

**Decision no. 2016/09-10
pertaining to the State Admission
of Master's degrees from: The Faculty of Engineering and
Architecture of Ghent University,
Ghent – Belgium (FEA of Ghent University)**

Decision amended following May 16th 2017 plenary session

Purpose:

Application G: 1st application for State admission of the following 24 study programmes, from 1 September 2016:

- Bachelor en Sciences de l'Ingénieur: Architecture - Bachelor of Science in de ingenieurswetenschappen: architectuur (VL) - Bachelor of Science in Engineering: Architecture (EN)
- Bachelor en Sciences de l'Ingénieur en Génie Civil - Bachelor of Science in de ingenieurswetenschappen: bouwkunde (VL) - Bachelor of Science in Civil Engineering (EN)
- Bachelor en Science de l'Ingénieur en Génie Chimique et Science des Matériaux - Bachelor of Science in de ingenieurswetenschappen: chemische technologie en materiaalkunde (VL) - Bachelor of Science in Chemical Engineering and Materials Science (EN)
- Bachelor en Sciences de l'Ingénieur en Génie Physique - Bachelor of Science in de ingenieurswetenschappen: toegepaste natuurkunde (VL) - Bachelor of Science in Engineering Physics (EN)
- Bachelor en Sciences de l'Ingénieur en Génie Electrique - Bachelor of Science in de ingenieurswetenschappen: elektrotechniek (VL) - Bachelor of Science in Electrical Engineering (EN)
- Bachelor en Sciences de l'Ingénieur en Génie Electromécanique - Bachelor of Science in de ingenieurswetenschappen: werktuigkunde-elektrotechniek (VL) - Bachelor of Science in Electromechanical Engineering (EN)
- Bachelor en Sciences de l'Ingénieur en Génie Informatique - Bachelor of Science in de ingenieurswetenschappen: computerwetenschappen (VL) - Bachelor of Science in Computer Science Engineering (EN)
- Master en Sciences de l'Ingénieur: Architecture - Master of Science in de ingenieurswetenschappen: architectuur (VL) - Master of Science in Engineering: Architecture (EN)
- Master en Sciences de l'Ingénieur en Génie Civil - Master of Science in de ingenieurswetenschappen: bouwkunde (VL) - Master of Science in Civil Engineering (EN)
- Master en Sciences de l'Ingénieur en Ingénierie Physique - Master of Science in de ingenieurswetenschappen: toegepaste natuurkunde (VL) - Master of Science in Engineering Physics (EN)
- Master en Sciences de l'Ingénieur en Génie Electrique - Master of Science in de ingenieurswetenschappen: elektrotechniek (VL) - Master of Science in Electrical Engineering (EN)
- Master européen en sciences de la photonique - European Master of Science in Photonics (EN) (in convention with Vrije Universiteit, Brussel – VUB)
- Master en sciences de l'Ingénieur en Génie Biomédical - Master of Science in de ingenieurswetenschappen: biomedische ingenieurstechnieken (VL) - Master of Science in Biomedical Engineering (EN)

- *Master en Science de l'Ingénieur en Génie Electromécanique - Master of Science in de ingenieurswetenschappen: werktuigkunde-elektrotechniek (VL) - Master of Science in Electromechanical Engineering (EN)*
- *Master en Sciences de l'Ingénieur en Génie Industriel et Recherche Opérationnelle - Master of Science in de ingenieurswetenschappen: bedrijfskundige systeemtechnieken en operationeel onderzoek (VL) - Master of Science in Industrial Engineering and Operations Research (EN)*
- *Master en Sciences de l'Ingénieur en Génie Informatique - Master of Science in de ingenieurswetenschappen: computerwetenschappen (VL) - Master of Science in Computer Science Engineering (EN)*
- *Master en Sciences de l'Ingénieur en Génie Chimique - Master of Science in de ingenieurswetenschappen: chemische technologie (VL) - Master of Science in Chemical Engineering (EN)*
- *Master en Sciences de l'Ingénieur en Génie des Matériaux durables - Master of Science in de ingenieurswetenschappen: materiaalkunde (VL) - Master of Science in Sustainable Materials Engineering (EN)*
- *Master en Sciences de l'Urbanisme et de l'aménagement du territoire - Master of Science in de stedenbouw en de ruimtelijke planning (VL) - Master of Science in Urbanism and Spatial Planning (EN)*
- *Master International en Sciences de l'Ingénierie Biomédicale - International Master of Science in Biomedical Engineering (EN)*
- *Master Européen en Sciences de la Fusion Nucléaire et en Ingénierie Physique - European Master of Science in Nuclear Fusion and Engineering Physics (EN)*
- *Master International en Sciences de l'Ingénierie de la sûreté du feu - International Master of Science in Fire Safety Engineering (EN)*
- *Master en Sciences du Génie Textile - Master of Science in Textile Engineering (EN)*

- Having regard to the French Education Code, particularly Articles L.642-7 and R642-9,
- Having regard to the request submitted by the Vice Minister-President of the Flemish Government and the Flemish Minister for Education
- Having regard to the report prepared by: Anne-Marie JOLLY, member of CTI and panel chair
- Gabriel HENRIST, member of CTI and co-chair
Bernard REMAUD, CTI expert and co-chair
Denis LEMAITRE, Anne PERWUELZ, Marie-Jo GOEDERT, Jean Le QUEVEN, Roland VIDIL, Bertrand BONTE, Laurent BEDAT, Jean-Louis ALLARD, CTI experts
Joost WALRAVEN, André DE HERDE, Daniele CHOUEIRY, Cédric BELLOC, international experts
David EL BAZE, student engineer expert
and presented in CTI plenary meetings held on 13 and 14 September and 11 October 2016,

*3 Belgian universities (higher education institutions) asked to be audited by CTI in order to have their degrees recognised in France via the State admission procedure. This was their first request. These “**Master of Science in Engineering**” degrees are issued upon completion of a 5-year programme involving a 3-year general science and technology undergraduate degree followed by a 2-year specialisation resulting in the Master’s degree. The first cycle ends with the issuance of a “transitional” bachelor’s degree. 55 study programmes were examined based on the CTI R&O 2012 international standards, 2009 ESGs and EAFSG (EUR-ACE Master’s degree) standards.*

The Commission des Titres d’Ingénieur (French engineering accreditation body) adopted the following decision:

General presentation

Ghent University is a major university in Belgium, offering courses to 41,000 students under 11 different faculties that cover the full spectrum of academic disciplines. It distinguishes itself as a socially committed and pluralistic university that is open to all students, regardless of their ideologies, political opinions or cultural or social background, and scores highly in international rankings.

The Faculty of Engineering and Architecture (FEA) is one of the 11 faculties, established by Napoleonic Decree based on the French *Corps des Ponts et Chaussées* system. It integrated Ghent University in 1835.

The range of engineering specialisations has gradually increased to cover needs in industry and society.

The FEA offers a 5-year integrated programme structured according to the Bologna Accords, with a 3-year Bachelor's degree followed by a 2-year Master's programme.

The faculty currently has 7 Bachelor's programmes and 17 Master's programmes mostly leading to a Bachelor of Science in Engineering and Master of Science in Engineering.

General characteristics

The FEA is well integrated into the University, and has the independence needed to define its own missions while taking into account the specific needs of engineering training, and to reach its objectives.

Ghent University and the FEA define themselves as research-driven schools, and the FEA's education missions are based on the following principle:

To educate and prepare students so that they are able to solve complex problems, based on a solid technological and scientific background, and with a readiness to adopt and develop new methods and knowledge.

The FEA aspires to train highly skilled engineers able to adapt quickly to global technological and economic changes, and contribute to the long-term socioeconomic development of Flanders and Belgium.

Doctoral and postdoctoral researchers advise students during their Masters studies, bringing them into close contact with current research practices and results.

The FEA staff are involved in cutting edge research and ERC and Methusalem grants are commonplace. Start-ups and spin-offs are well-developed and a longstanding tradition at Ghent University.

Changes to the institution

In 2013-2014, industrial engineering programmes (4-year degrees in Flanders) were integrated into the FEA as the result of a 7-year integration process. CTI did not examine these programmes (Bachelor and Master of Engineering Technology) under this evaluation.

The language of instruction has been Dutch since 1930. However, in 2012, language legislation became less restrictive and since the 2013-2014 academic year, all engineering programmes except Architecture have been taught in English.

As part of the "Creative Knowledge Development" initiative, the FEA has created programmes available to all students that foster innovation, entrepreneurship and entrepreneurial skills.

Over the last several years, these programmes have given students the opportunity to take part in internships and gain hands-on experience. Unfortunately, this is not a widespread practice in all programmes.

The FEA has also developed a “Project track” which applies throughout the whole 5 years of programmes, but cross-disciplinary aspects still need to be improved.

Several initiatives have been developed by the FEA and/or students to inform secondary students about engineering studies and careers in an effort to encourage them to enrol in engineering studies.

Strengths of FEA

- Students appreciate the strong friendships and relations between staff and students
- Laboratories are well recognised and of high scientific quality, managed by highly skilled scientific staff
- Innovation and entrepreneurial skills have been strongly developed: “Student entrepreneurs” is well designed and organised
- Project track is available for all students
- Project team work analysis is a good initiative and could be shared between programmes
- Student association initiatives are noteworthy. They implement real successful initiatives to create ties with industry
- Employment opportunities are excellent for all the master’s programmes

Weaknesses of FEA

- Too few students from Belgium and from abroad with respect to the staff potential of the FEA
- Course evaluation methodology should be examined to get even more feedback
- Programmes taught in English do not attract enough students, promotion is necessary
- Not enough outbound mobility, however these students could be the best publicity for the FEA
- The role of Advisory Groups could be enhanced
- More guidance for the students in building their career project could be of great use
- Follow-up with alumni from each programme could be improved

Risks

- Strategic vision of the FEA does not appear clear in particular with respect to:
- Mobility, international students and internships that are unequally developed depending on the programmes

Opportunities

- Set up multidisciplinary projects across departments or faculties in favour of cross-fertilization
- Increase the share of successful experiments and best practices such as new teaching practices
- To attract more Belgian students, use companies to increase numbers and send more students into secondary schools
- Send teachers for training in industry to better understand companies and strengthen ties
- Improve coordination between the bottom-up approach used to design the programmes and learning outcomes
- Promote English-taught programmes through marketing and branding

Ghent University is a major university in Belgium, offering courses to 41,000 students under 11 different faculties that cover the full spectrum of academic disciplines. It distinguishes itself as a socially committed and pluralistic university that is open to all students, regardless of their ideologies, political opinions or cultural or social background, and scores highly in international rankings.

The Faculty of Engineering and Architecture (FEA) is one of the 11 faculties, established by Napoleonic Decree based on the French *Corps des Ponts et Chaussées* system. It integrated Ghent University in 1835.

The range of engineering specialisations has gradually increased to cover needs in industry and society.

The FEA offers a 5-year integrated programme structured according to the Bologna Accords, with a 3-year Bachelor's degree followed by a 2-year Master's programme.

The faculty currently has seven Bachelor's programmes and seventeen Master's programmes mostly leading to a Bachelor of Science in Engineering and Master of Science in Engineering.

General characteristics

The FEA is well integrated into the University, and has the independence needed to define its own missions while taking into account the specific needs of engineering training, and to reach its objectives.

Ghent University and the FEA define themselves as research-driven schools, and the FEA's education missions are based on the following principle:

To educate and prepare students so that they are able to solve complex problems, based on a solid technological and scientific background, and with a readiness to adopt and develop new methods and knowledge.

The FEA aspires to train highly skilled engineers able to adapt quickly to global technological and economic changes, and contribute to the long-term socioeconomic development of Flanders and Belgium.

Doctoral and postdoctoral researchers advise students during their Masters studies, bringing them into close contact with current research practices and results.

The FEA staff are involved in cutting edge research and ERC and Methusalem grants are commonplace. Start-ups and spin-offs are well-developed and a longstanding tradition at Ghent University.

Changes to the institution

In 2013-2014, industrial engineering programmes (4-year degrees in Flanders) were integrated into the FEA as the result of a 7-year integration process. CTI did not examine these programmes (Bachelor and Master of Engineering Technology) under this evaluation.

The language of instruction has been Dutch since 1930. However, in 2012, language legislation became less restrictive and since the 2013-2014 academic year, all engineering programmes except Architecture have been taught in English.

As part of the "Creative Knowledge Development" initiative, the FEA has created programmes available to all students that foster innovation, entrepreneurship and entrepreneurial skills.

Over the last several years, these programmes have given students the opportunity to take part in internships and gain hands-on experience. Unfortunately, this is not a widespread practice in all programmes.

The FEA has also developed a "Project track" which applies throughout the whole 5 years of programmes, but cross-disciplinary aspects still need to be improved.

Several initiatives have been developed by the FEA and/or students to inform secondary students about engineering studies and careers in an effort to encourage them to enrol in engineering studies.

Programme content (All the Masters are taught in English)

Bachelor en Sciences de l'Ingénieur: Architecture - Bachelor of Science in de ingenieurwetenschappen: architectuur - Bachelor of Science in Engineering: Architecture
Architecture is strongly positioned at Ghent University. Architecture is explicitly mentioned in the name of the faculty: Faculty of Engineering and Architecture.

There is good continuity between BAC+ and MA which is in fact a 5 years programme: the Bachelor diploma is only an academic diploma. Each year more than 120 students register for this bachelor's programme.

This Bachelor is clearly distinct from other Bachelors in Engineering because basic science is condensed to make room for the cultural, social and historical aspects of architecture.

Bachelors en Sciences de l'Ingénieur (6) - Bachelor of Science in de ingenieurwetenschappen - Bachelor of Science in Engineering

In contrast to faculties of engineering in other universities, the Ghent University faculty offers six bachelors of Science in engineering in addition to the bachelor of architecture. According to the staff, this particular curriculum design is based on existing research and relationships with laboratories. With respect to administrative rules, this organization appears more appropriate in terms of funding and human resources with legal difficulties introducing new disciplinary fields. Each year between 330 and 370 students register for this programme.

The bachelor programme aims to train students in basic sciences and basic engineering sciences, with a large spectrum of disciplines. However, in accordance with the culture of a major university, research and innovation are part of the objectives, especially through project work.

A compulsory first year bachelor's "Business Administration" course introduces students to the business environment. Elective courses on entrepreneurship are also offered.

Master en Sciences de l'Ingénieur: Architecture - Master of Science in de ingenieurwetenschappen: architectuur - Master of Science in Engineering: Architecture
This programme is the direct continuation of the bachelor programme. Like any other Flemish university degree, the links between research and teaching are important, which partly limits the independence of the education system. There is a good balance between architectural, human and social sciences (57% ECTS), and engineering sciences (43% ECTS) with a progression at the end of the courses towards project-based teaching

Master en Sciences de l'Ingénieur en Génie Civil - Master of Science in de ingenieurwetenschappen: bouwkunde - Master of Science in Civil Engineering

The goal of the programme is to educate students to broadly educated civil engineers with a wide field of knowledge in the area of civil and structural engineering and with the possibility to specialise in particular fields, like structural design, water and transport, and/or industrial management. The graduates should have research skills in order to be able to achieve industrial innovation or further developments of science-based knowledge.

The programme consists of 60 compulsory course credits and 60 elective course credits (including the master's thesis of 24 credits). The compulsory part consists of lectures which enable students to acquire the minimum outcomes for civil engineers. This concerns calculation methods, material oriented courses, construction specific courses (road and bridge engineering), water and soil oriented courses, and projects covering the design of typical civil structures.

Master en Sciences de l'Urbanisme et de l'aménagement du territoire - Master of Science in de stedenbouw en de ruimtelijke planning - Master of Science in Urbanism and Spatial Planning

The aim of this master is to train planners that have the knowledge base and analytical and the design skills to develop effective solutions individually or as a team for the various spatial challenges faced by communities across the world.

This programme is developed by the FEA together with Faculty of Sciences. The diploma awarded is therefore a Master of Science and not a master in Engineering.

Master en Sciences de l'Ingénieur en Ingénierie Physique - Master of Science in de ingenieurwetenschappen: toegepaste natuurkunde - Master of Science in Engineering Physics

The Master of Science in Engineering Physics (SEP) aims to prepare students for research and development tasks with foundations in physics both in industry and research labs but also have the skills to set up and lead industrial production departments.

The claimed objectives are the training of “engineers who are well versed in the reductionist approach, in which experimentation and mathematical modelling are aimed at reducing the physical phenomena to their essence and to ascertain the physical laws”¹.

The emphasis is put on scientific excellence and on teaching based on research, so that about 70% of the graduates pursue a Ph.D.

Master en Sciences de l'Ingénieur en Génie Electrique - Master of Science in de ingenieurwetenschappen: elektrotechniek - Master of Science in Electrical Engineering

The graduates of this Master are expected to be capable of building complex electronic (communications) systems in an efficient and methodical manner within a broad field of applications, ranging from the conception and analysis right up to the design, implementation, testing and management of such systems. The Master of Science in Electrical Engineering is thus focused on electronic devices and on communication systems.

Master Européen en Sciences de la Photonique - European Master of Science in Photonics (in convention with Vrije Universiteit Brussel – VUB)

The goal of the European Master of Science in Photonics is to address the societal need for engineers capable of developing innovative systems in which light is used as information or an energy carrier. More particularly, the objective is to train engineers who are duly capable - both on a self-reliant basis and as a member of a team – to build, in an efficient and methodological manner, complex photonic systems, from their conception, design, analysis, implementation up to the testing of these systems.

Master en sciences de l'Ingénieur en Génie Biomédical - Master of Science in de ingenieurwetenschappen: biomedische ingenieurstechnieken - Master of Science in Biomedical Engineering

And Master International en Sciences de l'Ingénierie Biomédicale - International Master of Science in Biomedical Engineering

Graduate Engineers in these Masters programmes develop knowledge and know-how with regard to materials, equipment, tools and resources, systems and methods for prevention, diagnosis and treatment of disease, to improve healthcare and the quality of life of individuals

Master Européen en Sciences de la Fusion Nucléaire et en Ingénierie Physique - European Master of Science in Nuclear Fusion and Engineering Physics

The aim of the master's programme is to provide a high-level multinational research-oriented education in fusion-related engineering physics, in close relation to the research activities of

¹ This position is unique in the field of engineering, where “complexity” and “undefined environment” are the most common keywords.

the partners (...). The Joint European Master's programme offers a genuine European opportunity for master level studies in a field which can contribute in a crucial way to the solution to the urgent and vital energy problem of the world. The studies are devoted to the technical applications of physics in general and nuclear fusion and plasma physics in particular.

Master en Science de l'Ingénieur en Génie Electromécanique - Master of Science in de ingenieurswetenschappen: werktuigkunde-elektrotechniek - Master of Science in Electromechanical Engineering

The Master of Science in Electromechanical Engineering offers training in all aspects of Electromechanical Engineering and their economic and social implications. Five main subjects are offered to students (36 credits) « Mechanical Energy Engineering », « Electrical Power Engineering », « Mechanical construction », « Control Engineering and automation », « Maritime engineering ».

The current programme was introduced in 2014.

Master en Sciences de l'Ingénieur en Génie Industriel et Recherche Opérationnelle - Master of Science in de ingenieurswetenschappen: bedrijfskundige systeemtechnieken en operationeel onderzoek - Master of Science in Industrial Engineering and Operations Research

The Master of Science in Industrial Engineering and Operations aims at educating students to become engineers with the essential scientific background and practical ability to guide, manage and optimise industrial production processes, including manufacturing, distribution and service aspects.

To enable the graduates to function in this way, the programme combines two major fields of expertise. One field is the area of industrial engineering, where a solid scientific basis is created in mathematical models and techniques, including probabilities, statistics, dynamic programming, decision techniques and network analysis. In-depth knowledge is also provided in industrial processes, economics, organization, logistics, cost price, financial management and human factors.

Master International en Sciences de l'Ingénierie de la sûreté du feu - International Master of Science in Fire Safety Engineering

The main objective of this 4-term International Master of Science in Fire Safety Engineering (IMFSE) programme is to provide graduates with a first-rate education so that they can emerge as leading experts in the field of Fire Safety Engineering (FSE) all over the world.

This programme moved to an Erasmus Mundus Master in partnership with Lund University and the Edinburgh University, Ghent University being the Programme's Coordinator. It currently has about 20 Students / year under the ERASMUS+ label. The ETH Zürich and the University of Queensland (Australia) have now joined the founders' Consortium as associated partners and the University of Maryland is in the process of joining as well.

Master en Sciences de l'Ingénieur en Génie Informatique - Master of Science in de ingenieurswetenschappen: computerwetenschappen - Master of Science in Computer Science Engineering

The Master of Science in Computer Science Engineering is to train academic engineers who are capable of building complex information processing systems. The original programme was designed in 2001 and the current version has been in place since 2014, with updated content and a reorganization of the Master. In the previous version, the programme was organised around three main topics: "software engineering", "ICT" and "embedded systems". The current version has been replaced by compulsory courses and a large range of elective courses.

Master en Sciences de l'Ingénieur en Génie Chimique - Master of Science in de ingenieurswetenschappen: chemische technologie - Master of Science in Chemical Engineering

The Master of Sciences in Chemical and Materials Engineering aims to deliver broadly trained engineers. The master's programme and associated research activities are focused on Reactions and Catalysis with a strong reputation in reactor technology and kinetic modelling.

Master en Sciences de l'Ingénieur en Génie des Matériaux durables - Master of Science in de ingenieurwetenschappen: materiaalkunde - Master of Science in Sustainable Materials Engineering

This master is aimed at training material engineers with a good knowledge of the structure and properties of materials and also on processing methods from their primary and secondary (e.g. e-waste) sources. Graduates in materials engineering should be duly capable of efficiently and methodically optimising production methods and processes as well as designing new and/or improved materials including sustainable materials and processes.

Master en Sciences du Génie Textile - Master of Science in Textile Engineering

This master is aimed at training textile engineers with a good knowledge of the structure and properties of textiles and the production and processing methods of various fibre-based structures. Textile engineers should be duly capable of efficiently and methodically optimising production methods and processes as well as purposefully designing new and/or improved textile materials including sustainable materials and processes.

The Master in Textile Engineering builds an international and highly advanced programme in which the latest developments in the textile field are incorporated. Textile education is brought in a multidisciplinary way and the strengths of the most renowned textile education specialists in Europe are brought together.

Evaluation summary

The audit and SER led the team to general conclusions:

Strengths of FEA

- Students appreciate the strong friendships and the relations between staff and students
- Laboratories are well recognised and of high scientific quality, managed by highly skilled scientific staff
- Innovation and entrepreneurial skills have been strongly developed: "Student entrepreneurs" is well designed and organised
- "Project track" is available for all students
- Project team work analysis is a good initiative and could be shared between programmes
- Student association initiatives are noticeable. They implement real successful initiatives to create ties with industry
- Employment opportunities are excellent for all the master's programmes

Weaknesses of FEA

- Too few students from Belgium and from abroad with respect to the staff potential of the FEA
- Course evaluation methodology should be looked at to get even more feedback
- Programmes taught in English do not attract enough students, promotion is necessary
- Not enough outbound mobility however these students could be the best publicity for the FEA
- The role of Advisory Groups could be enhanced
- More guidance for students in building their career projects could be of great use
- Follow-up with alumni from each programme could be improved

Risks

- Strategic vision of the FEA does not appear clear, in particular with respect to:
- Mobility, international students and internships that are unequally developed depending on the programmes

Opportunities

- Set up multidisciplinary projects across departments or faculties in favour of cross-fertilization
- Increase the share of successful experiments and best practices such as new teaching practices
- To attract more Belgian students, use companies to increase numbers and send more students into secondary schools
- Send teachers for training in industry to better understand companies and strengthen ties
- Improve coordination between the bottom-up approach used to design the programmes and learning outcomes
- Promote English-taught programmes through marketing and branding

Therefore,

Firstly, the *Commission des Titres d'Ingénieur* hereby **issues a favourable opinion concerning the State admission** of the following 9 degrees awarded by the Faculty of Engineering and Architecture at Ghent University (Belgium), for **a maximum period of 6 years**, from 1 September 2016:

- **Master en Sciences de l'Ingénieur: Architecture** - Master of Science in de ingenieurswetenschappen: architectuur - Master of Science in Engineering: Architecture
- **Master en Sciences de l'Ingénieur en Génie Civil** - Master of Science in de ingenieurswetenschappen: bouwkunde - Master of Science in Civil Engineering
- **Master en Sciences de l'Ingénieur en Génie Electrique** - Master of Science in de ingenieurswetenschappen: elektrotechniek - Master of Science in Electrical Engineering
- **Master européen en Sciences de la Photonique** - Master of Science in Photonics Engineering (in convention with Vrije Universiteit Brussel - VUB)
- **Master en sciences de l'Ingénieur en Génie Biomédical** - Master of Science in de ingenieurswetenschappen: biomedische ingenieurstechnieken - Master of Science in Biomedical Engineering
- **Master en Science de l'Ingénieur en Génie Electromécanique** - Master of Science in de ingenieurswetenschappen: werktuigkunde-elektrotechniek - Master of Science in Electromechanical Engineering
- **Master en Sciences de l'Ingénieur en Génie Industriel et Recherche Opérationnelle** - Master of Science in de ingenieurswetenschappen: bedrijfskundige systeemtechnieken en operationeel onderzoek - Master of Science in Industrial Engineering and Operations Research

- **Master en Sciences de l'Ingénieur en Génie Informatique** - Master of Science in de ingenieurswetenschappen: computerwetenschappen - Master of Science in Computer Science Engineering
- **Master en Sciences de l'Ingénieur en Génie des Matériaux durables** - Master of Science in de ingenieurswetenschappen: materiaalkunde - Master of Science in Sustainable Materials Engineering

This opinion is issued with the following recommendations:

- Improve the capabilities of faculty management teams to conduct multidisciplinary actions and coordinate cross-cutting initiatives
- Pursue the excellent work done to prepare the SER and define a precise action plan driven by a broad vision of the faculty's future
- Put into action the University mission statement concerning interactions with alumni
- Develop the sharing of good practices and encourage programmes to share initiatives
- Work at the university level to develop common marketing and student selection tools.

The recommendations for each programme are as follows:

- **Master en Sciences de l'Ingénieur: Architecture** - Master of Science in de ingenieurswetenschappen: architectuur - Master of Science in Engineering: Architecture
 - The Engineering and Architecture department is a combination of committed teachers and enthusiastic students, forming a tightly knit group.
 - One may say that the tendency for the students of Ghent University is to be more architect-engineers than engineer-architects
 - Ties with Sint Lucas should be developed
 - Staff should be concerned with internationalisation
- **Master en Sciences de l'Ingénieur en Génie Civil** - Master of Science in de ingenieurswetenschappen: bouwkunde - Master of Science in Civil Engineering
 - Graduate employment is outstanding in the field.
 - An effort should be made to increase the number of students participating in internships.
 - It may be useful to select certain universities for more intensive cooperation, in order to be able to select the best students and decrease the likelihood of drop-out.
 - The student workload remains high along with drop-out rates in the Bachelor's programme, like other Bachelor's programmes
- **Master en Sciences de l'Ingénieur en Génie Electrique** - Master of Science in de ingenieurswetenschappen: elektrotechniek - Master of Science in Electrical Engineering
 - The programme has scientific and technical excellence objectives, based on electronics and complex systems.
 - The programme management team seems conservative in terms of teaching methods and openness to soft skills and preparation for the job market (other than research).
 - The issues of the global energy transition and of the post carbon economy should be addressed.
 - The attractiveness of the Master must be addressed, in connection with a strategic analysis of the future of the programme to be carried out with all the stakeholders.
- **Master européen en Sciences de la Photonique** – European Master of Science in photonics (in convention with Vrije Universiteit Brussel – VUB)

- The programme has scientific and technical excellence objectives in the field of photonics, with a focus on devices and systems and less on uses and applications.
 - The staff is competent and dedicated, with good relationships with industry.
 - The programme has good international visibility, but appears as specialised when compared to other fields such as electrical or mechanical engineering.
- **Master en sciences de l'Ingénieur en Génie Biomédical** - Master of Science in de ingenieurwetenschappen: biomedische ingenieurstechnieken - Master of Science in Biomedical Engineering
 - The creation of the Steering Committee in order to develop the Strategic Vision is positive and the formal and thorough analysis of soft skills developed during the Master 2 Project is to be underlined
 - The forthcoming objective to have students participate in mandatory internships is to be encouraged
 - The visibility of the Biomed programme needs to be improved:
 - The creation of a dedicated stream at the Bachelor's level currently discussed within the Steering Committee would certainly contribute
 - Student initiatives to promote the programme in secondary schools deserves support
 - Initiatives to increase visibility within industry, to better understand industry needs, have to be strengthened
 - The programme has been adapting quickly over the years since its creation less than 10 years ago The Strategic Vision will define the Programme signature to be promoted with various stakeholders (Hospitals, Companies, Students, etc.) in the future
 - International visibility (beyond the International Master partners) and foreign recruitment deserve to be improved as part of a reinforced FEA policy in this area
- **Master en Science de l'Ingénieur en Génie Electromécanique** - Master of Science in de ingenieurwetenschappen: werktuigkunde-elektrotechniek - Master of Science in Electromechanical Engineering
 - An attractive programme that is open for the enrolment of 80 students per year
 - Very strong content in line with expectations of companies
 - Good quality staff with broad expertise, excellent relationship with research
 - The SWOT analysis correctly identifies strengths and weaknesses, opportunities and threats.
 - Since the courses are taught in English, a first step towards internationalization strategy could be implemented to develop international mobility, attract good international students and allow them to succeed in this Master.
- **Master en Sciences de l'Ingénieur en Génie Industriel et Recherche Opérationnelle** - Master of Science in de ingenieurwetenschappen: bedrijfskundige systeemtechnieken en operationeel onderzoek - Master of Science in Industrial Engineering and Operations Research
 - Well supervised by SPC and often revised programme, efficient advisory board
 - Teachers with part-time contracts coexist with academic teachers
 - Difficulties for foreign students because this master has a high scientific level
 - Necessity to make this master better known and understood by companies for its scientific specificity
 - Outstanding employment for the discipline
- **Master en Sciences de l'Ingénieur en Génie Informatique** - Master of Science in de ingenieurwetenschappen: computerwetenschappen - Master of Science in Computer Science Engineering

- The SWOT analysis correctly identifies strengths and weaknesses, opportunities and threats.
 - Globally this is a very good programme proposed by good teachers that are highly motivated.
 - The effectiveness of the student entrepreneur programme is very impressive.
 - There are a lot of elective courses. Students can choose "a la carte".
 - Some students are very clear in their choice of career, others want the very broad programme, and others have no idea what to do. It may be appropriate to guide students in their career choices and help them to choose the elective courses they will need to have the skills required for their future professional careers
 - Develop the internationalisation of the programme.
- **Master en Sciences de l'Ingénieur en Génie des Matériaux durables** - Master of Science in de ingenieurwetenschappen: materiaalkunde - Master of Science in Sustainable Materials Engineering
 - The "sustainability" aspect needs to be more developed in the compulsory lessons and should be better highlighted in the curriculum description.
 - More coherence between the different courses and between the 2 majors would be beneficial for the attractiveness of the master.
 - According to the LO/Courses table, the learning outcomes are well distributed over the different courses: it is important to evaluate all the learning outcomes.
 - The projects are appreciated by the students; they could be developed, especially by making them more interdisciplinary or associating students from different disciplines.
 - Management, Economics and Social Courses are not compulsory, which is a pity for this field of activity.
 - International exchanges are not sufficient even if Erasmus mobility is encouraged. An effort should be made to attract foreign students. The strategy concerning the Textile Major of this master needs to be more clearly defined with respect to the International Master in Textile Engineering. The number of students is too low. All the efforts need to be pursued to attract more students.
 - "Sustainability" has been added to the master name, but to attract students, this concept has to be more developed in the curriculum.
 - There are close relations with industry and a very good research environment.
 - The objective to pursue industrial internships is to be encouraged. There are very good industrial placements.

EUR-ACE Master accreditation may be **attributed to the 9 degrees stated above**, upon the institution's request, for the same period.

The institution shall prepare **a report**, due 15 September 2019, detailing how these recommendations have been taken into account.

Secondly, CTI is in favour of **accreditation** of the following degrees, which generally comply with evaluation standards:

- **Master en Sciences de l'Ingénieur en Ingénierie Physique** - Master of Science in de ingenieurwetenschappen: toegepaste natuurkunde - Master of Science in Engineering Physics

- **Master en Sciences de l'Ingénieur en Génie Chimique** - Master of Science in de ingenieurswetenschappen: chemische technologie - Master of Science in Chemical Engineering

After evaluation, CTI issues the following recommendations for these two programmes:

- **Master en Sciences de l'Ingénieur en Ingénierie Physique** - Master of Science in de ingenieurswetenschappen: toegepaste natuurkunde - Master of Science in Engineering Physics
 - Re-examine the fundamentals of the programme, giving it a more skilled-based approach and a deeper relevance to engineering (in the content and in the teaching methods)
 - The programme has scientific and technical excellence objectives based on the teaching of the modern theories of physics (reductionist paradigm)
 - The students benefit from the broader education in engineering provided by the Bachelor of Engineering physics, with in particular the “project track”, which provides efficient training to the “problem solving” approach.
 - The common core of basic physics constitutes one third of the curriculum, the rest being elective courses. This “à la carte” organization does enable specific graduate profiles to be defined. One may question why clusters of elective specialised courses overlap with the programmes of other masters.
 - The lack of defined graduate profiles -beyond scientific excellence- does not favour communication to the public and employers on the benefits of this programme.
 - There is little place left for soft skills in the curriculum and they are not a priority for teachers.
- **Master en Sciences de l'Ingénieur en Génie Chimique** - Master of Science in de ingenieurswetenschappen: chemische technologie - Master of Science in Chemical Engineering
 - Establish an ambitious vision for the future of the Chemical Engineering Master and clarify the student recruitment strategy
 - Actively promote the programme both in Belgium and abroad and further develop outbound mobility
 - Increase the awareness of process safety throughout this programme
 - Include a hands-on execution phase for the business project

The request for State admission may be re-examined in 3 years, based on the changes made in response to CTI recommendations.

EUR-ACE Master accreditation may be attributed to these 2 degrees, upon the institution's request, for a period of 6 years, from 1 September 2016.

Thirdly, CTI evaluated the 7 “Transitional Bachelor” programmes and determined that they are compliant with evaluation standards. These degrees do not qualify for State admission or EUR-ACE Master accreditation.

Fourthly, CTI examined master's programmes that do not qualify for State admission due to the fact that they are specific one or two year programmes. Like other master's degrees, CTI examined these master's programmes based on ESG 2009 and EAFSG (EUR-ACE Master) standards.

CTI hereby issues a **favourable opinion** concerning attribution of **EUR-ACE Master accreditation** to the following 3 degrees awarded by the Faculty of Engineering and Architecture at Ghent University, for a maximum period of 6 years, from 1 September 2016:

- **Master International en Sciences de l'Ingénierie Biomédicale** - International Master of Science in Biomedical Engineering
- **Master International en Sciences de l'Ingénierie de la sûreté du feu** - International Master of Science in Fire Safety Engineering
- **Master en Sciences du Génie Textile** - Master of Science in Textile Engineering

After evaluation, CTI issues the following recommendations for these three programmes:

- **Master International en Sciences de l'Ingénierie Biomédicale** - International Master of Science in Biomedical Engineering
 - The creation of the Steering Committee in order to develop the Strategic Vision is positive and the formal and thorough analysis of soft skills developed during the Master 2 Project is to be underlined
 - The forthcoming objective to participate in a mandatory internship is to be encouraged
 - The visibility of the Biomed programme needs to be improved:
 - The creation of a dedicated stream at the Bachelor level, currently being discussed within the Steering Committee, would certainly contribute
 - The Students initiatives to promote the programme in High Schools should be encouraged
 - Initiatives to increase visibility within industry, to better understand industry needs, have to be strengthened
 - The programme course has been adapting quickly over the years since its creation less than 10 years ago. The Strategic Vision will define the Programme signature to be promoted with various stakeholders (Hospitals, Companies, Students, etc.) in the future
 - International visibility (beyond the International Master partners) and foreign recruitment deserve to be improved as part of a reinforced FEA policy in this area
- **Master International en Sciences de l'Ingénierie de la sûreté du feu** - International Master of Science in Fire Safety Engineering
 - Very good and unique programme at the Master's level, delivering strong multicultural background
 - Both students and alumni seem very active and well prepared for the professional world
 - Would be worthwhile make projects more cross-disciplinary
 - Some parts of the Programme seem rather theoretical with few or no lab experiments
 - The programme's staff need to develop new sponsorships in order to secure the future when the Erasmus+ support ends
- **Master en Sciences du Génie Textile** - Master of Science in Textile Engineering
 - This is an international master's programme over 100 students participating since it opened. It is well recognised in the specialised area of textile engineering.
 - However relations and the role of the various partner universities are not well-defined. The involvement of the partners is not well-promoted. For instance, this master is not described on the websites of most of the partner universities.
 - This master is now in competition with the Textile Major of the Science in Sustainable Materials Engineering programme.
 - The students enrolled at Ghent University easily found jobs. No information is available about the other students from partner universities.

EUR-ACE Master accreditation **is not attributed** to the following degrees due to the fact that they are not engineering programmes or because of their research focus:

- **Master en Sciences de l'Urbanisme et de l'aménagement du territoire** - Master of Science in de stedenbouw en de ruimtelijke planning - Master of Science in Urbanism and Spatial Planning
- **Master Européen en Sciences de la Fusion Nucléaire et en Ingénierie Physique** - European Master of Science in Nuclear Fusion and Engineering Physics

After evaluation, CTI issues the following recommendations for these three programmes:

- **Master en Sciences de l'Urbanisme et de l'aménagement du territoire** - Master of Science in de stedenbouw en de ruimtelijke planning - Master of Science in Urbanism and Spatial Planning
 - Specific and interesting programme with an interesting mix of student backgrounds
 - International exchanges and internships need to be developed
 - Designed in reference with professional regulations
 - Use graduates more to create a strong network of alumni.
 - Develop ties between the masters in Architecture and Urbanisms
- **Master Européen en Sciences de la Fusion Nucléaire et en Ingénierie Physique** - European Master of Science in Nuclear Fusion and Engineering Physics
 - The Fusion-EP master is a well-organised international master, with a high-level scientific programme, supported by the main stakeholders in nuclear fusion in Europe. It aims to educate scientists and specialists in a strategic field in Europe and the world
 - The programme follows the Erasmus Mundus framework, with sequences of courses in the different universities and common training periods.
 - The wording "Engineering physics" in its title is somewhat misleading. The curriculum is that of a high-level research-based master in a specialised field of Physics.
 - The study conditions vary from one university to another. Some students complain about the lack of supervision and the facilities in some cases. The admission conditions and processes and the diversity of study streams do not ensure that all graduates achieve the outcomes expected from an engineering degree, according to Ghent University and international standards. Attention to soft skills in the programme seems not equally shared in the consortium.

This opinion will be forwarded to the French Ministry of Higher Education and Research, which will make a decision regarding the applications for State admission.

The list of all accredited French or foreign degrees accepted by the State is published each year in the Official Journal of the French Republic. If applicable, these degrees may be included on the list for the years indicated.

Graduates awarded these degrees during the period covered by the State admission will be authorised to carry the French engineering graduate title.

Discussed during plenary sessions held on 13 and 14 September and 11 October 2016

Approved during the plenary session held on 8 November 2016

the President
Laurent MAHIEU



**Institutions' request regarding Masters in Photonics
(Addendum to decision n°2016/09-10)**

During the initial institution's procedure, the situation of the Master programme in photonics has been misunderstood, leading to consider the persisting existence of two distinct programmes:

- Master of Science in Photonics Engineering (in convention with Vrije Universiteit Brussel - VUB) : favorable decision from CTI regarding *admission par l'état* and EUR-ACE Master label attribution
- European Master of Science in Photonics Engineering (Erasmus Mundus programme organised with VUB and 3 institutions outside of Belgium) : no favorable decision

Following the request sent and accepted, the additional documents received and the meeting with the Institution's management, it appears that :

- 1) The Erasmus Mundus programme has stopped since september 2015
- 2) The Master of Science in Photonics Engineering – without updating its content – has changed his name for European Master of Science in Photonics Engineering

Consequently, CTI's favorable decision (admission par l'Etat and EUR-ACE label) is granted to the European Master of Science in Photonics Engineering and any mention of the Master of Science in Photonics Engineering suppressed from the decision approved during the plenary sessions of 8 november 2016 and the related decision lists (*relevés de conclusions*).

Discussed during plenary session held on 16 May 2017

Approved during the plenary session held on 13 June 2017

The president
Laurent MAHIEU

