![nvao logo] *nvao*
nederlands - vlaamse accreditatieorganisatie

Besluit

Definitief equivalentie- en accreditatiebesluit met positief eindoordeel voor 1 masteropleiding in de ingenieurswetenschappen aan de Vrije Universiteit Brussel

Oordeel van de accreditatieorganisatie

De Commission des titres d'ingénieur (CTI) heeft vastgesteld dat de volgende opleidingen in de ingenieurswetenschappen van de Vrije Universiteit Brussel voldoen aan de generieke kwaliteitswaarborgen:

– Master of Science in de ingenieurswetenschappen: toegepaste computerwetenschappen / Master of Science in Applied Sciences and Engineering: Applied Computer Science (master) (005697).

Samenvatting van de beoordeling

General presentation

VUB is the Dutch-speaking offshoot of the French-speaking ULB, founded in 1834 by Théodore VERHAEGEN. Although some law courses were already being taught in Dutch in 1890, it was not until 1963 that almost all the faculties offered courses in Dutch. Following a political crisis, the francophone sections of KU LEUVEN split from the university in 1968 and the "Université Catholique de Louvain" was established on the new campus in Louvain-la-Neuve, VUB split off from ULB on 1 October 1969 and officially became a separate legal, administrative and scientific entity in May 1970.

During the 2013-2014 academic year, 15,444 students (Appendix 04_02) were enrolled in VUB's 8 faculties. The Faculty of Engineering Science had 342 bachelor's students, 609 masters and 354 doctoral students for a total of 1305 students.

This accreditation visit only applies to the Faculty of Engineering Science:

– 2 Bachelor's programmes (180 ECTS credits): Bachelor of Engineering (238 students) and the Bachelor of Architectural Engineering (104 students). The language of instruction is Dutch.
– 8 master's programmes (120 ECTS credits) with a total of 609 students (with 13 students in the "Master in Physical Land Resources" programme, 15 students in the "Master in Photonics Engineering" programme and 12 students in the "Master in Biomedical Engineering" programme not included in the audit. According to law in Flanders, these programmes are taught in English provided that equivalent courses are also offered in Dutch.

General characteristics

Like other faculties at VUB, the Faculty of Engineering Science manages its human and financial resources with a great degree of independence. It has eleven departments that are responsible for courses closely related to their scientific research.
A twelfth department, INDI (Industrial Engineering, SER page 7), is responsible for its Bachelor's and Master's programmes (240 ECTS). The audit did not cover this department. Research is one of the pillars of the faculty. Department councils are responsible for the management of the departments. Education is a cross-disciplinary activity managed by the Faculty Education Committee and relies on the human resources and equipment provided by the departments.

The Faculty of Engineering Science receives financial resources mainly from private research funding from companies that use the research results. From 2009 to 2013, it received a total of €72.228 million in research grants, or a growing average of €14.5 million per year.

The general policy of the Faculty of Engineering Science is to "develop, transfer and apply high-quality academic education and scientific research, free from any form of preconception". Research-driven education is emphasised with a bottom-up approach to designing programmes.

This approach is based on the expertise of research teams and provides the latest cutting edge scientific knowledge. However this can be problematic for ensuring that engineering students acquire non-scientific and soft skills.

General analysis
Strengths
- VUB is a research-driven university, which provides a first-rate scientific environment (both staff and equipment) for engineering studies.
- With the support of the university, the Faculty has a well-defined training policy centred on student competencies.
- Through the bottom-up, research-driven approach to designing programmes, graduates achieve a high level of scientific competency.
- Students are provided with a solid foundation of scientific training, enabling them to be versatile and seek a career with broad responsibilities in various fields.
- The overall structure of engineering education seems consistent with the Bachelor's degree, providing a strong common basis for all students and a system preparing students for the Master's programmes at the end of the Bachelor's degree.
- Inter-faculty collaboration and the number of interdisciplinary projects complement entrepreneurship courses.
- The faculty's academic staff have established mutually beneficial long-term relationships with industry.
- The Faculty of Engineering Science produces good research output that attracts enough funding to keep a good number of researchers on staff who can to be involved in teaching.
- Graduates find jobs easily and quickly as they take advantage of the high demand for engineers in Belgium.
- Students appreciate the fact that low numbers give them greater accessibility to teaching staff.
- A large-scale infrastructure project is in progress to build student housing, classrooms,

and cultural facilities.

Pagina 3 van 8 is in the header.

and cultural facilities.

Weaknesses
- The Faculty relies strongly on the research departments, and therefore lacks a comprehensive view and proper management of non-scientific learning outcomes.
- The considerable independence of the programmes' departments leads to inconsistent implementation of Faculty policies.
- There seems to be some reluctance to involve all stakeholders (society, alumni, employers) in the formal supervision of programme content and outcomes.
- The high demand for engineers in Belgium does not motivate the staff to invest heavily in the employability of graduates (e.g. graduate follow-up, internship policies, exposing students systematically to non-academic work environments, etc.).
- The Faculty does not take full advantage of its geographical position, the status of and Brussels and its international reputation for the outbound mobility of its students and to attract the best foreign students.
- Soft skills such as Human and Social Science skills are supposed to be acquired through various learning experiences and projects throughout the programme. All or some of these skills could be taught by outside lecturers specialised in the relevant field.
- Professional experience should not be limited to non-mandatory internships.
- Administrative issues related to BRUFACE programmes and differences in VUB and ULB systems have been worked on and are one of the aspects of VUB's current action plan.
- The number of students enrolled in engineering studies is relatively low despite high demand for graduates in Belgium. Female student numbers are low, except for Architectural Engineering.

Risks and opportunities
- Legal requirements related to teaching languages to be used could hinder the international development of the faculty, even if it has not been a problem to date.
- The staff's involvement in preparing the international accreditation deserves to be mentioned. Efforts need to be made to pursue their involvement in order to achieve long-term benefits.
- The highly successful BRUFACE programmes and other English-speaking Master's programmes offer a unique multicultural and multi-lingual experience that could be further developed.
- The faculty could pursue increased collaboration with other universities (ULB, Ghent University) to achieve same level as the BRUFACE "European Master in Photonics" and "Biomedical Engineering" programmes.

– Strategic partnerships with external stakeholders could increase VUB's financial resources and help it attract more students.

Evaluation summary for each programme

Master en sciences appliquée et sciences de l'ingénieur: informatique appliquée - Master of Science in de ingenieurswetenschappen: toegepaste computerwetenschappen (NL) - Master of Science in Applied Sciences and Engineering: Applied Computer Science (EN)
120 ECTS credits, taught English, 53 students (2013-2014)

The master of applied computer science programme is concerned with the design and engineering of workable, practical computer-based smart systems using available devices, components, electronic and photonic hardware, software technologies, sensors and actuators to meet the requirements of well-defined applications. This field of ICT engineering sciences is generally known as "smart systems of systems design" and associates with the field of big data. Smart systems are typically characterised by their multi-modal and multi-sensory nature, resulting in large multi-dimensional, distributed datasets that need to be efficiently processed, and of which the output needs to be (visually) represented in a consumer/prosumer friendly fashion.

The master of applied computer science provides a broad education in generic smart systems of systems design complemented with elective minors in important fields such as digital health and smart cities. Nonetheless, the programme will offer students the skills to operate in other application domains such as the factory of the future, smart grids or food production systems. In general the accumulated knowledge should give rise to an ICT engineer who is able to design systems of systems. (SER page 48)

Analysis (specific to the programme):
– There is an imbalance between inbound and outbound student mobility (improve participation in exchange programmes)
– More insight/data about the whereabouts of graduates would be useful (graduate employability analysis)
– A much higher proportion of in-company internships is necessary (also improve information about internships)
– Incorporate basic principles of HRM in the program

Recommendations
General recommendations for the institution:
– The Faculty would benefit from including Engineering Fellows and industry professionals in the teaching teams as much as possible.
– The panel regrets that the relatively basic indicators are not available in a public and synthetic form.
– The FIRW staff and management demonstrate their open-mindedness and ability to adapt with the successful BRUFACE initiative led with ULB. This experience, as well as the alliance with NPU in China, should be used to foster international partnerships with specifically chosen European universities.

– The BRUFACE project provides a solid experience of double degrees taught in English and should be used to attract more foreign students. They are good models for the creation of real joint programmes.
- Outbound student mobility is far from what could be expected from a university wishing to educate "world citizens". The Faculty of Engineering Sciences should take strong actions to reach the VUB objectives of 20% student mobility.
- Inbound student mobility is low as well and the university could capitalise more on its key location in the middle of Europe.
- VUB lacks a strategic vision and has some problems projecting into the future. Planning actions must be undertaken in order to include architectural engineering topics in the priorities of the energy transition and the post-carbon civilization.
- Promotion of the BRUFACE deserves greater attention.
- A lack of surveys on future needs is regretted. This would help anticipate updates to curriculum.
- Continuous improvement cycle (Deming Wheel) is a good way to efficiently complete any Quality Assurance system.
- Well-structured organisation, Quality Assurance training, well-distributed responsibilities, few, well-chosen and relevant KPI and tracking, fully consistent with the Institution Strategy, will give meaning and associated measurable results.
- Participative methods still need to be worked on and Quality Assurance is a good way to develop them and measure the benefits. Results will be published naturally when KPI have been defined, accepted by all actors when the quality system is working and the first results obtained.
- Include more people in the quality process.
- Build a strategy policy for each Master's program
- Build a real international policy, particularly for Students and Staff, both ways.
- Include outside managers from Industry and other stakeholders in the different VUB decision-making committees.
- Organise a real win-win policy between Alumni, Students, Graduates and the Institution.

The recommendations for each programme are as follows:
Masters of Engineering

Master en sciences appliquée et sciences de l'ingénieur : informatique appliquée - Master of Science in de ingenieurswetenschappen: toegepaste computerwetenschappen (NL) - Master of Science in Applied Sciences and Engineering: Applied Computer Science (EN)
- The requested report is made to be sure that the scientific level of the recruitment and of the graduates allow the future employers to trust the engineering degree.
- Increase connection with industry and work on the lack of information about international exchanges programmes and internships.

Aanbevelingen
De NVAO onderschrijft alle aanbevelingen geformuleerd door deze accreditatieorganisatie.

Bevindingen NVAO

De NVAO verklaart de accreditatiebesluiten van CTI equivalent op basis van de volgende vaststellingen:
- De buitenlandse accreditatieorganisatie geeft een positieve beoordeling van de kwaliteit van de betrokken opleidingen;
- De buitenlandse accreditatiebesluiten zijn voldoende actueel;
- De buitenlandse accreditatiebesluiten zijn gebaseerd op een openbare externe beoordeling;
- De buitenlandse accreditatieorganisatie is EQAR-geregistreerd;
- De buitenlandse accreditatieorganisatie heeft een methodologische aanpak vergelijkbaar met de Vlaamse.

Besluit[1]

betreffende de Equivalentie- en accreditatiebesluiten met positief eindoordeel voor 1 masteropleiding in de ingenieurswetenschappen aan de Vrije Universiteit Brussel.

De NVAO,
Na beraadslaging,
Besluit:

Met toepassing van de Codex Hoger Onderwijs, in het bijzonder de artikel II.149, besluit de NVAO accreditatie te verlenen aan de volgende opleiding:
- Master of Science in de ingenieurswetenschappen: toegepaste computerwetenschappen / Master of Science in Applied Sciences and Engineering: Applied Computer Science (master) (005697).

De accreditatie geldt, overeenkomstig de door CTI aangegeven periode van zes jaar, van 1 september 2016 tot en met 31 augustus 2022.

Den Haag, 6 juli 2017

De NVAO
Voor deze:

Marc Luwel
(bestuurder)

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[1] Het ontwerp van accreditatiebesluit werd aan de instelling bezorgd voor eventuele opmerkingen en bezwaren. Bij e-mail van 29 juni 2017 heeft de instelling van de gelegenheid gebruik gemaakt om te reageren. Dit heeft geleid tot enkele tekstuele aanpassingen.

Bijlage 1: Basisgegevens over de instelling en de opleidingen

Instelling	Vrije Universiteit Brussel Pleinlaan 2 B-1050 BRUSSEL
Aard instelling	Ambtshalve geregistreerd
Naam associatie	Universitaire Associatie Brussel

Naam opleidingen	Master of Science in de ingenieurswetenschappen: toegepaste computerwetenschappen / Master of Science in Applied Sciences and Engineering: Applied Computer Science (master) (005697)
Bijkomende titel	Master of Science: Burgerlijk ingenieur
Opleidingsvarianten: – Afstudeerrichtingen: – Studietraject voor werkstudenten	– geen – geen
Onderwijstaal	Nederlands met Engelstalige variant
Studieomvang (in studiepunten)	120
Studiegebied(en)	Toegepaste Wetenschappen
ISCED benaming studiegebied	07: Engineering, manufacturing and construction 071: Engineering and engineering trades

Bijlage 2: Samenstelling van het accreditatiepanel

Voorzitter:
- G. (Gabriel) Henrist, CTI member and chair;
- A. (Anne-Marie) Jolly, CTI member and co-chair;
- B. (Bernard) Remaud, CTI expert, co-chair;

Leden:
- L. (Laurent) Bedat, CTI expert;
- M. (Marie-Jo) Goedert, CTI expert;
- D. (Denis) LeMaitre, CTI expert;
- J. (Jean-Jacques) Maillard, CTI expert;
- R. (Roland) Vidil, CTI expert
- D. (Danièle) Chouery, International expert;
- A. (André) De Herde, International expert;
- L. (Ludo) Gelders, International expert;
- J. Walraven, International expert;
- S. (Stéphane) Wojcik, International expert;
- A. (Alexandre) Milot, student engineer expert.