsystems (in Dutch)	1/3	6
Applied High Frequency Design	1/3	6
Robotics	1/3	6
Microphotonics	1/3	6
Display Technology	1/3	6
Performance Analysis of Telecommunication Systems	1/3	4
Estimation and Decision Techniques	1/3	4
Advanced Analog Design	2/4	6
Digital Building Blocks (in Dutch)	2/4	6
Avionics	2/4	4
Audio Engineering	2/4	4
Optical Communication Systems	2/4	6
Power Electronics	2/4	4
Quantum Physics for Electronics and Photonics (in Dutch)	2/4	6
Physics of Semiconductor Devices	2/4	6
Photovoltaic Energy Conversion and Sustainable Energy	2/4	6
Computational Solutions of Wave Problems	2/4	6
Queueing Theory (in Dutch)	2/4	6
Advanced Modulation and Coding	2/4	4
Bio Electromagnetism	2/4	4
MASTER'S DISSERTATION	3-4	24

More details about the content of the courses can be found on the study sheets on studiegids.ugent.be. Go to your degree program and click on the course you want to know more about.

COMMUNICATION AND INFORMATION TECHNOLOGY (CIT)

SPECIALISATION COURSES

The specialisation subjects mostly emphasise on the design of communication channels and the interface between hardware and software.

Robotics is a fast evolving and increasingly prominent application area for artificial intelligence and mechatronics. The goal of this course is to give an overview of a selection of hardware, concepts and methods that are explicitly used for the building and development of mobile robotics. The course introduces hardware elements of mobile robotics, including sensors, actuators, and mobile computing. Algorithms will focus on sensor fusion, kinematics, dynamics, localisation and mapping. The course will frame the content through the presentation of use cases and hands-on lab work.

Mobile and Broadband Access Networks builds on the Bachelor course Communication Networks. The course explains what it takes to be able to send multimedia information (images, video, sound) over computer networks. The main difference with conventional computer networks is that one must now be able to guarantee that the data arrive on time, in order to avoid disturbing hitches in the multimedia stream.

Hardware Design Project is aimed at the actual application of the design principles applied in the compulsory subjects, and the detailed design knowledge applied in the specialisation courses. You will learn in a team of 3 to 4 students how to carry out a design through a suitable range of design assignments. This means: realisation, evaluation and debugging of communication infrastructure.

Queueing Analysis and Simulation builds on elementary knowledge of probability and random processes. It is a mathematically in-depth course that studies the behaviour of queueing lines. You will learn how to calculate system populations, time delays and loss probabilities in queueing lines, and to dimension buffers. The course then introduces queueing lines as parts of performance models for e.g. computers and network equipment, and yes, also airports, supermarkets and morning traffic jams.

SPECIALISATION SUBJECTS	SEM	CRDT
Robotics	1	6
Mobile and Broadband Access Networks	2	6
Hardware Design Project	2	6
Queueing Analysis and Simulation	3	6

ELECTIVE COURSES

The table below contains the electives of the specialisation ECS, the semester in which they are offered and the number of credits they represent. As you can see, there is a wide range of subjects and it is not so difficult to select a package of at least 16 credits that suits your interests.

Machine Learning	1/3	6
Performance Analysis of Telecommunication Systems	1/3	4
High Frequency Systems	1/3	6
Internet of Things	1/3	6
Image Processing (in Dutch)	1/3	6
Artificial Intelligence	1/3	6
VLSI Technology and Design	1/3	6
Estimation and Decision Techniques	1/3	4
Advanced High Frequency Design	1/3	6
Parallel and Distributed Software Systems	1/3	6
Game theory with engineering applications	1/3	6
Broadband cable-TV and in-home networks	1/3	4
Design of Multimedia Applications	2/4	6
Avionics	2/4	4
Audio Engineering	2/4	4
Speech Processing	2/4	4
Network Modelling and Design	2/4	4
Optimisation Techniques (in Dutch)	2/4	6
Digital Building Blocks (in Dutch)	2/4	6
Multimedia Techniques (in Dutch)	2/4	6
Advanced Multimedia Applications	2/4	4
Bio Electromagnetism	2/4	4
Optical Communication Systems	2/4	6
Advanced Analog Design	2/4	6
Advanced Modulation and Coding	2/4	4
MASTER'S DISSERTATION	3-4	24

FOR MASTERS IN ENGINEERING TECHNOLOGY

Are you a Master of Science in Engineering Technology with specialisation in electronics, ICT, or electrical engineering, then you can enroll for the Master of Science in Electrical Engineering. You will follow an adapted program of 120 credits, but you still obtain the same diploma as the students who follow the regular program of 120 credits. You can also choose between the two specialisations Electronic Circuits & Systems (ECS) and Communication and Information Technology (CIT).

A CUSTOMISED PROGRAMME

The adapted programme of 120 credits consists of 66 credits of common subjects (compulsory subjects taught in both specialisations), 24 credits of specialisation subjects (compulsory courses that are specific to the chosen specialisation), 6 credits of elective courses, and 24 credits for the master thesis (see table on next page). The elective courses can be chosen from the list of electives of the specialisation (see regular programme).

The adapted program contains a bridge programme that is composed as follows: a mathematical course to catch up on the basic mathematics (Mathematic Models, 6 credits, in Dutch) and four courses (together 24 credits) from the regular Bachelor programme in Electrical Engineering: Applied Electromagnetism, Communication Theory (in Dutch), Modelling and Control of Dynamic Systems (in Dutch), and Design of Analog Circuits and Building Blocks. These bridging courses facilitate the transition from education in the Master of Science in Engineering Technology to that in the Master of Sciences in Electrical Engineering.

THE SUCCESS OF THE INTAKE

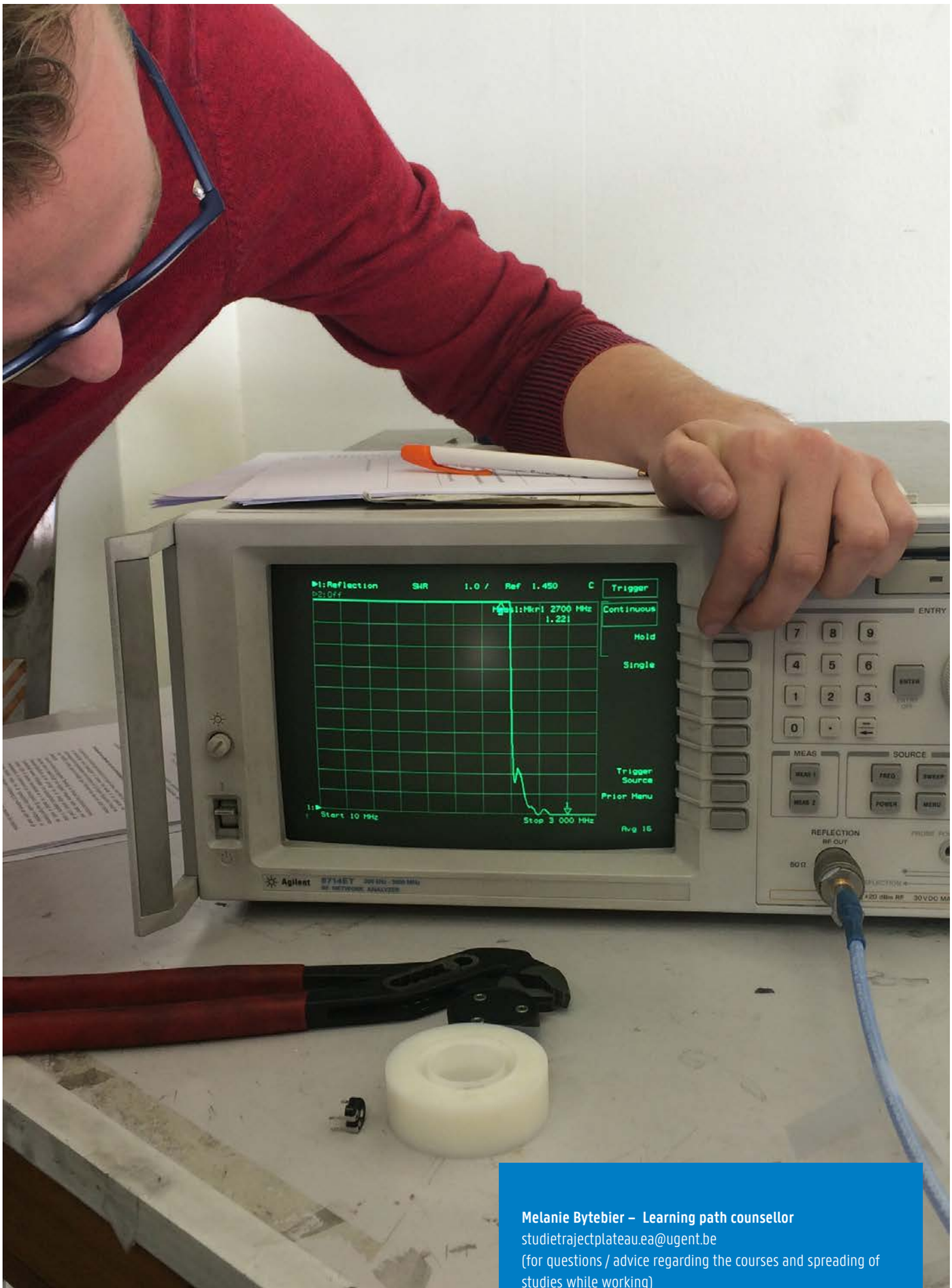
The reform of higher education, the transfer of the engineering technology degree to a university degree and the so-called horizontal intake of Masters of Engineering Technology in the Master of Sciences in Engineering has only been in place for a few years, but there are already some visible trends. As it turns out, the influx has actually been fairly constant over the last 10 years. Every year between 5 and 10 Masters in Engineering Technology start a Master of Science in Electrical Engineering. But you are probably wondering how many of them are actually obtaining the Master's degree?

FEASIBILITY OF THE PROGRAMME

Of course, it is not easy for everyone to adapt to a new environment in which a lot of attention is paid to the in-depth processing and understanding of the subject material rather than to the collection of factual knowledge. You will have to learn to think more abstractly in order to solve complex problems and especially new problems in a creative way.

For a number of courses it has been found that they (partly unconsciously) rely on prior knowledge of a Bachelor of Science in Engineering that is not necessarily your prior knowledge. In the first years of the horizontal intake, therefore, a number of problems arose that have since surfaced by the educational evaluations. Based on these evaluation results, an adapted program with five bridging courses (see above) was compiled. Also, the instructors of a number of 'difficult' subjects were asked to provide extra course material (this can help to fill in the gaps in your prior knowledge yourself), or to spend extra time (during the first lessons) on applying elements that are based on prior knowledge that is not entirely yours. In the education committee, we do everything possible to give you the best chance of success!

The result is that a large percentage (70 to 80%) of the students who enroll after two years effectively obtain a Master's degree. A number of these were not completely successful in the first year, but eventually they were able to obtain their diploma in the planned time via a GIT (individualized track). Only a small fraction (1 or 2 students per year) declines after the first year, and the number that graduates only after three years is also very small (1 or 2 students per year).



Melanie Bytebier – Learning path counsellor
studietrajectplateau.ea@ugent.be
(for questions / advice regarding the courses and spreading of studies while working)

CAREER PROSPECTS

The applications of electrical engineering have become endless and this makes electrical engineering essential in every company and sector, ranging from telecommunication and consumer electronics to the chemical industry and the building and construction sector.

WORKING IN A COMPANY

If you graduate as an electrical engineer, you usually start your career in a technical position, as a member of a design or research team. Afterwards you will gradually evolve towards a more general policy function. After all, good policy requires leadership, experience and sound knowledge, and a Master of Science in Electrical Engineering possesses all of these qualities.

A survey among graduate electrical engineers revealed that graduates can easily switch companies. This is partly because many companies have a shortage on electrical engineers. Some example companies that hire a lot of electrical engineers are Agfa Gevaert, Arcelor/Mittal, Barco, Belgacom, Cochlear, Dekimo, Honeywell, IBM, Infrabel, KBC, Melexis, Newtec, Nokia Bell Labs, Philips, SAIT/Zenitel, Siemens, Telenet and VRT. This list is of course far from complete, but it shows that electrical engineers end up in very different sectors.

Many electrical engineers are now highly sought after by the many SMEs in the technology sector that flourish in Flanders and Belgium. These smaller companies are much less known to the general public but they are at the forefront of many new technological developments and they are constantly looking for new talent to grow and to develop even more interesting applications of their new technologies. Some Master students even start their own company during their studies in the framework of Dare to Venture (Durf Ondernemen) and continue to enlarge their own company after their studies.

As an example of what products electrical engineers may be working on, the CMOSIS intelligent camera system is used in various applications such as broadcast cameras, the more advanced home and kitchen camera, for studying sports movements or animation, intelligent traffic guidance systems, space travel, industrial inspection and medical applications.

Another example is the Advanced Design System (ADS), an electronic design environment from Keysight Technologies. This is a computer-controlled design environment for the development of high-frequency and high-speed electronic components, circuits and systems. The ADS design environment is used in a wide range of industries such as computer, communication, networking, medical, automotive, … Many engineers with an electrical engineering degree are involved in the development and commercialisation of ADS.

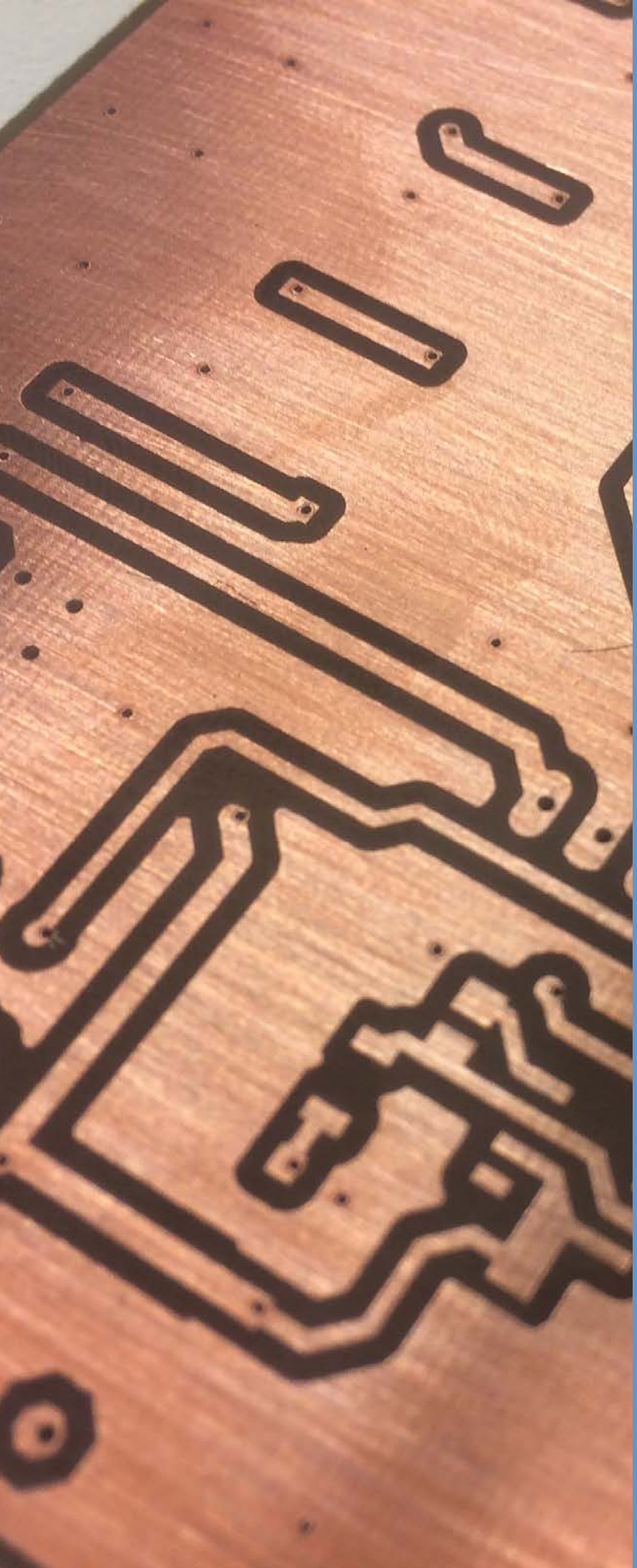
As a final example, Barco Healthcare develops displays that are used in digital mammography. Digital mammography makes x-ray images of the breast, which are investigated to detect breast cancer at an early stage. Since one must look for very fine details in the image, the image quality of the display is crucial. The electrical engineers develop the optics of the display such as the LCD, the LED backlight and the optical filters, as well as the advanced digital image processing.

Many electrical engineers are at some point in their career involved in the design of hardware (both analog and digital hardware, and both at the level of chips, PC cards and large systems). However, about the same number are also involved in the development of software (ranging from algorithms and protocols that provide the functionality of embedded systems to software that supports certain services via the internet). Other activities that often belong to the task package are the provision or organisation of knowledge transfer (training), the drafting of standards (e.g. ETSI standards for communication networks), the mapping and optimisation of production processes, project management, etc. In short, the job of an electrical engineer is a very versatile job.

OBTAINING A PHD FROM THE UNIVERSITY

An ever increasing number of Master students (more than 30%) does not immediately go to a company, but first performs scientific research at the university or a research institution for a few years. A doctoral degree is not only indispensable as access to a position in higher education, but it also provides much easier access to a position in a research institute or the R & D department of a large company. While you do a PhD, you gain so much experience, from which you can draw your entire career.

Due to the continuous expansion of the university research groups, the demand for doctoral students continues to rise and the research groups are obliged to attract more and more graduates from abroad. Doctoral students therefore collaborate intensively with colleagues from other cultures who have often followed elective courses with very different accents. Through this cooperation your network of friends and colleagues grows, which can be very useful for your further career.



REGISTER AT GHENT UNIVERSITY

If you were a student at Ghent University in the 2017-2018 academic year, you will receive an invitation to re-enroll electronically. All other students enroll as 'new students':

x From 1 March you can register online and pre-register.

x You must then convert your pre-registration into a definitive registration. You will personally meet in the summer months. The exact dates and location are announced via the website ugent.be/inschrijven.

TUITION FEE

Tuition fees are determined each year in consultation with the various universities. The following amounts were applicable in 2017-18 for the bachelor's and master's after-bachelor's degree programs (full-time model trajectory of 60 credits):

x non-scholarship student: € 906.10

x almost scholarship student: € 480.10

x scholarship student: € 106.90

Students who do not come from countries of the European Economic Union will be charged a higher tuition fee (with exceptions). For the curricula that deviate from 60 credits, a settlement is made according to the number of credits.

For master after master programs and postgraduate courses an adjusted tuition fee is requested.

Consult the website for the correct information: ugent.be/studiegeld

COURSE SCHEDULE

You can find the timetables online at studiekiezer.ugent.be. Go to the course of your choice under the 'practical' tab.

STILL QUESTIONS ABOUT...

The courses and admission requirements

If after reading through the documentation you still have questions or if you wish a personal interview, you can do so in the Study Advice department. The study advisors are available for all students. For an extensive interview, it is best to make an appointment in advance.

Department of Study Advice
Campus Ufo,
Ufo, Sint-Pietersnieuwstraat 33
9000 Gent, T 09 331 00 31
studieadvies@ugent.be
ugent.be/studieadvies

Special status

For information about student finance, child benefit, the status of the part-time student ... you can contact the Social Service, Campus UFO, Sint-Pietersnieuwstraat 47, 9000 Ghent, T 09 264 70 72 or 09 264 70 78, socialedienst@ugent.be.

Housing

For more information about renting a flat or about the university homes, please contact the Housing department, Home Vermeylen, Stalhof 6, 9000 Gent, T 09 264 71 00, huisvesting@ugent.be.

FACULTEIT INGENIEURSWETENSCHAPPEN
EN ARCHITECTUUR

ugent.be/ea
studiegids.ugent.be

REGISTER AT GHENT UNIVERSITY
From March 1st you can register online and pre-register for all Ghent University programs. You must then convert your pre-registration into a definitive registration during a personal visit in the summer months. The exact dates and location are announced via the website ugent.be/inschrijven

Afdeling Studieadvies
Directie Onderwijsaangelegenheden
Campus Ufo, Ufo, Sint-Pietersnieuwstraat 33, 9000 Gent
T 09 331 00 31
studieadvies@ugent.be
ugent.be/studieadvies

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