



De onderwijsvisitatie Statistiek en Financial and Actuarial Engineering

Een evaluatie van de kwaliteit van de masteropleidingen in de Statistiek
en de Actuariële Wetenschappen aan de Vlaamse universiteiten



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Voorwoord van de voorzitter van de vlir

Dit rapport bevat de bevindingen van de visitatiecommissie die de academische opleidingen Statistiek en Actuariële Wetenschappen aan de transnationale Universiteit Limburg (tUL), de Vrije Universiteit Brussel en de K.U.Leuven heeft geëvalueerd. De commissie heeft haar opdracht uitgevoerd tussen september 2007 en juli 2008, met inbegrip van het bezoek aan de opleidingen. Dat initiatief kadert in de opdracht die de Vlaamse overheid geeft aan de Vlaamse universiteiten en aan de Vlaamse Interuniversitaire Raad (VLIR) betreffende de externe kwaliteitszorg van het academisch onderwijs.

De commissie heeft de visitatieprocedure gevolgd zoals die is vastgelegd in de 'Handleiding Onderwijsvisitaties VLIR/VLHORA' (Brussel, februari 2005). Naast relevante suggesties en aanbevelingen voor continue verbetering van het academisch onderwijs, formuleert de commissie een beoordeling en geeft zij een evaluatiescore aan de zes onderwerpen en de onderliggende facetten van het accreditatiekader van de Nederlands-Vlaamse Accreditatie Organisatie (NVAO). Samen met de kwalitatieve beoordelingen vormen die scores in de opleidingsrapporten een belangrijk element ten behoeve van de accreditatiebesluiten van de NVAO.

Het visitatierapport is in de eerste plaats bedoeld voor de betrokken opleidingen. Het is in het bijzonder gericht op de handhaving en verbetering van de kwaliteit ervan. Daarnaast beoogt het rapport ook de samenleving objectief in te lichten over de kwaliteit van de geëvalueerde opleidingen. Daartoe zijn de visitatierapporten publiek gemaakt op de webstek van de VLIR (www.vlir.be).

De lezer moet er rekening mee houden dat het visitatierapport een momentopname is en slechts één fase vertegenwoordigt in het proces van blijvende zorg voor onderwijskwaliteit. Al na korte tijd kunnen de opleidingen immers grondig zijn gewijzigd en verbeterd, mee in antwoord op de resultaten van interne onderwijsbeoordelingen door de universiteiten zelf of als reactie op aanbevelingen van de betrokken visitatiecommissie.

Graag dank ik op de eerste plaats de voorzitter en de leden van de visitatiecommissie voor de tijd die zij geïnvesteerd hebben in de doorlichting van de opleidingen, maar ook voor de grote deskundigheid waarmee zij hun opdracht hebben uitgevoerd.

Deze visitatie was enkel mogelijk dankzij de inzet van velen die binnen de universiteiten betrokken waren bij de voorbereiding en uitvoering ervan. Ik ben hen daarvoor zeer erkentelijk. Het is mijn hoop dat zij de positieve opmerkingen van de visitatie-

commissie mogen ervaren als een bevestiging van hun inspanningen en tevens een bijkomende stimulans vinden in de geformuleerde aanbevelingen tevens ten einde de kwaliteit van het academisch onderwijs verder te verbeteren en te versterken.

Prof. dr. Marc Vervenne
voorzitter VLIR

Preface of the chairperson of the assessment committee

Statistics is known to have a long-standing tradition in England, the United States, and more generally in the Anglo-Saxon world. Its development on the European continent, however, is more recent. The rapid evolution and growth of statistics, particularly biostatistics, during the past two decades in Flanders is impressive and serves as a reference for many countries. The same consideration applies to financial and actuarial engineering sciences, although Belgium has a longer historical and pioneering record in this domain.

The assessment of the master of statistics programmes at the transnationale Universiteit Limburg, campus Diepenbeek, and at the Katholieke Universiteit Leuven, on the one hand, and the evaluation of the master of financial and actuarial engineering at the Vrije Universiteit Brussel and at the Katholieke Universiteit Leuven, on the other hand, were a unique opportunity to measure the current level of education in these specialized and cutting-edge domains of science in Flanders.

It has been a great honour and immense privilege for me to chair the visiting committee which was composed of distinguished members with recognized expertise in the domains to be evaluated. Without their confidence, integrity, critical sense of judgement and peer-review, enthusiastic involvement and wide availability, this work would have been impossible. I want to express to each of them my heartfelt thanks. My deep gratitude also goes to our secretary, Pieter-Jan Van de Velde, who did a wonderful job in the organization of the visits and ancillary meetings, the summary of the discussions and the writing of the present report.

The visiting process took almost an entire year. The committee has been impressed by the high quality content of the self-assessment reports of the master programmes and the seriousness with which they were prepared and written by the university teams. The universities visited have to be commended for the hospitality, welcome and open-minded attitudes they offered during the visits. All educational programme stakeholders (managers, faculty, assistants, administrative staff, students and alumni, and industrial partners) have been very supportive in providing the visiting committee with the most comprehensive, up-to-date and accurate information.

The visiting committee has strived to objectively appraise the various aspects and facets listed in the VLIR/VLHORA assessment and accreditation guidelines, and to come up with a critical and constructive, sometimes harsh, opinion for the sake of improvement and quality enhancement. With this working strategy in mind, the visiting committee hopes it will have contributed to further advancement and

strengthening of the statistics, financial and actuarial engineering master programmes in the Flemish universities. This is seen to be particularly important in the context of the Bologna Declaration and the rapidly changing education environment in Europe.

Liège, 23 May 2008

Prof. Dr Adelin Albert
President of the visiting committee

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Deel 1 Algemeen deel



De onderwijsvisitatie Statistiek en Financial and Actuarial Engineering

1| Inleiding

In dit rapport brengt de visitatiecommissie Statistiek en Financial and Actuarial Engineering verslag uit van haar bevindingen over de masteropleidingen Statistiek en Actuariële Wetenschappen, die zij in het najaar 2007, in opdracht van de Vlaamse Interuniversitaire Raad (VLIR) heeft bezocht.

Dit initiatief kadert in de werkzaamheden van de VLIR op het vlak van de externe kwaliteitszorg, waarmee de Vlaamse universiteiten gevolg geven aan de decretale verplichtingen terzake.

2| De betrokken opleidingen

Ingevolge haar opdracht heeft de visitatiecommissie bezocht:

- op 24 en 25 oktober 2007: transnationale Universiteit Limburg, campus Diepenbeek
 - o Master of Statistics
- op 27 en 28 november 2007: Vrije Universiteit Brussel
 - o Master in de Actuariële Wetenschappen
- van 18 tot en met 20 december 2007: Katholieke Universiteit Leuven
 - o Master in de Statistiek/Master of Statistics
 - o Master of Financial and Actuarial Engineering

De volgorde van de bezoeken is uitsluitend bepaald door overwegingen van pragmatisch-organisatorische aard. De commissie is er zich van bewust dat deze volgorde, zij het impliciet, een invloed kan hebben gehad op de visitatie. Ze heeft er evenwel zorgvuldig over gewaakt dat in alle opzichten vergelijkbare beoordelingen en adviezen tot stand kwamen.

3| De visitatiecommissie

3.1. Samenstelling

De samenstelling van de visitatiecommissie Statistiek en Financial and Actuarial Engineering werd op 28 juni 2007 bekrachtigd door de Erkenningscommissie Hoger Onderwijs. De visitatiecommissie werd vervolgens door de VLIR ingesteld bij besluit van 12 juli 2007.

De commissie had de volgende samenstelling:

Voorzitter:

- Prof. dr. Adelin Albert, gewoon hoogleraar toegepaste statistiek, Université de Liège.

Vakdeskundige leden:

- Dhr. Willy Lenaerts, voormalige Voorzitter van de Controledienst voor de Verzekeringen;
- Prof. dr. Jacques Hagenaars, hoogleraar methoden en technieken, Universiteit van Tilburg.

Onderwijsdeskundig lid:

- Prof. Dr. Matthias Löwe, hoogleraar Wiskunde en Informatica, Universiteit Münster.

Vakdeskundige extra-lid ten behoeve van de beoordeling van de masteropleidingen Actuariële Wetenschappen:

- Prof. dr. Michel Denuit, hoogleraar statistiek, Université Catholique de Louvain.

Vakdeskundige extra-lid ten behoeve van de beoordeling van de masteropleidingen Statistiek:

- Prof. dr. Fred Van Eeuwijk, hoogleraar bij Biometris, Universiteit Wageningen.

Ontwikkelingsexpert vanuit VLIR-UOS (Universitaire Ontwikkelingssamenwerking) ten behoeve van de beoordeling van de ICP-afstudeerrichting Biostatistics van de masteropleiding Statistiek aan de tUL:

- Dr. Jaak Lenvain, Diensthoofd Kwaliteitsmanagement, Belgische Technische Coöperatie, VLIR-UOS .

Student-leden:

- Mevr. Amparo Yovanna Castro Sánchez, studente transnationale Universiteit Limburg;
- Dhr. Mario Vanherle, student Katholieke Universiteit Leuven.

De studentleden hebben niet deelgenomen aan het bezoek en de beoordeling van de eigen opleiding.

Mevr. A.Y. Castro Sánchez heeft deelgenomen aan het bezoek aan en de beoordeling van de opleidingen ingericht door de Katholieke Universiteit Leuven. Gezien haar verbondenheid aan de Master of Statistics van de transnationale Universiteit Limburg heeft zij noch deelgenomen aan het bezoek noch aan de beoordeling van de opleiding van de transnationale Universiteit Limburg.

Dhr. M. Vanherle heeft deelgenomen aan de bezoeken en beoordeling van de opleidingen ingericht door de Vrije Universiteit Brussel en de transnationale Universiteit Limburg. Gezien zijn verbondenheid aan de Master in de Financial and Actuarial Engineering van de K.U.Leuven heeft hij noch deelgenomen aan het bezoek noch aan de beoordeling van de opleidingen van de K.U.Leuven.

Dhr. Pieter-Jan Van de Velde, stafmedewerker kwaliteitszorg verbonden aan het VLIR-secretariaat, trad op als projectbegeleider voor de visitatie.

Voor een kort curriculum vitae van de commissieleden wordt verwezen naar bijlage 1.

3.2. Taakomschrijving

De opdracht aan de visitatiecommissie, die in het instellingsbesluit is omschreven, luidde als volgt:

- a. op basis van de door de faculteiten aan te leveren informatie en door middel van ter plaatse te voeren gesprekken, zich een oordeel te vormen over de kwaliteit van de opleiding (inclusief de kwaliteit van de afgestudeerden) en over de kwaliteit van het onderwijsproces (inclusief de kwaliteit van de onderwijsorganisatie), mede gelet op de eisen/verwachtingen die voortvloeien uit de facultaire taak iedere student voor te bereiden op de zelfstandige beoefening van de wetenschap of de beroepsmatige toepassing van wetenschappelijke kennis;
- b. het formuleren van aanbevelingen om te komen tot kwaliteitsverbetering;
- c. het beoordelen of de kwaliteit van de opleiding voldoet aan de beoordelingscriteria van het accreditiekader en het geven van een integraal oordeel over de opleiding waarop de NVAO zich zal baseren bij de accreditatie.

3.3. Werkwijze

3.3.1. Voorbereiding

Ter voorbereiding van de visitatie werd aan de opleidingen gevraagd een uitgebreid zelfevaluatierapport op te stellen. De Cel Kwaliteitszorg van de VLIR heeft hiervoor een visitatieprotocol¹ ter beschikking gesteld, waarin de verwachtingen t.o.v. de inhoud van het zelfevaluatierapport uitgebreid beschreven zijn. De zelfevaluatierapporten volgen het accreditatiekader. Naast feitelijke beschrijvingen per onderwerp en per facet van het accreditatiekader wordt aan de opleidingen ook gevraagd hun toekomstperspectieven kenbaar te maken en een kritische sterkte-zwakke analyse op te nemen in het zelfevaluatierapport. Daarnaast wordt een aantal verplichte bijlagen opgenomen, zoals een beschrijving van het programma, studenten- en personeelstabellen, cursusbeschrijvingen, examenvragen, enz. De commissie ontvangt deze zelfevaluatierapporten een aantal maanden voor de eigenlijke bezoeken, waardoor zij voldoende gelegenheid krijgt deze documenten zorgvuldig te bestuderen en het eigenlijke bezoek grondig voor te bereiden.

De commissieleden worden bovendien verzocht per opleiding een tweetal eindverhandelingen te selecteren uit een lijst van recente eindverhandelingen. De geselecteerde eindverhandelingen worden eveneens een aantal weken voor het eigenlijke bezoek door de Cel Kwaliteitszorg aan de commissieleden bezorgd. Elk commissielid heeft bijgevolg twee eindverhandelingen grondig gelezen vooraleer het bezoek aan de opleiding plaatsvindt.

De visitatiecommissie hield haar installatievergadering op 27 september 2007. Op dit moment hadden de commissieleden het visitatieprotocol en de zelfevaluatierapporten reeds een aantal maanden in hun bezit. Tijdens deze vergadering werden de commissieleden verder ingelicht over het visitatieproces en hebben zij zich concreet voorbereid op de af te leggen bezoeken. Verder heeft de commissie op deze vergadering een referentiekader geformuleerd (zie hoofdstuk II).

Daarnaast werd het programma van de bezoeken opgesteld (zie bijlage 2) en werd een eerste bespreking gehouden van de zelfevaluatierapporten.

3.3.2. Bezoek aan de instellingen

De tweede bron van informatie wordt gevormd door de gesprekken die de commissie tijdens haar bezoek aan de organiserende instellingen heeft gevoerd met alle geledingen die zijn betrokken bij het onderwijs. Ook wordt aan de opleidingen gevraagd - als een derde bron van informatie - om een veelheid aan documenten ter inzage te leggen ten behoeve van de commissie. Tijdens de bezoeken is voldoen-

¹ | Handleiding Onderwijsvisitaties VLIR/VLHORA. Brussel, februari 2005. (www.vlir.be)

de tijd uitgetrokken om de commissie de gelegenheid te geven deze documenten grondig te bestuderen. De documenten die ter inzage van de commissie worden gelegd zijn: het leermateriaal (cursussen, handboeken, syllabi), verslagen van de belangrijke beleidsvormende of beleidsopvolgende organen (faculteitsraad, opleidingscommissies, departementsraden), documenten die betrekking hebben op de interne kwaliteitszorg (enquêteformulieren, niet-persoonsgebonden evaluatie van het onderwijs), documenten aangaande de procedures van curriculumherzieningen, c.q. de omvorming naar de bachelor-master (bama)structuur, voorbeelden van informatieverstrekking aan kandidaat-studenten, etc. Bovendien worden nog enkele tientallen eindverhandelingen ter inzage gelegd.

Het programma voorziet - naast gesprekken met de opleidingsverantwoordelijken, de studenten, de assistenten, de docenten en de facultaire en opleidingsgebonden beleidsmedewerkers - steeds in een bezoek aan de faciliteiten (inclusief bibliotheek, practicalokalen, computerfaciliteiten), een gesprek met de afgestudeerden van de opleidingen en een spreekuur waarop de commissie bijkomend leden van de opleiding kan uitnodigen of waarop individuen op een vertrouwelijke wijze door de commissie kunnen worden gehoord.

De gesprekken zijn verhelderend geweest en waren een goede aanvulling bij de lectuur van de zelfevaluatierapporten. Aan het einde van elk bezoek werden, na intern beraad van de visitatiecommissie, de voorlopige bevindingen mondeling aan de gevisiteerde opleiding medegedeeld aan de hand van een presentatie door de voorzitter.

3.3.3. Rapportering

Als laatste stap in het visitatieproces heeft de commissie haar bevindingen, conclusies en aanbevelingen in voorliggend rapport vastgelegd. Bovendien heeft zij, overeenkomstig de bepalingen voor de visitaties in het kader van de NVAO accreditatie van de opleidingen, een beoordeling voldoende/onvoldoende toegekend aan de zes onderwerpen van het accreditatiekader, en een beoordeling excellent/goed/voldoende/onvoldoende toegekend aan de samenstellende en onderliggende facetten van elk onderwerp.

De opleidingsverantwoordelijken werden hierbij in de gelegenheid gesteld om op het concept deelrapport te reageren. De commissie heeft deze reacties voor zover zij zich er in kon vinden in het rapport verwerkt.

4 | Korte terugblik op de visitatie

De commissie heeft de haar toegekende opdracht met veel belangstelling uitgevoerd. De visitatie heeft de leden van de commissie niet alleen de kans geboden om het academisch onderwijs in de opleidingen in de Statistiek en in de Actuariële Wetenschappen in Vlaanderen van naderbij te bekijken, maar het was voor haar tevens een unieke gelegenheid om onder vakgenoten te reflecteren en te debatteren over de aard, de kwaliteit en de toekomst van dit onderwijs.

De visitatie Statistiek en Financial and Actuarial Engineering is uitgevoerd volgens het VLIR-VLHORA-visitatieprotocol dat is afgestemd op de accreditatievereisten. Het visitatierapport zal ook worden gehanteerd voor de accreditatieaanvraag van de betreffende opleidingen.

De commissie is er zich van bewust dat de visitatie ook voor de opleidingen op een scharniermoment plaatsvond. De Bologna-verklaring die in 1999 werd ondertekend vormde de aanzet tot een fundamentele hervorming van het hoger onderwijs in Vlaanderen. Het juridisch kader hiervoor wordt gevormd door het Decreet van 4 april 2003 betreffende de herstructurering van het hoger onderwijs in Vlaanderen, kortweg het Structuurdecreet genoemd. Op basis van dit decreet werden de bacheloropleidingen in Vlaanderen gradueel geïmplementeerd vanaf het academiejaar 2004-2005. De masteropleidingen werden gradueel ingevoerd vanaf 2007-2008. De bij deze visitatie betrokken masteropleidingen werden dus voor de eerste keer aangeboden op het moment van de visitatie. Voor de aanvullende opleiding Actuariële Wetenschappen die aan de Vrije Universiteit Brussel wordt aangeboden, die pas in 2009-2010 omgevormd wordt tot een masteropleiding.

Ondanks de hervormingen die op het moment van de visitatie in volle gang was, is de commissie van oordeel dat deze visitatie uitermate relevant en leerrijk is: door de vroegere situatie met de merites en tekorten in de respectieve opleidingen te beschrijven, kunnen de opleidingen hun plannen met betrekking tot de opleidingen in de nieuwe bachelor-masterstructuur waar nodig nog bijsturen.

De commissie heeft tijdens de discussies steeds getracht om, vanuit een kritische ingesteldheid, op een constructieve wijze bij te dragen tot de toekomstige hervormingen. Ze heeft bij haar beoordeling de eigenheid van elke universiteit en elke opleiding in acht genomen en de oordelen en suggesties steeds gesitueerd binnen de context van de opleidingen.

Met het voorliggend rapport hoopt de commissie dan ook een bijdrage te leveren tot de verdere positieve ontwikkeling van het onderwijs in de Statistiek en de Actuariële Wetenschappen in Vlaanderen. De commissie wenst met het rapport in de eerste

plaats een discussie op gang te brengen binnen de betrokken faculteiten met de bedoeling na te gaan op welke punten verbetering nodig is en in welke mate dit binnen de gegeven randvoorwaarden te verwezenlijken is. Verder hoopt de visitatiecommissie dat voorliggend rapport in zijn geheel ook aan de buitenwereld nuttige informatie verschaft en een goed inzicht geeft in de eigenheid en de kwaliteit van de gevisiteerde opleidingen.

Tot slot dankt de visitatiecommissie, de decanen, bestuurders, medewerkers, studenten en afgestudeerden die door hun inspanningen tijdens de voorbereiding en de open dialoog tijdens de bezoeken hebben bijgedragen aan het welslagen van deze visitatie.

5| Opzet en indeling van het rapport

Het voorliggend rapport bestaat uit twee delen. In het eerste deel van het rapport beschrijft de visitatiecommissie in hoofdstuk II het referentiekader van waaruit zij de gevisiteerde opleidingen heeft beoordeeld. In hoofdstuk III worden de toegekende scores in tabelvorm samengevat.

In het tweede deel van het rapport brengt de commissie verslag uit over de verschillende opleidingen die zij heeft gevisiteerd. De aanbevelingen die de commissie doet ten aanzien van de afzonderlijke universiteiten worden in deze deelrapporten achteraan opgenomen. De deelrapporten werden geordend naar de chronologische volgorde van de bezoeken. De visitatiecommissie heeft haar werkzaamheden deels in het Nederlands en deels in het Engels uitgevoerd. Dit blijkt ook in dit rapport, dat deels in het Nederlands en deels in het Engels geschreven is. Er is een evenwicht tussen het gebruik van beide talen nagestreefd. De evaluatie van de opleidingen aan de transnationale Universiteit Limburg en de K.U.Leuven zijn in het Engels verlopen. Dit geldt zowel voor de zelfevaluatierapporten, de gesprekken tijdens de bezoeken als de voorliggende deelrapporten. De evaluatie van de Masteropleiding Actuariële Wetenschappen is grotendeels in het Nederlands verlopen, wat zich vertaalt in een Nederlandstalig deelrapport. Het referentiekader werd in het Engels opgesteld.



Frames of reference

1| Introduction

Although the master of statistics and the master of financial and actuarial engineering are different in terms of subject domains, curriculum content and objectives, they present a number of similarities. Both have long been considered as so called ‘master after master’ degrees, in the sense there was no corresponding bachelor or master degree. They are open to graduates from different disciplines (e.g., mathematics, economics, management sciences, and engineering) and strive to provide a uniform training. Both lead to a profession which has been recognized in the society. Actuaries are predominantly active in insurance companies, in finance and business companies and administrations. Statisticians are serving in governmental agencies, universities, public and private institutions, industry and more particularly in pharmaceutical companies. The two domains of statistics and actuarial sciences have their own national and international societies, scientific meetings, literature and journals. In particular, statistics has developed itself as an independent branch of mathematics and even of probability. Its research has been mainly driven by applications and by recent advances and developments in other fields of science. It should be remarked that biostatistics, i.e. statistics applied to life sciences, encompasses the majority of statisticians employed today.

There is no specific reference framework for the master of statistics or the master of financial and actuarial sciences which can be considered as novel masters under the Bologna decree, but one can rely upon existing guidelines for other masters (e.g., mathematics or engineering sciences).

2| Reference framework for the master of statistics

Statistics can be viewed as a branch of probability theory, itself part of mathematics. From this standpoint, statistics is merely an option within the master in mathematics. In the present context, the master focuses on the concepts and methods of statistics applied to sciences and society and can be seen as a novel domain of science.

Sir R.A. Fisher, the founding father of modern statistics, defined statistics as the discipline studying data reduction methods, variability, and populations. The first aspect concerns descriptive or exploratory statistics. The second focuses on randomness, probability theory and sampling experiments. The third concept relates to inferential statistics (estimation, hypothesis testing and decision making). This remarkable definition of statistics entails both theoretical and practical aspects of the field. It can be used to design a reference framework for the evaluation. Clearly, the statistician will have to master various skills and competences. He/she should have a solid theoretical background and a good sense of practical applications. He/she will have to understand the user's problems and apply the appropriate methods to solve them, to rapidly get acquaintance with the domain he/she is working in (e.g., medicine, social sciences, industry, education, business, and engineering), and possibly to impact on his/her working environment.

To evaluate the education programme, the commission uses a reference framework based on formulated objectives, defined attainment targets and established quality requirements for an academic study programme.

The commission expects the following outcomes for the master of statistics:

- The recipient has a sufficient theoretical background in statistics, enabling him/her to appraise recent developments in statistical methodology and to understand the methods applied on practice.
- The recipient has a highly developed ability in applied statistics, specifically the capacity to comprehend the users' problems, to choose the best (descriptive and inferential) statistical methods and models, and to provide the appropriate answers.
- The recipient possesses the necessary skills in computing and using statistical software to design, develop, edit, analyse and interpret databases.
- The recipient is able to discuss and critically assess a project, to design an experiment, to advise a researcher or a user, to provide positive feedback, whichever field of application he/she is involved in. In particular, he/she must be particularly knowledgeable about measurement methods, questionnaires design and

the entire information process (data collection, acquisition, quality, validity, reliability, privacy, editing, exchange, treatment, and interpretation).

- The recipient is clearly and unambiguously able to communicate results and conclusions, as well as understanding knowledge, rationale and considerations to an audience of specialists and non specialists. A particular emphasis will be placed on the recipient's 'consultancy' abilities, in the sense that he/she must be capable of explaining in simple terms even advanced statistical methodology (tests, methods, concepts, formulas) to users and laymen.
- The recipient possesses the learning skills enabling him/her to undertake further study that is largely self-directed or autonomous.
- For the ICP master programme, the reference framework will incorporate specific requirements to attain effectiveness and contribute to sustainable development. This includes among others a thoughtful selection process, sustained accompanying measures throughout the studies, and the establishment of durable relations with the recipient upon home return to engage a genuine cooperation process.

The Commission translates this in the following domain-specific requirements:

- The curriculum provides a solid basis in mathematics (derivatives, integrals, linear algebra, function theory, matrix calculus).
- The curriculum provides the necessary basic knowledge in probability theory and mathematical statistics (random variables, probability distributions, stochastic processes, estimation theory, and hypotheses testing).
- The curriculum entails a solid training in numerical calculus, programming and use of statistical packages (e.g., SAS, SPSS, S-PLUS).

Next, the curriculum concentrates on specific domains of statistics:

- Planning of experiments
- Generalized linear models
- Survival analysis
- Non-parametric statistics
- Multivariate statistics
- Categorical data analysis
- Bayesian statistics
- Time series
- Classification methods
- Measurement methods
- Survey methods

Depending on the orientation chosen by the student, optional courses can be included in the curriculum, e.g. for biostatisticians (clinical trials, epidemiology), for industrial statistics (quality control methods), for bioinformatics (biology, genetic data analysis, proteomics, genomics), for management science (econometrics, decision-making theory).

The curriculum should also incorporate practical sessions, group projects, and seminars, where the student will gain expertise in computational and problem solving, develop learning, literature search, reporting and communication skills.

The final thesis should demonstrate the recipient's competence of carrying out an individual project in which he/she will integrate the knowledge, reasoning and skills acquired during the programme.

3| Reference framework for the master of financial and actuarial engineering

Financial and actuarial engineering is a mix of mathematical, economical and law sciences. The profession of actuary is a well-known one in insurance companies. With the overwhelming role of economy, finance and law in society, which has developed over the past decades, the profession has widened to other domains, such as business and finance, stock market, retirement funds and global commerce and trading. In this constantly changing and evolving context, the actuary and financial engineer will have to master various skills and competences. He/she should have a solid theoretical background and a good sense of practical applications. He/she will have to understand and solve problems in situations of uncertainty and high risk, get acquainted to market characteristics and possibly to impact on his/her working environment.

In the present context, it is worth mentioning that international programmes for actuarial education have been prepared by the International Actuarial Association (IAA) and by its EU counterpart. These common syllabus guidelines aim to improve the international portability of actuaries, actuarial graduates and actuarial students. Within Europe, education guidelines underpin the Mutual Recognition Agreement between EU actuarial professional associations: cross recognition of qualifications of the different EU members are linked to the fulfilment of the requirements of a Core Syllabus. According to the terms of this agreement, each association shall provide for admission as a full member any actuary who is a full member of another member association who wishes to pursue actively the profession of actuary in its country. Within the Belgian actuarial society (KVBA-ARAB), an Education Committee with members from the 4 Belgian universities offering programs in actuarial

science agreed on a Belgian actuarial syllabus, complying with the international standards. Universities remain free to decide about the contents of their own programs, but need to cover the topics listed in the Belgian syllabus to ensure that their graduates are allowed to become members of the Belgian actuarial society and benefit from the mutual recognition treaty.

To evaluate the education programme, the commission uses a reference framework based on formulated objectives, defined attainment targets and established quality requirements for an academic study programme.

The commission will consider the following attainment targets for the master of financial and actuarial engineering.

- The recipient has a sufficient theoretical background in probability theory, risk theory, finance and economy, enabling him/her to appraise recent developments in the domain and to understand the methods applied on practice.
- The recipient has the necessary advanced knowledge in law to cope and get acquainted with national and international legal facets and regulations of an increasingly complex society.
- The recipient has developed an expertise in applications, specifically the capacity to comprehend the problems, to choose the best methods and models, and to provide the appropriate answers.
- The recipient possesses the necessary skills in computing and modern software to design, develop, edit, analyse and interpret databases.
- The recipient is able to discuss and critically assess a project, to design a solution proposal, to advise the management staff, to provide positive feedback, whichever team he/she is working in.
- The recipient is clearly and unambiguously able to communicate results and conclusions, as well as understanding knowledge, rationale and considerations to an audience of specialists and non specialists.
- The recipient possesses the learning skills enabling him/her to undertake further projects that are largely self-directed or autonomous. In particular, the recipient has ability in corporate management, as he/she may soon or later be appointed higher responsibilities in the company.

The Commission translates this in the following domain-specific requirements:

- The curriculum provides a solid basis in mathematics (derivatives, integrals, linear algebra, function theory, matrix calculus).
- The curriculum provides the necessary basic knowledge in probability theory and mathematical statistics (random variables, probability distributions, estimation theory, risk theory, and hypotheses testing).
- The curriculum provides the necessary knowledge in economy (accounting, insurance, econometrics, finance, funds and stocks management) but also basic knowledge in management and business administration.
- The curriculum provides the necessary knowledge in law (civil law, insurance law, in particular control law, insurance contracts and retirement funds legal aspects, European directives on insurances).
- The curriculum entails a solid training in using modern software tools (advanced spreadsheet, database management, data mining, statistical packages).

Next, the curriculum concentrates on specific domains of financial and actuarial sciences.

- Risk theory
- Stochastic processes
- Time series forecasting
- Numerical analysis
- Operational research
- Finance
- Insurance and re-insurance
- General ledger
- Banking
- Income and calculation of interest
- Insurance law

Depending on the orientation chosen by the student, optional courses can be included in the curriculum. The curriculum should also incorporate practical sessions, group projects, and seminars, where the student will gain expertise in computational and problem solving, develop learning, literature search, reporting and communication skills.

The final thesis should demonstrate the recipient's competence of carrying out an individual project in which he/she will integrate the knowledge, reasoning and skills acquired during the programme.

4| Educational requirements

The study programme guarantees the scientific, social and preparatory professional relevance, the effectiveness and efficiency of the training programme.

To this end, the teaching must meet content-related and professional standards defined by developments in the field of study and scientific area and requirements imposed by the labour market, the study programme must be up-to-date with the available scientific knowledge about learning and teaching required for the design, implementation and evaluation of the teaching and taking into account relevant social developments, such as the sharp rise in information technology, the increasing multicultural nature of society and the trend towards internationalisation.

Scientific area and field of study

The study programme is up-to-date with (most recent) theory development and with developments in the field of study and these can be found in the content and structure of the teaching programme.

Labour market

- The study programme establishes structural contacts with the professional field.
- The knowledge of and experience with the professional field is translated, where possible, into the programmes offered.
- The study programme pursues an active alumni policy.

Scientific knowledge concerning learning and teaching

- The study programme has an explicit vision of learning and teaching (the educational frame of reference), based on recent theories.
- The educational frame of reference helps form the starting point for the organisation of the programme.

Relevant social developments

- The study programme is up-to-date with the effects of information technology in the field of study and scientific area and has incorporated this knowledge into the teaching programme.
- The study programme has a clear and explicit vision of the internationalisation of the study programme.

Objectives and attainment targets

- The objectives and attainment targets of the study programme must be partly based on the legal regulations, developments in the scientific area and field of study, the labour market for graduates, knowledge concerning learning and teaching and relevant social developments.

- The choices made by the Faculty are clearly and explicitly set forth in the educational policy of the Faculty and translated into the training profile.
- The objectives and attainment targets are clear and specific. The attainment targets are described in the light of conduct observable in the student (regarding knowledge, skills and attitudes).
- The scientific level of the study programme is expressed in detail in the objectives and attainment targets.
- The attainment targets are decisive for the content and design of the programmes offered.
- Objectives and attainment targets are formulated at the level of both the study programme and programme phase and course level.
- The academic staff works demonstrably within the context of the attainment targets of the study programme.
- A recognisable correlation is observed between the attainment targets for the study programme and the objectives at course level, programme phase and programme level.
- Attainment targets and objectives are formulated so as to be testable.

Didactics of the educational learning process

- The vision of learning and teaching is translated specifically into methods and didactics deemed necessary by the study programme.
- The student's learning process is the main focus and is the starting point for organisation of the teaching programme.
- The learning process is supported by adequate didactic equipment and by appropriate study and instructional material, available in sufficient amount to the students.
- Suitable didactic methods are used in a variety of ways; they are efficiently monitored using relevant technologies, making active use of an electronic teaching platform.
- The methods are stimulating and activating.

Consumability

- The vision of learning and teaching is specifically translated into consumability characteristics which must be met by the organisation of the study programme.
- The programme should be feasible for the student in the time allowed and it should encourage an effective use of time.
- In as far as possible, account should be taken of individual variations in pace of study. This is evident, for instance, from differentiation provisions within the programme.

Study output/Study time

- The institution operates systematic study time monitoring.
- The institution works on a system which will make figures available regarding students' progress and educational career.

Intake/Admission conditions

The institution clearly indicates the entry level required of students.

Presence of factors facilitating/hindering study

- Factors hindering study are identified. A remedy is devised.
- Factors facilitating study are implemented, followed up and adjusted where necessary.

Evaluation and testing

- The vision of learning and teaching is specifically translated into the form and content of the evaluation.
- Efforts are made to achieve variation in evaluation forms, an optimum distribution of the study load and the best possible planning of the evaluation activities during the examination periods.
- The examination requirements and forms are clearly made known to students in advance.
- Evaluation takes place based on previously established evaluation criteria.
- The study programme envisages feedback to students regarding test results.

Quality requirements regarding final thesis/Master's dissertation

- The final thesis/Master's dissertation is an individual demonstration of competence and represents the final element of the study programme.
- The study programme is organised so that the student can prepare adequately for taking the competence test.
- Through the final thesis/Master's dissertation, the students demonstrate that they can analyse, approach and implement a research problem in a creative and scientifically justifiable way and can clearly report its results both in writing and orally, in accordance with scientific guidelines.
- The final thesis/Master's dissertation must be of publication standard. This implies that the document must make an original contribution to science.
- The final thesis/Master's dissertation represents at least one-fifth of the total number of credits, with a minimum of 15 and a maximum of 30 credits.
- The evaluation criteria are clearly and explicitly defined and published.

Internationalisation

- The Faculty forms an active part of a network of educational establishments.
- Foreign students are encouraged to study at the Faculty.
- The Faculty encourages international relations and university mobility, both within Europe and with the relevant areas of study.
- The quality of education received abroad is tested.
- The Faculty must check whether all communication and IT options are utilised for knowledge acquisition and dissemination.

5| Requirements with regard to Teaching organisation/Provisions

Teaching organisation

- Teaching is organised so that it is possible to steer the teaching.
- Teaching is organised so that the consistency of the teaching programme (both in the development phase and during the implementation and improvement phases) is guaranteed.
- The Faculty board has the power and the responsibility, based on the objectives and attainment targets and the ensuing course profile, to design the teaching and the teaching organisation.
- The internal working and consultation structure is in line with the necessary steering of the programme.

Material provisions/facilities

- The staff has sufficient resources (quantity and quality) and adequate accommodation available to suit their educational and research assignments.
- The students have sufficient resources (quantity and quality) and adequate accommodation to support the educational and learning process.

Study information and counselling

- Sufficient information (prospectuses, website, introductory days) are made available to (potential) students.
- The teaching and examination rules are made available to everyone, as is the possibility of lodging a complaint in this respect with an ombudsman, central department or person of trust.
- The faculty pursues a policy aimed at early detection of changes in intake.
- The study programmes are subject to the provisions of the flexibility decree in the development of flexible learning routes.
- Possibilities are built into the teaching to eliminate deficiencies in knowledge and skills.

- The study programme envisages a system of study and student counselling, aimed at the prevention and early detection of study problems. Solutions are actively sought. Individual counselling is envisaged for personal and/or study-related problems.
- Student counselling is aimed at assuming one's own responsibility for studying (and learning to study).
- The faculty takes specific measures to enhance students' results and progress.
- The faculty pursues an active counselling policy.

6| Personnel policy requirements and quality requirements of teaching staff

Personnel policy

- The procedure regarding the recruitment and appointment of personnel is clearly described and publicised.
- Personnel selection takes place partly on the basis of task profiles in line with the teaching tasks.
- Lecturers are regularly evaluated as described in the 1991 University Decree.
- Results of evaluations partly form the basis for the personnel policy to be pursued.

Quality requirements of teaching staff

- The quality requirements of the teaching staff relate primarily to:
 - o teaching expertise;
 - o scientific expertise;
 - o linguistic proficiency;
 - o acquaintance and experience with the professional field.
- The constant aim is for a clear link between the staff's research and teaching. The broad orientation inherent in a study programme also requires that staff be widely available. As a result, the teaching field can be broader than the research field.
- The specificity of the study programme requires that staff develop international contacts with feedback to teaching and/or research through participation in international networks and joint ventures.
- In order to achieve familiarity and involvement with scientific research, a scientific curriculum and active participation in scientific research are expected of staff.
- The teaching staff is regularly evaluated and an active remedy policy is pursued.
- Sufficient didactic support is offered.
- The educational curriculum forms an important element of promotion and recruitment.

7 | Requirements with regard to Internal quality assurance

- The faculty has a detailed total quality assurance system.
- The quality policy and system are geared to both prevention and control.
- Quality assurance concerns not only the primary process, but all quality aspects in their mutual correlation and in relation to the responsibility levels.
- The Faculty works as often as possible with target standards for evaluating whether and to what extent the desired quality is achieved.
- Competences are clearly defined within the context of the implementation of quality control, consultation in the light of availability of results, following up decisions with possible adjustments and/or teaching innovations as a result.
- The faculty possesses the information systems needed to achieve quality and for monitoring and judging the quality provided.
- A clear structure is present to support the quality assurance process.
- Quality control is in line with the intended aims of the teaching design and the target standards established for achieving them.
- Within the study programme, a climate is present aimed at delivering maximum quality.
- The faculty pursues a policy that stresses quality delivery.

8 | Complementary requirements for the ICP programme in Biostatistics

Since the study programme is conceived as an International Course Programme focusing on students from developing countries, additional settings are to be in place to attain effectiveness and contribute to sustainable development.

Sustainable development is preconditioned by carefully selecting students for fellowships. Candidates should already be anchored in a national institution before arrival. It guarantees that the content of the programme is relevant to the country. Support of the manpower development of a national institution is prevalent to the individual. Upon their return, the newly graduated masters should be inserted at a level with higher responsibilities based on the acquired knowledge and aftercare provided by the programme.

Effectiveness is attained when the students meet the attainment targets of the Master degree. Effectiveness might be deficient when cultural differences, social needs and special expectations related to the working environment in their home country are insufficiently addressed.

In practice, both contributing to the sustainable development of the partner country and increasing the effectiveness of the programme can be realised by considering the following additional activities:

Before the start of the programme

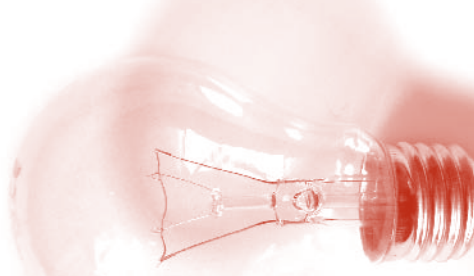
- Announcing the programme to institutions in developing countries.
- Facilitating fellowships for the candidates.
- Selection of candidates on the basis of a development-oriented and transparent policy (e.g., extended curriculum vitae, motivation, references, awareness and understanding of the problems in the country of origin).
- Encouraging enrolling students to prepare a document outlining the problems in their country and the need for training to solve such problems (this could facilitate the selection of the candidates).
- Prepare for arrival of students (e.g., lodging facilities).
- Social and cultural introduction.
- Organise preparatory courses (e.g., language, mathematical, computer courses).

During programme execution

- Lecturers should be fluent in English, have experience in developing countries and be highly motivated to care for the target group.
- The programme should inform the students clearly and in detail about the regulations of the university, especially those with regard to exams, class attendance and relationships with staff.
- The ethical code related to the area of study should be given special attention.
- Independent working and public/oral reporting should be encouraged, taught and developed.
- Procurement of a portable computer and documentation (e.g., books, software programmes...) should be facilitated.
- Thesis subjects on material or problem from the home country should be given priority.
- Techniques learnt during the programme should be complemented with techniques applicable in the home country.
- Continuous socio-cultural care complemented with an easy entry complaint/question/suggestion/feedback system.

After programme completion

- Take care of the organisational aspects of return.
- Give access to networks or stimulate participation in networks (e.g., discussion forum on the web, exchange of PDF documents of recent literature).
- Organise post programme activities (e.g., regional workshops, refresher courses, Internet newsletter, and training).
- Create opportunities for PhD projects.



Tabellen met scores onderwerpen en facetten

In de hierna volgende tabellen wordt het oordeel van de commissie op de 6 onderwerpen van het accreditiekader en de onderliggende facetten weergegeven. Voor het toekennen van de scores heeft de commissie zich gebaseerd op de minimale eisen die aan een bachelor- of masteropleiding mogen worden gesteld, zoals beschreven in de Dublin descriptor en vertaald naar de Vlaamse situatie in het structuurdecreet van het hoger onderwijs (2003) en het toetsingskader van de Nederlands-Vlaamse Accreditatie organisatie (2004). Bovendien heeft de visitatiecommissie een referentiekader opgesteld, waarin o.a. de domeinspecifieke eisen worden geëxpliciteerd. Het referentiekader van de commissie is beschreven in hoofdstuk II van Deel 1 van het visitatierapport.

De commissie wil er op wijzen dat de toegekende score per onderwerp of per facet een samenvatting inhoudt van een groter aantal aandachtspunten en criteria. Achter elk facet zitten dus diverse (zeer goede, goede en minder goede) aandachtspunten die meespelen in de beoordeling, hetgeen uiteraard duidelijker tot uiting komt in de tekst dan in de 'scoretabel'. Bij het toekennen van de scores heeft de commissie een gewogen gemiddelde gemaakt van haar beoordeling van deze aandachtspunten.

Vanzelfsprekend moeten de tabellen en de daar in opgenomen scores gelezen en geïnterpreteerd worden in samenhang met de oordelen die in de tekst van het rapport zelf (vergelijking en de deelrapporten) gemaakt worden. Het is de bedoeling om, door de opleidingen naast elkaar te plaatsen, een beter zicht te geven op de diversiteit in kwaliteit.

Verklaring van de scores op de facetten (quaternaire schaal):

O	Onvoldoende	De beoordeling onvoldoende wijst er op dat onder het facet essentiële gebreken werden vastgesteld die ingrijpende bijstellingen noodzakelijk maken.
V	Voldoende	Dit betekent dat aan de meeste aspecten van het facet voldoende aandacht wordt besteed, maar dat sommige elementen voor verbetering vatbaar zijn, zonder dat essentiële gebreken werden vastgesteld.
G	Goed	Goed wordt gegeven indien de commissie van mening is dat de opleiding zich behoorlijk inspanst voor alle aspecten van het facet en er geen tekorten werden vastgesteld.
E	Excellent	Dit houdt in dat voor het facet een niveau wordt gerealiseerd waardoor de beoordeelde opleiding zowel in Vlaanderen, in België als internationaal als een voorbeeld van goede praktijk kan functioneren.
NVT	Niet van toepassing	

Verklaring van de scores op de onderwerpen (binaire schaal):

+	Positief	voldoet ten minste aan de minimumeisen voor basiskwaliteit; er is geen verdere schaalverdeling om verdere graden van excellentie aan te duiden.
-	Negatief	voldoet niet aan de minimumeisen voor basiskwaliteit.

Het facet 'studieomvang' wordt gescoord met 'OK', indien de opleiding voldoet aan de decretale eisen m.b.t. de studieomvang, uitgedrukt in studiepunten.

Tabel 1 geeft vergelijkenderwijs de oordelen van de visitatiecommissie per onderwerp en de bijbehorende facetten weer over de masteropleidingen in de Statistiek aan de transnationale Universiteit Limburg en de Katholieke Universiteit Leuven.

Tabel 2 geeft vergelijkenderwijs de oordelen van de visitatiecommissie per onderwerp en de bijbehorende facetten weer over de masteropleidingen Actuariële Wetenschappen aan de Vrije Universiteit Brussel en Financial and Actuarial Engineering aan de Katholieke Universiteit Leuven.

Tabel 1 Vergelijkende scoretabel masteropleidingen in de Statistiek aan de transnationale Universiteit Limburg en de Katholieke Universiteit Leuven (chronologisch volgens bezoek aan de opleiding)

	transnationale Universiteit Limburg				K.U.Leuven	
	Master of Statistics				Master in de Statistiek	Master of Statistics
	Specialisation Applied statistics	Specialisation Biostatistics	Specialisation Biostatistics ICP	Specialisation Bioinformatics		
Onderwerp 1: Doelstellingen van de opleiding	+	+	+	+	+	+
Facet 1.1. Niveau en oriëntatie	G	E	E	E	G	G
Facet 1.2 Domeinspecifieke eisen	V	E	E	G	G	G
Onderwerp 2: Programma	+	+	+	+	+	+
Facet 2.1. Relatie doelstellingen en inhoud	V	G	G	G	V	V
Facet 2.2. Eisen professionele en academische gerichtheid	E	E	E	E	G	G
Facet 2.3. Samenhang	G	G	G	G	V	V
Facet 2.4. Studieomvang	OK	OK	OK	OK	OK	OK
Facet 2.5. Studietijd	V	V	V	V	V	V
Facet 2.6. Afstemming vormgeving-inhoud	G	G	G	G	V	V
Facet 2.7. Beoordeling en toetsing	G	G	G	G	G	G
Facet 2.8. Masterproef	G	G	G	G	V	V
Facet 2.9. Toelatingsvoorwaarden	G	G	G	G	V	V
Onderwerp 3: Inzet van personeel	+	+	+	+	+	+
Facet 3.1. Kwaliteit personeel	E	E	E	E	G	G
Facet 3.2. Eisen professionele en academische gerichtheid	E	E	E	E	E	E
Facet 3.3. Kwantiteit personeel	V	V	V	V	V	V
Onderwerp 4: Voorzieningen	+	+	+	+	+	+
Facet 4.1. Materiële voorzieningen	V	V	V	V	G	G
Facet 4.2. Studiebegeleiding	G	G	E	G	V	V
Onderwerp 5: Interne kwaliteitszorg	+	+	+	+	+	+
Facet 5.1. Evaluatie resultaten	V	V	V	V	V	V
Facet 5.2. Maatregelen tot verbetering	G	G	G	G	V	V
Facet 5.3. Betrekken van medewerkers, studenten, alumni en beroepenveld	V	V	V	V	V	V
Onderwerp 6: Resultaten	+	+	+	+	+	+
Facet 6.1. Gerealiseerd niveau	E	E	E	E	G	G
Facet 6.2. Onderwijsrendement	G	G	G	G	V	V

Tabel 2 Vergelijkende scoretabel Master in de Actuariële Wetenschappen aan de Vrije Universiteit Brussel en Master of Financial and Actuarial Engineering aan de Katholieke Universiteit Leuven

	Vrije Universiteit Brussel	K.U.Leuven
	Master in de Actuariële Wetenschappen	Master of Financial and Actuarial Engineering
Onderwerp 1: Doelstellingen van de opleiding	+	+
Facet 1.1. Niveau en oriëntatie	V	E
Facet 1.2. Domeinspecifieke eisen	G	G
Onderwerp 2: Programma	+	+
Facet 2.1. Relatie doelstellingen en inhoud	G	E
Facet 2.2. Eisen professionele en academische gerichtheid	V	G
Facet 2.3. Samenhang	G	G
Facet 2.4. Studieomvang	OK	OK
Facet 2.5. Studietijd	V	V
Facet 2.6. Afstemming vormgeving-inhoud	V	V
Facet 2.7. Beoordeling en toetsing	V	V
Facet 2.8. Masterproef	V	V
Facet 2.9. Toelatingsvoorwaarden	V	V
Onderwerp 3: Inzet van personeel	-	+
Facet 3.1. Kwaliteit personeel	V	G
Facet 3.2. Eisen professionele en academische gerichtheid	V	E
Facet 3.3. Kwantiteit personeel	O	V
Onderwerp 4: Voorzieningen	+	+
Facet 4.1. Materiële voorzieningen	V	G
Facet 4.2. Studiebegeleiding	G	V
Onderwerp 5: Interne kwaliteitszorg	+	+
Facet 5.1. Evaluatie resultaten	G	V
Facet 5.2. Maatregelen tot verbetering	V	G
Facet 5.3. Betrekken van medewerkers, studenten, alumni en beroepenveld	V	G
Onderwerp 6: Resultaten	+	+
Facet 6.1. Gerealiseerd niveau	G	E
Facet 6.2. Onderwijsrendement	G	G





Deel 2 Opleidingsrapporten





Foreword

In accordance with its mission, the assessment committee presents in this report its evaluation of the six themes from the frame of reference for accreditation as well as a global assessment, which will form the basis for the NVAO's accreditation. The assessment committee also makes recommendations for further optimisation of the quality of the education.

In accordance with the VLIR/VLHORA-guidelines, the six themes have been assessed, on the basis of the aspects defined in the VLIR/VLHORA evaluation framework and on the associated assessment criteria defined in the NVAO accreditation framework. The committee has formed its assessment on the basis of the information contained in the self-evaluation report. During the assessment visit to the programme (October 24-25, 2007) this information has been completed with conversations with the faculty management, course co-ordinators, lecturers, supporting academic, administrative and technical staff, students and alumni and with documentation of the faculty and the programme, visits to facilities such as classrooms, computer room and library, the study materials made available by the programme and exams, papers and master's theses of students.

Per aspect, the committee grants the score unsatisfactory, satisfactory, good or excellent. The score 'unsatisfactory' indicates that the aspect does not fulfil the basic quality demands and that policy makers should pay attention to the aspect. The score 'satisfactory' implies that the basic quality demands for this aspect of the programme are met. The score 'good' indicates that the quality stands out above the basic quality and the score 'excellent' implies that, on the assessed aspect, the quality of the programme can serve both nationally and internationally as a best prac-

tice. It has been made transparent in the report how the committee came to its score per aspect, taking into account the associated assessment criteria, to make clear on which elements the score has been based. It has been tried to motivate the appraisals as much as possible with facts and analyses. The appraisals are also based on a comparison with internationally used standards in the domain. On the basis of the aspect scores, the committee then gives a summarising evaluation on the theme level. A positive (+) theme evaluation implies that the basic quality demands are met. A negative (-) theme evaluation implies that the basic quality demands are not met. Lastly, the committee gives an overall judgement about the basic quality of the complete programme at the end of the report.

The elements which could be improved and recommendations for quality improvement have been identified together with the relevant aspect in the report. For the programme management, an overview of the recommendations for further optimisation of the quality of the education is repeated at the end of the report

It was decided to write the self-evaluation report as well as the assessment report in English to make it accessible for students, alumni and the vocational field.

Introduction

The Master of Statistics is offered by the transnational University Limburg (tUL), which is a collaboration of Maastricht University and Hasselt University. The Master of Statistics is fully organised at the Campus Diepenbeek.

Until the academic year 2006-2007, there have been two Masters of Science programmes in Statistics at the Campus Diepenbeek: a one-year Master of Science in Biostatistics, founded in 1988, and a one-year Master of Science in Applied Statistics, founded in 1999. Since then, the latter formed the first year of the VLIR-ICP-Biostatistics programme trajectory and the former, the second year.

The Master of Science in Bioinformatics evolved out of the tUL programme in Biomedical Sciences. Due to the strong connection between bioinformatics and biostatistics, it was deemed natural to place them under a single umbrella.

As of the academic year 2007-2008, the programmes have been integrated in a two-year initial Master of Statistics with four specialisations: Applied Statistics, Biostatistics, Biostatistics (ICP) and Bioinformatics. Wherever 'the programme' is discussed in this report, the four specialisations are meant. In case of differentiation between specialisations, this will be stated explicitly.

Since 2006, there has been a protocol of collaboration between K.U.Leuven and UHasselt, in particular between the University Centre for Statistics (UCS) at K.U.Leuven and the Center for Statistics (CenStat) at UHasselt. This agreement is geared towards a close collaboration between both universities in terms of educational initiatives in statistics. For the current master programmes, this implies that the universities in general and the bodies responsible for the master programmes in particular strive towards:

- exchanging faculty for selected courses to efficiently use capacity and to enhance the scientific quality of all programmes;
- exchanging students for elective courses so that students have access to a wider and more attractive range of optional courses;
- defining the domains in which they offer statistical education to complement rather than compete;
- adopting a maximum amount of common policies regarding the programmes' administration and organization.

Theme 1: Aims and objectives

The objectives for the programme as formulated in the self-evaluation report are as follows.

Fundamental Scientific Objectives are:

1. that the students learn to deal with scientific problems independently and efficiently.
2. that they can recognize the theoretical basis of the applications, and starting from these concepts, can follow the rationale for the applications.
3. that they learn to have a critical, scientific way of thinking enabling them to independently gain new knowledge.
4. that they are stimulated to engage in further scientific research.
5. that they learn to place statistical science and the job of statistician in a broad, international context.

Concrete Practical Objectives are:

1. that the students gain inter-relational skills so that they are able to work efficiently in a team context.
2. that they become proficient in communication, both with those in their own field as well as with colleagues from other disciplines.
3. that they are able to write clear reports and give plain presentations, both at the technical and the non-technical levels.
4. that they are able to discover structures in the usually complex questions from clients, and that they can independently plan to carry out the project within the allotted time, thereby using the most adequate statistical techniques.
5. that they are confronted with real-life situations of the applied statistician, biostatistician and bioinformatics scientist, where datasets are never clean and according to the textbook, and that they can then determine which statistical methods ought to be used in each case, and what the limitations or even totally inadequate techniques are in such a specific context.
6. that they experience the impact of statistics on policy decisions, on healthcare, on agriculture and the environment, etc., through the use of examples and without neglecting ethical considerations.
7. that they gain experience with the common phenomenon that data sets are supplied in structures and formats not compatible with standard statistical software, and that they become competent in data processing and data management.

Since students in the trajectory 'ICP Biostatistics' originate from developing countries, the above-mentioned objectives are complemented by the following specific ICP objectives:

1. increasing the number of well-trained statisticians in developing countries, with a broad education in applied statistics and specialized training in biostatistics.
2. introducing knowledge of modern statistical methodology into the South universities via the students we train (awareness of modern technology).

3. increasing knowledge of selected software (awareness of modern statistical computing). In addition to commercial packages, software is also used that is available on the Internet free-of-charge.
4. strengthening the multiplicative effect of the education received by ensuring that in several carefully selected countries small teams of biostatisticians are formed, who will be supported further by the expertise of the Centre for Statistics (science sharing).
5. on the basis of experiences within our own programme, provide advice and support for the strengthening of the biostatistics component in local university courses.

These formulated objectives are made concrete in specific goals and final competences in the self-evaluation report:

Competences Particular to the Domain

After completing the study programme, the student:

1. has insight into the aim of studies and the consequences they have for further analysis (experimental studies, observational studies, survey methods, etc.).
2. is familiar with methods for determining the sample sizes and for collecting data.
3. can use graphical methods to explore, summarize and describe numerical data.
4. has a deep insight into the basic underlying theoretical concepts (probability theory, distribution theory, estimation theory, hypothesis testing, etc.).
5. can recognize patterns and structures in data (independence, correlation, repeated measurements, missing observations, etc.).
6. is familiar with a whole range of statistical modelling techniques and knows how to use them correctly (simple, multiple, and logistic regression, variance analysis, discrete data analysis, multivariate methods, non-parametric techniques, etc.).
7. is able to correctly interpret the results of an analysis, with well-founded motivation.
8. understands the limitations of statistical analyses, takes them into consideration and makes them known.
9. is capable of independently understanding the underlying concepts of new methods sufficiently so as to correctly apply them in new situations.
10. views new developments and applications in statistics as a coherent process, and not as disconnected methodologies.
11. follows the professional literature and knows how to reasonably and efficiently collect statistical information (from periodicals, the Internet, etc.) and how to evaluate its quality.
12. has developed an overall capacity for analytical and synthetic thinking to be able to solve real statistical problems both personally and in a team, and to be able to write a sound scientific report (master's thesis) and to defend it.

Competence in Auxiliary Disciplines

The student:

1. has sufficient skills in calculus (derivatives and integrals) and in applied linear algebra to understand the background of the statistical methods applied.
2. has mastered standard word-processing and presentation software, and working with the Internet.
3. has thoroughly mastered more than one large statistical software package, and is able to manipulate data across the various systems.
4. understands the specificity of statistical software, and knows which package and which procedure is most suitable for common data analyses.
5. is able to correctly interpret output.
6. has an appreciation for the combined action of statistics and fast calculation techniques, and is able to use that combination for statistical analyses that employ computer-intensive methods.
7. knows methods and has a thorough command of software to manage data in databases, and to show relationships among those data.

Competence in Fields of Application

The student has sufficient scientific insight into several areas of application, to demonstrate that the student deals with applied statistics in a proper way as 'data in context'. The student is capable of mastering this 'context' in a different field of study to be able to carry out an optimally adapted statistical analysis.

Interdisciplinary Competence

The student:

1. can produce clear and professionally written reports, also in an international context; knows the criteria and guidelines for scientific texts.
2. can make clear and motivated oral presentations at a level that is adapted to the audience; is able to judge when and how modern audio-visual resources can support the presentation.
3. has learned to work together in a team context, and can foster the right atmosphere and work motivation within a group.
4. can plan both personal tasks and group assignments, and bring them to a successful conclusion on time with well-thought-out time management.
5. has developed the right feeling to be able to provide an effective consultancy service. This includes adaptation to the terminology of the client, clarification of the question's formulation, and ability of reformulating it into an understandable statistical procedure, making agreements about the procedure to be followed, and producing final conclusions that are clear for the one asking the question.
6. is trained to work in an international context with fellow students from countries in the entire world. Can work easily with international English-language literature. Is capable of doing a job in an international context (where English is almost always one of the working languages).

The above spelled out requirements apply to all four specialisations of the master programme. Only the focus differs slightly. The specialisation Biostatistics is aimed at preparing for a research career, possibly in conjunction with PhD training, or as a preparation towards such training. All of this applies to the ICP trajectory as well, where additional and strong emphasis is placed on aspects of biometry and biostatistics, relevant for economically developing countries. These include design of agricultural experiments, animal health, etc. The specialisation Applied Statistics is the more professionally oriented version of the master; it aims to be suited to be combined with a teacher training, but does not preclude the successful graduate from starting a PhD level training. The specialisation Bioinformatics has the same level of research orientation as the specialisation Biostatistics, with focus on statistical and computer science aspects of genetics and bioinformatics, including the analysis of gene expression data, data base theory, data mining, statistical genetics, etc.

1.1. Level and orientation

The committee assesses the level and orientation of the programme as being excellent for the specialisations Biostatistics (including the ICP) and Bioinformatics and as good for the specialisation Applied Statistics.

The programme aims at strengthening the knowledge and skills of students in statistics in general and in the topic of the chosen specialisation in depth. Specifically for the students originating from developing countries, an ICP-version of the Biostatistics programme is offered with extra attention for the needs of developing countries. The assessment committee observes that the aims of the programme are clearly formulated. Both the scientific and the practical objectives are well defined and definitely relevant. Nevertheless, the exact aims and profile of the Applied Statistics specialisation leave some room for further clarification in the opinion of the committee. The programme combines in a unique way an intuitive approach with a sound mathematical and statistical basis and a very good practical orientation. The teaching staff clearly knows and applies these aims and objectives. The final objective has been translated very carefully in goals and final competences and in learning outcomes for each course component. Potential applicants are informed by the course information brochures on the objectives of the course. The programme directors and course instructors communicate the objectives to the students on a permanent basis.

The committee evaluates the alignment of the objectives with the master's competences in the Decree as very consistent. The programme focuses on offering an advanced knowledge and insight into the scientific discipline, and includes recent scientific developments. Further, the programme emphasizes on developing the capacity to conduct and apply scientific research and on communication skills.

1.2. Discipline-specific requirements

The committee assesses the discipline-specific requirements as being excellent for the specialisation Biostatistics (including the ICP-programme), good for the specialisation Bioinformatics and satisfactory for the specialisation Applied Statistics.

The profile and the objectives are in line with the committee's frame of reference. The committee appreciates the specific and well defined profile of the Biostatistics specialisation. The programme management is clearly confident about where they want to go. The committee values specially the focus on both the development of research and of professional skills. The excellent profile of the Biostatistics specialisation is clearly based on a long experience and on frequent (informal) contacts with the professional field. The objectives are also up to date with recent evolutions. This has clearly led to international recognition for this programme.

The aims and objectives of the Bioinformatics specialisation are also well defined and in line with international standards. The committee acknowledges the audacious choice to integrate a Bioinformatics specialisation in this master programme. The committee believes that the interaction with the other specialisations can create a clear added-value. This added value could especially result from the combination of the study of the underlying statistical methods and techniques which are common for the different specialisations on the one hand and from the specific applications in the bioinformatics field on the other hand.

The general aims and objectives of the Applied Statistics specialisation are satisfactory. The committee, however, worries that this specialisation may turn out as a second rate Biostatistics programme, whose profile isn't clear enough to attract good students, in competition with the strong Biostatistics specialisation and the other programmes. So, the committee suggests further defining the profile of this specialisation. A clear profile for Applied Statistics might, for example, be found in two directions: first, a stronger focus on designs, especially non-experimental designs, causality, data gathering techniques, imperfect data handling, policy implications, consulting abilities, learning how to deal with non-statisticians, how to translate their problem into statistical terms and models (rather than transforming the questions into something that can be handled statistically) and how to communicate the results; secondly, learning the statistical analysis methods, techniques and models, since a fundamental understanding (as always) is required, but perhaps in a different way. In sum, the aim is a bit less on the mathematics needed for further development of new techniques and models, but on understanding these basics in terms of their consequences for practical research and applications.

The committee is convinced of the added value of collaboration. So, the committee appreciates the collaboration between the programme and the K.U.Leuven programme. The committee hopes that this collaboration will be further developed and will contribute to an efficient use of the scarce resources and a varied field of high level statistical training. The committee suggests continuing looking for collaboration opportunities, such as for example could exist for the specialisation Bioinformatics with the research of the Flemish Institute for Biotechnology (VIB).

Furthermore, the committee is convinced that within the transnational university opportunities should exist for mutual reinforcement. Up to now the added value of the transnational university and the input by Maastricht University is not clearly visible to the committee. As this programme is promoted as a tUL-programme, the committee deems it necessary to substantiate this collaboration. The committee sees this as a chance to even further increase the quality of the programme.

General conclusion related to theme 1: Aims and objectives

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the aims and objectives as being positive for every specialisation.

Theme 2: Curriculum

Description of the master's programme

The integrated two-year Master of Statistics, as it is now being organised since 2007–2008, offers the specialisations Applied Statistics, Biostatistics, Biostatistics (ICP) and Bioinformatics. These four specialisations consist on the one hand of a number of common courses and on the other hand of a number of specific courses and projects. The structure of the specialisations is shown in the scheme 1. For all specialisations, courses and projects have been subdivided into a number of families to clarify the structure of the programme:

- a. Statistical inference family
- b. Univariate modelling family
- c. Correlated data family
- d. Molecular biological family
- e. Survival analysis and clinical trials and experimental studies family
- f. Epidemiological family
- g. Computer science family
- h. Project family

The A and B families can be considered as the basic foundation courses, on inference aspects (A family) and on modelling aspects (B family). They are typically programmed in the first year and in the first semester of the second year. More advanced models, building further on families A and B are covered by the C family. These are programmed later on in the first year and further in the second year. As such, the A and B families, and to some extent the C family, are common to all trajectories.

Scheme 1: The course components of the Master of Statistics (indicating title, number of credits and family; Components marked with a * are projects contributing to the master's thesis)

First Year			
Applied Statistics	Biostatistics	Biostatistics/ICP	Bioinformatics
First Semester			
Concepts of Probability and Statistics (5-A)			
Regression (5-B)			
Analysis of Variance (5-B)			
Data Management in Statistics (5-E)		Molecular Biology (3-D)	
Optional Subject (3)		Computer Programming (4-G)	
Learning from Data (Group Project) (7-Z)			
Second Semester			
Nonparametric Methods (5-B)			
Correlated and Multivariate Data (5-C)			
Discrete Data Analysis (5-B)			
Survey Methods (5-F)	Disease Mapping (5-F)	Topics in Biometry (5-E,F)	Database Management (3-G)
Optional Subject (3)		Optional Subject ICP (3)	Basic Bioinformatics (Individual Project) (6-Z)
Discovering Associations (Group Project)* (7-Z)			

Second Year			
Applied Statistics	Biostatistics	Biostatistics/ICP	Bioinformatics
First Semester			
Multivariate Data Analysis (3-C)			
Computer Intensive Methods (3-A)	Foundations of Linear Models (3-A)		Computer Intensive Methods (3-A)
Microbial Risk Assessment (3-F)	Principles of Statistical Inference (3-A)		Programming for Bioinformatics (4-D)
Applied Data Modelling (4-B)			Analysis of Gene Expression (4-D)
Incomplete Data (Group Project)* (6-Z)	Medical Biology (3-D)		
Epidemiology (3-F)			Data Mining in Bioinformatics (3-D)
Thesis Project (Individual Project)* (5-Z)	Genetic Epidemiology (3-D)	Optional Subject ICP (3)	Genetic Epidemiology (3-D)
Optional Subject (3)		Optional Subject ICP (3)	Optional Subject (3)
Second Semester			
Bayesian Data Analysis (3-C)			Data Management and Algorithmic Techniques for Bioinformatics (7-D)
Data Mining (5-B)	Longitudinal Data Analysis (3-C)		Computer Intensive Methods for Bioinformatics (4-D)
Modelling Infectious Diseases (4-F)	Survival Analysis (4-E)		Analysis of Protein Expression (4-D)
Topics in Epidemiology (3-F)	Clinical Trials (5-E)		
Optional Subject (3)	Longitudinal Data Analysis (Group Project)* (3-Z)		Optional Subject (3)
Optional Subject (3)	Advanced Modelling Techniques (Individual Project)* (3-Z)		Optional Subject (3)
Thesis Project (Individual Project)* (Z-9)	Thesis Project (Individual Project)* (Z-14)		

Families D, E, F, and G are more trajectory-specific, although not in an exclusive way: families D and G for the Bioinformatics trajectory, family E for the Biostatistics trajectory, and family F for the Applied Statistics trajectory.

Family Z is the core family, in several ways: it serves as a binding agent between the different courses, as processing agent to apply theory, methods, models and software on real and more complex data, as communication tool to acquire communication and reporting skills, and as tool to enhance functioning in a multidisciplinary and multicultural team.

In addition, there is a list of optional courses for every trajectory. The principle is as follows: courses compulsory for one trajectory are optional courses for any other trajectory (not having that particular course as a compulsory course). There are exceptions to this principle, such as the 'Project Incomplete Data'.

Given the collaboration with the K.U.Leuven, a student is able to take optional courses from the 'Master of Statistics' of K.U.Leuven. A common committee grants students authority to take such a course. The integrity of an individual student's trajectory will be an important criterion in the decision process, together with practical feasibility of the exchange.

2.1. Correspondence between the aims and objectives, and the curriculum

The committee assesses the correspondence between the aims and objectives, and the curriculum as being good for the specialisations Biostatistics and Bioinformatics and satisfactory for Applied Statistics.

Although the new two-year curriculum still had to be implemented at the moment of the assessment visit, the practice in the past and the well developed plans for the future convinced the committee that the relationship between the objectives of the programme and the content of the curriculum is, and will be, overall very good. The committee is convinced that the (planned) curriculum enables the students to attain the formulated final qualifications. Generally, the curriculum is also well adapted to the context in which the participants have to work after graduating. For instance, the needs of developing countries are well taken care of in the ICP-Biostatistics specialisation.

The committee appreciates very much the combination in the curriculum of an intuitive approach with an attention to a sound mathematical and statistical knowledge and a good practical orientation. The committee values also the good balance in the curriculum between mere introductory courses and more in depth advanced and specialised courses. All relevant topics are discussed, especially in the Biostatistics specialisation.

As already indicated for the Applied Statistics specialisation, the committee recommends that, in all four orientations of the programme, more attention be paid to data collection, designs, causality, privacy aspects, consistency checking, and other non covered but important issues related to data. The programme definitely lacks such a course. It is believed that students should be prepared to permanently question themselves about how data are collected and where they come from, before proceeding with data analysis and interpretation.

The curriculum for the Bioinformatics specialisation has been well developed. The committee, nevertheless, thinks - as said before - that further exchange with the

other specialisations (e.g., on handling of large datasets), offers room to further increase the already promising quality of the curriculum.

As indicated under Aspect 1.2. the committee is convinced that a clearer profile of the Applied Statistics specialisation should be defined to attract enough good students, taking into account the strong internal competition for students with the other specialisations. Also in the curriculum, the committee missed out this clear profile for the Applied Statistics specialisation. Content-wise or other differences with the other specialisations should be clarified. The committee suggests, for example, indicating better how other important elements in applied statistics, next to data analysis, are integrated in the curriculum. The committee further misses the translation in the programme of the objective for this specialisation to be well-suited to be combined with a teacher training.

2.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation of the curriculum as being excellent for every specialisation.

Knowledge development is important in the course and is tackled in different ways. In the common part, all participants are provided with essential knowledge in the field of statistics based on research expertise available within the programme and guest lecturers are invited regularly to bring in extra expertise. In the specialisations, this knowledge is deepened to serve as a resource for the thesis work and further professional career of the participants. Recent evolutions in the domain (both theoretic and practical) are taken into account during the courses.

The committee also appreciates the clear focus on research training in the programme. In classes and in assignments, students are clearly stimulated to work and think scientifically. All courses are based on research. Wherever expertise isn't available within the own staff, guest lecturers are invited. Most specialized courses are based on faculty's key research topics, such as mixed models, longitudinal and incomplete data, infectious disease models and bioinformatics.

The committee also acknowledges the professional orientation of the programme. In all specialisations, examples and homework assignments related to consultancy experiences are used. In the Biostatistics option, strong cooperation exists with the pharmaceutical industry. Specific for the ICP-programme, the experience of staff in cooperation with institutions in developing countries provides added value. The programme and the staff also provide a lot of opportunities for the ICP-students to exchange their prior professional experience.

2.3. Consistency of the curriculum

The committee assesses the consistency of the curriculum as being good for every specialisation.

The course components have been subdivided in a number of families of courses. This concept contributes to the transparency and the consistency of the programme. A good balance between courses and projects from the different families is offered within the curriculum. The committee appreciates also the clear links between courses, both within and between course families.

The committee values the good balance between compulsory and optional courses. The students are offered a sufficiently guided curriculum, but get also enough freedom to choose their own trajectory. The committee appreciates also that flexibility exists to change specialisation if a student wishes so. However, most students make a thoughtful decision and don't need to change specialisation.

The consistency is monitored by continuous evaluations of the programme and frequent interaction among the lecturers who establish links between different modules and course components.

2.4. Size of the curriculum

The committee assesses the size of the curriculum to be in line with the formal regulations as described in the decree on the restructuring of the Flemish Higher Education. The master programme is a 120 credit programme.

2.5. Workload

The committee assesses the workload as being satisfactory for every specialisation.

Evaluations of the programme and the interviews of the committee with students, alumni and academic faculty indicate that the programme is quite demanding and that workload is not always balanced over time. The students the committee spoke with don't consider this as a major problem. They want to learn as much as possible during their stay in Diepenbeek and are quite committed to their studies. The educational committee monitors the actual study load, mostly on an informal basis. The committee, nevertheless, thinks that as a measure for further improvement, it would be useful to implement a more formalised follow-up procedure. As the study load is very high, attention should be paid constantly to monitor the feasibility of the programme.

2.6. Coherence of structure and contents

The committee assesses the coherence of structure and contents of the programme as being good for every specialisation.

The committee is satisfied with the mix of educational methods used in the programme. The curriculum is organized around a limited number of teaching sessions, supplemented with homework and self-study. A consequence of this choice is broad opportunity for students to interact with the senior staff and faculty members. Students are also invited to workshops and seminars on specific topics relevant for the programme. The used educational methods are adapted to the mature student population and are evaluated positively by the students who were interviewed. The committee suggests that an explicit didactic concept could make the positively evaluated implicit didactic concept explicit and transparent for all stakeholders.

Most courses are planned around face-to-face classes, essentially organized in three half days a week, each one comprising three hours. Students are expected to be present during the formal classes. Different forms of homework - more theoretical or a more applied form - are used to stimulate students to develop their general understanding of theoretical and methodological concepts and the application of concepts using data analysis. Some homework consists of writing formal reports that need to be prepared in accordance with scientific standards. In a number of courses, there is also a formal oral presentation of homework and reports. Both individual and group assignments are organised. For group assignments, cultural diversity as well as diversity in terms of backgrounds is strived for, as these elements will also be important in the student's later working environment. Students are generally satisfied with the feedback which is provided on homework.

Via project-oriented education ('Projects Learning from Data' and 'Project Discovering Associations' in Applied Statistics, and 'Project Longitudinal Data Analysis' and 'Project Advanced Modelling Techniques' in Biostatistics), collaborative learning in an active learning environment is further stimulated. Students are confronted with original data and problems, fed by the consultancy of CenStat.

Lecturer notes are provided in hard copy or in an electronic version on Blackboard. The didactic tools used are of good quality in the opinion of the committee. Each year, most of the course material is updated, while exercises and assignments are adapted in function of the evaluations.

2.7. Learning assessment

The committee assesses the learning assessment as being good for every specialisation.

The assessments verify knowledge acquisition as well as development of skills and attitudes, using different tools. Written or oral exams as well as evaluation based on homework are used. The committee values the mix of assessment methods. Students and alumni interviewed by the committee have positive feelings about the quality of the feedback provided on evaluation results.

The committee has investigated samples of the examinations and assignments and appreciates the high quality and relevance of the exam questions. Also the evaluation of the theses and the continuous appraisal are appreciated. The assessments relate clearly to the objectives of the course. The committee concludes that the students are properly tested, assessed and informed about the results.

2.8. Master's thesis

The committee assesses the Master's thesis as being good for every specialisation.

The main aims of the Master's thesis can be formulated as:

- the student is able to work independently and as a member of a team on an applied problem;
- the student is able to select and apply appropriate methodology;
- the student can report in written and oral form, following scientific reporting standards.

The number of credits allocated to the Master's thesis is 27, which is in line with the legal requirements. Different components are combined to reach the above stated aims. The Master's thesis in Applied Statistics consists of the group projects 'Discovering Associations' and 'Incomplete Data' and an 'Individual Thesis Project'. The Master's thesis in Biostatistics consists of the group projects 'Discovering Associations', 'Longitudinal Data Analysis' and 'Advanced Modelling Techniques' and an 'Individual Thesis Project'. The Master's thesis in Bioinformatics consists of the individual project 'Project Basic Bioinformatics', the group 'Project Discovering Associations' and an 'Individual Thesis Project'. This individual thesis project (14 credits) is for all majors linked to an internship, scheduled in the second semester. The committee appreciates these concepts of Master's theses.

During the Project Meeting Day, proposals for individual thesis projects are presented. The committee appreciates this initiative. The student's progress during his/her internship is registered in a progress report. On the basis of the discussions with students, alumni and academic staff, the committee is convinced that students

receive a good guidance for both the group projects and the individual projects which are part of the Master's thesis. The good guidance is especially appreciated by the ICP-students.

The thesis has to be approved by both an internal and external supervisor, and defended successfully in public before a jury. The committee has read a sample of the Master's theses and generally agreed with the rating about the scientific quality made by the tUL-staff. Students clearly reach the stated objectives. Several of the theses have led to scientific publications.

2.9. Admission requirements

The committee assesses the admission requirements as being good for every specialisation.

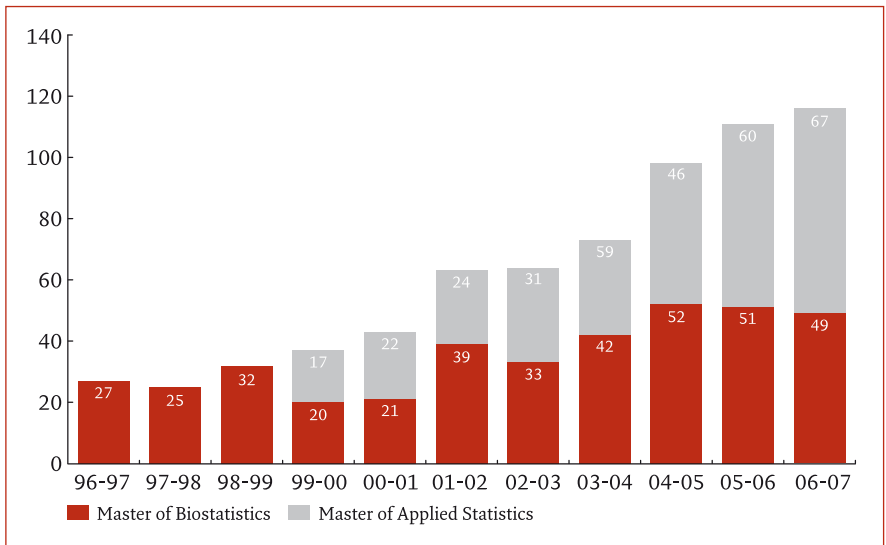


Figure 1: Number of students in the Master of Biostatistics and Master of Applied Statistics since 1996-1997

The number of students the tUL attracts with its master programmes in Statistics has grown rapidly over the last 10 years. This is shown in Figure 1. The one-year Master in Biostatistics has nearly seen a doubling of its annual student intake in comparison with 1996-1997. In total, the two one-year master programmes provide education to over 100 students. This rapid growth in student populations reflects the high quality and attractiveness of the programme and is acknowledged by the committee.

All applicants need at least a university diploma or a diploma of higher education equivalent to a bachelor degree. Applications from bachelors in a variety of disciplines, such as mathematics, physics, computer sciences, chemistry, biology, life sciences, (bio, business, civil) engineering, medicine, sociology, psychology, (applied) economics, artificial intelligence, biotechnology, etc., with a basic but sufficiently strong background in mathematics and statistics can be admitted directly, conditionally, or indirectly after completion of an individualized preparatory programme. The Examination Board considers each application individually. Academic bachelors obtained from a Belgian university, in mathematics, physics, computer sciences, chemistry, biology, life sciences, (bio-, business, civil) engineering, are directly admitted. The committee appreciates these admission requirements.

To motivate and prepare students in the UHasselt Bachelor in Mathematics to follow the Master of Statistics, an optional course ‘Topics in Statistics’ was included in the Mathematics curriculum. This course contributes to motivate and facilitate students to start the master programme.

Table 1: Inflow of students in the Master of Statistics at tUL per Region

Inflow per Region			
Region	2004-2005	2005-2006	2006-2007
Master of Science in Applied Statistics			
Flanders	9	7	12
Rest of Belgium and Europe	6	4	7
Asia	23	34	44
Africa	22	23	36
Latin America	0	2	1
Rest of the world	1	0	0
Total	61	70	100
Master of Science in Biostatistics			
Flanders	30	26	21
Rest of Belgium and Europe	13	26	13
Asia	18	8	20
Africa	17	19	27
Latin America	2	0	1
Rest of the world	0	1	1
Total	80	80	80

The Master of Statistics has a quite international inflow. Table 1 indicates that students from all over the world are present. The Flemish contingent is supplemented with Walloon students and students from the rest of Europe. Next to this, there are major contingents from Asia and Africa. The absence of North America is explained by the strongly developed educational framework in statistics and biosta-

tistics in this part of the world, in line with the general Anglo-Saxon tradition of the field. Non-native English speaking applicants have to provide evidence of sufficient knowledge of the English language (TOEFL or IELTS).

General conclusion related to theme 2: Curriculum

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the curriculum as being positive for every specialisation.

Theme 3: Staff

3.1. Quality of staff

The committee assesses the quality of staff as being excellent for every specialisation.

Based on the interviews with all stakeholders and the evaluation results which were presented in the self-evaluation report, the committee is of the opinion that the quality and expertise of the staff and their commitment to education is outstanding. The committee appreciates the strong group dynamics and the ambition to provide an excellent programme which is clearly present among the entire staff.

A close collaboration exists between the CenStat, the Department of Mathematics, Statistics and Computer Science and the programme management. This allows taking into account both research and teaching needs when hiring new staff. The faculty is chosen in view of the course contents aimed for. In the initial years of the programmes, this was facilitated by a large and hence flexible contingent of visiting faculty. Later, regular, locally based appointments have been made so as to optimize the new hires' fitting within the programmes. Programme management has also a strong impact on the distribution of educational tasks amongst faculty. The committee appreciates this room for human resources policy within the programme. As an example, a large part of the educational efforts is carried out by the professors and senior postdoctoral collaborators, as this level of knowledge, skills, maturity and experience is deemed essential for most teaching activities at master's level. This contributes strongly to the quality of the programme.

Detailed procedures are designed for appointment and evaluation of staff. Vacancies for positions are publicly advertised. Job descriptions are formulated in advance. Selection committees are constituted by senior staff. The final decision is made by the Board of Directors. Promotions of senior academic staff are based on performance in education, research and scientific consultancy. Evaluation data on these

aspects are based on the advice of the Bureau of the Research Council and on the personal teaching dossier. The latter contains the results of course and teaching block specific standardized student surveys, and overview of teaching duties, a self-reflection of the staff member on his/her approach to teaching and evaluations by the evaluation committee. The evaluation committee assesses whether the job performance matches the job description. This is seen in the light of both the general profile of the staff member's personnel category, as well as with his/her specific job profile. The evaluation committee prepares a detailed written report for the academic authorities, based on the prescribed dossier elements. The report consists of a descriptive and an assessment part. The staff member in question receives the report in written and has the right to provide comments to the dossier. Assisting staff is evaluated every 2 years, other staff members are evaluated at least every five years, three years after their first appointment and in preparation of every promotion. After a negative evaluation, a new evaluation is planned within two-years and even within one year after negative evaluation if the negative evaluation is based on teaching performance. For a professor's promotion, the entire dossier, including research, education and consultancy, is submitted to the Statutory Advisory Committee. Promotion is evaluated at university wide level.

The University has a strong tradition in professionalizing education and consequently also professionalizing the staff involved in teaching. This takes place through formal and informal channels. Formal initiatives include the Chair 'Errector L. Verhaegen', which focuses on professionalizing staff relative to education, and the 'Herman Callaert Leadership Award in Biostatistical Education and Dissemination'. The latter prize is dedicated to an individual academic who has distinguished himself/herself in the field of education in statistics. In collaboration with the University of Antwerp, Hasselt University offers a one-year training for beginning lecturers. In view of the implementation of electronic learning platforms, such as Blackboard, several seminars have been organised within the faculty. Also for assistant staff educational training is provided. Informal channels include ad hoc meetings between members of a teaching team, coordinators of a number of courses, informal conversations, discussions of evaluations, and recommendations of visitation committees. These initiatives and informal exchange strongly benefit the quality of education.

3.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation as being excellent for every specialisation.

Research efforts within Hasselt University are concentrated on a limited number of areas of expertise to create high quality research groups. CenStat is one of the eight research institutes at Hasselt University. It integrates most of the statistical

research which underpins the programme. The committee has investigated a sample of the publications of the academic staff. All academic staff members involved in teaching the programme perform active research related to statistics, biostatistics and bioinformatics. The committee appreciates the high international standards of this research. Due to this close link between research and teaching activities, up-to-date knowledge is provided to the students. The continuing development of research activities is indicated by the high number of publications, books written by staff members, research grants received, PhD students and consultancy projects. Members of CenStat also take an active role in national and international (bio)statistical societies. For specific training objectives requiring specialized knowledge, the programme calls upon renown external lecturers from other (Belgian and foreign) universities, research institutes and private companies.

Next to their research activities, teaching staff has also excellent expertise on the use of (bio)statistics in the field. Frequent consultancy projects contribute to the professional orientation of the staff. Several staff members have been teaching in Africa and Latin America. A long term collaboration initiative with several Cuban institutions started in 2006 and junior staff is selected from all over the world.

According to the committee, the range of specialization present among the academic staff involved in the programme clearly covers the necessary fields in statistics, biostatistics and bioinformatics and a very high level of research is being carried out.

3.3. Quantity of staff

The committee assesses the quantity of staff as being satisfactory for every specialisation.

The senior academic personnel engaged in the Master of Statistics consist of 10 members with a regular appointment (7 FTE) and 10 guest lecturers (0.7 FTE). The junior academic staff consists of 3 regular assistants and 27 bursaries. Most of the formal teaching is carried out by the senior academic staff, while the coaching is shared by senior and junior staff. Teaching workload is, as far as possible, evenly partitioned over the different staff members and units. The average number of students over de last 4 years is 104 per year. In view of this intake of students, the range of staff is satisfactory for the organization of the programme. However, a further growth in student numbers would require an increase in quantity of staff.

General conclusion related to theme 3: Staff

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the staff as being positive for every specialisation.

Theme 4: Services

4.1. Facilities

The committee assesses the facilities as being satisfactory for every specialisation.

During the assessment, the committee visited the buildings, classrooms, libraries and laboratories that are used for the Master's programme. All study activities take place in the central building of the UHasselt.

The staff is experiencing a problem of office space. Not only is it scarce, it is also scattered around the central building. However, some UHasselt buildings are being renovated. This will allow the UHasselt to concentrate the research groups. The Centre for Statistics hopes this will also lead to more spacious accommodation. The committee is convinced that both in research and in teaching the already strong group dynamics only can be strengthened by a better organization of the accommodations.

The library is located centrally in the main building of the Diepenbeek campus and is easily accessible for students. The collection of the library satisfies the committee. Next to the collection on paper, the electronic collection offers access to a large number of scientific journals. An integrated catalogue with the Universiteit Antwerpen has been developed. This catalogue increases accessibility of books and journals on paper. Also within the tUL-framework, the library of the Universiteit Maastricht is accessible for UHasselt students.

Lecture and seminar rooms are all located in the main building of the campus. The lecture rooms the committee visited are well equipped with multimedia devices. Some of the computer rooms offer access to a wide range of statistical programmes. Some students proposed during the visit to make specific statistical software available on more computers as the best computers are occupied most of the time.

The Housing Service of UHasselt composes a list of student accommodation. The list encompasses about 3000 student rooms. Only landlords using the University's model contract are entered into the list. All rooms have to comply with norms regarding hygiene, safety, and security. The list is available on-line as well. Evidently, the student population brings about specific issues regarding accommodation. A large majority comes from abroad, from different continents. Thus, specific support is offered to these students to find the right accommodation for them. The students are quite positive about the help they get from the supporting staff of the programme (*see also 4.2. Tutoring*).

4.2. Tutoring

The committee assesses the tutoring as being excellent for the ICP-Biostatistics specialisation and good for the other specialisations.

The study progress is continuously evaluated and guided by the academic staff of the programme. There is a strong culture of continuous and intense support and guidance, throughout the academic year, to ensure the students develop the right working, studying, and collaborative attitudes. This is a joint effort of educational experts, programme chairmen, faculty, staff, and ombudsperson. The ICP-students further have dedicated contact persons. They are guided very well at their arrival and during their stay in Belgium. They receive help to find housing and are supported whenever they have problems during their stay in Belgium.

The supporting staff offers first line help for both academic and personal issues. Especially when foreign students just arrive they are welcomed at the airport and get help with finding accommodation (mostly before they arrive) and settling. Also during the study programme they get every required support. If needed, they will refer these students to an appropriate facility. The supporting staff assists new students also in all aspects living in Hasselt. They arrange all kinds of practical problems. Also social and cultural support is offered, as e.g. sympathetic ear to those feeling homesick or with other personal problems. The students are very positive on the help they get from the supporting staff.

The alumni organization targets next to alumni also current students. Special attention is devoted to students from foreign countries. Social and cultural activities are organised. In this sense, the Board members, who are traditionally junior CenStat members, facilitate living in Belgium for the foreign students.

Potential students are informed mostly by informal contacts. A lot of the foreign students get their information from alumni. National students get informed through staff members. Also the brochure which provides general information informs students. During the programme, the study guide offers all necessary information. The committee regrets that the study guide is only available in Dutch. It is therefore suggested to provide foreign students with an English version of the study guide.

General conclusion related to theme 4: Services

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the services as being positive for every specialisation.

Theme 5: Internal quality assurance

The internal quality assurance used for the Master of Statistics is described in scheme 2.

Scheme 2. Internal Quality assurance process

Description

The Master of Statistics is organized under the responsibility of the Faculty of Science. Within this Faculty there are three subordinate organs related to the Master of Statistics: the Curricular Committee, the Onderwijs Management Team (OMT), and the Exam Committee.

The Curricular Committee (Curriculumraad, CR) of the Master of Statistics provides advice to the Faculty of Science regarding the curriculum and undertakes teaching evaluation. The CR consists of a selected number of course coordinators, together with the ombudspersons. They are chosen so as to broadly represent the various backgrounds. For this reason, the chairmen of the various specializations are included. Both UHasselt as well as visiting faculty is represented. Students and educational experts are also represented.

The OMT consists of the chairs of the trajectories, together with student representatives and educational experts. The OMT is responsible for the daily operation of the programme. It reports to both the CR and the Faculty Council.

The ombudspersons and the educational experts play a crucial role in the quality control process. They operate at three levels. First, they receive structured feedback via surveying the students. Second, feedback is received in an informal way, through feedback meetings and further informal contacts. Third, the ombudspersons can give feedback on the programme, based on the comments received. All of these are instruments to prepare feedback, formally and informally, to the teaching staff, the leadership of the programme, and the faculty and academic authorities.

At a central university level, the Education Board (Onderwijsraad) advises the university management on educational matters. It is chaired by the Rector or Vice-Rector. Further membership includes the General Manager (Beheerder), representatives of all three Faculties and both Schools, encompassing staff and students, and the Educational Experts. The Education Board monitors quality and good practice, stimulates innovation regarding educational affairs and initiatives. It especially focuses on long-term strategic issues, and topics that require careful thinking and planning.

Since the academic year 1999-2000, evaluation procedures have been implemented at University level, but these surveys have not yet been done on a regular basis for

the Master of Statistics. The plan is to have every course evaluated at least once every three years. New faculty, new visitors, and one-time visitors will have their course evaluated without exception. The survey takes the form of a number of statements about all facets of the course. The response is by way of a five-point ordinal scale, expressing strong agreement, agreement, neutral opinion, disagreement, and strong disagreement, respectively. The analysis of the survey data rests in the hands of the Educational Experts. The results are entered into the staff members' educational dossier. It can also be used by Programme Chairs and the Chairs of the Curricular Committee and the OMT, for evaluation and programme-improvement purposes.

5.1. Evaluations of results

The committee assesses the evaluations of results as being satisfactory for every specialisation.

The course management has always taken evaluation of the quality as an important issue. Informal contacts between the course management and the students have always been frequent. Ad hoc procedures for quality control have been developed, including a survey sent to alumni short after their completing the programme. Only recently the master programme has been integrated also in the structured evaluations organised by the university. The committee is satisfied with the integration in the formal university level evaluation system. The committee suggests adding a structured evaluation of the programme as a whole to the current course component evaluation.

Evaluations by survey and informal interaction with the students by the programme chairs, the ombudsperson, the educational experts, and the teaching staff as a whole, contribute to painting a picture about the students' perception of teaching quality, consistency of the programme, and feasibility of the workload.

The self-assessment report gives extensive information on the programme. The committee, nevertheless, missed a critical attitude in the report. The discussions during the assessment site visit were held with an open mind and were a good addition to the information outlined in the self-evaluation report, as all stakeholders showed a positive critical attitude towards the programme and clearly indicated strengths and weaknesses.

5.2. Measures for improvement

The committee assesses the measures for improvement as being good for every specialisation.

Ever since the start of the Master of Science in Biostatistics in 1988, the programme management used internal and external evaluations and informal feedback from students, international contacts of staff, interaction with leading members of other

MSc programmes, etc. to increase the quality of the programme. The structure and the length of the different constituting programmes of the Master of Statistics have been changed over time to offer students the best possible programme. The committee especially acknowledges the integration of the Master of Biomedical Sciences option Bioinformatics in the Master of Statistics as it believes that the interaction will add value for all the offered specialisations. Also the shift towards a two-year programme created opportunities to further increase the quality of the programme. Furthermore attention has been paid to streamlining teaching and evaluation methods. On a course level new developments are integrated in existing courses and new courses (e.g. 'Data mining' and 'Genetic Data Analysis') are proposed.

The committee furthermore appreciates the improvement measures which have been taken as a follow-up of the VLIR-UOS external evaluation in 2000. As an illustration, academic and educational contacts with departments and organisations in the South have been enhanced and more time is devoted to non-medical biostatistics.

5.3. Involvement of staff, students, alumni and the professional field

The committee assesses the involvement of staff, students, alumni and the professional field as being satisfactory for every specialisation.

As indicated before the programme management is quite accessible and open for informal feedback and/or ideas for improvement and change from the students, the alumni, the various players in the professional field (university research groups, biopharmaceutical companies, contract research organizations, and governmental agencies). Also the visiting faculty members give their ideas and suggestions. Finally, the international contacts of CenStat staff and faculty are also extremely relevant in this respect. The committee noticed during the assessment visit that these stakeholders are committed to the quality of the programme.

Formally staff members and students are involved in quality assurance procedures. They are members of the educational advisory and decision making bodies. Students and alumni are invited to take part in a survey on the quality of the course components. The use of these procedures could, however, be intensified. Furthermore, the professional community is not involved in formal quality assurance procedures.

The committee appreciates the strong informal involvement of all stakeholders. Nevertheless, the committee suggests using the formalised structures more intensively.

General conclusion related to theme 5: Internal Quality Assurance

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the internal quality assurance as being positive for every specialisation.

Theme 6: Results

6.1. Achieved learning outcomes

The committee assesses the achieved learning outcomes as being excellent for every specialisation.

The committee is of the opinion that the former one-year Applied Statistics and Biostatistics programmes, including the ICP trajectory have been doing a really good job. The objectives have been achieved and academically well trained statisticians have been produced, both in the Master of Science in Applied Statistics and in the Master of Science in Biostatistics, followed together or individually. The interactive teaching methods focus on a strong scientific background and on the skills to apply these academic competences and hence prepare the graduates not only for high level research, but also for application in the chosen field.

The 20 years of experience in teaching (applied and) biostatistics to students from all over the world has contributed strongly to the reputation, not only of the Master of Statistics, but also of Hasselt University as a whole and the entire statistical community in Belgium. Employers and alumni are very positive about the results of the programme.

The academic level of the programme is also indicated by the fact that 40% of alumni stay in academia. Roughly 30% of the alumni hold a PhD after 5-10 years upon completing their master training, in a varied range of universities, both in Europe and abroad.

An indication of the professional orientation of the programme lies in the fact that alumni easily find jobs in quite diverse sectors, although the first consumer of master and PhD graduates is the biopharmaceutical industry. Some 40% of alumni work in industry, mostly biopharmaceutical companies. 20% of alumni are employed by government owned and affiliated departments and research institutes.

The excellent results of the programme guarantee a strong contribution to the development of the scientific community and institutions in the home countries of the ICP-participants.

The high quality of results which have been realised in the past, combined with the planned curriculum, comforts the committee that the new two-year master programme will also offer high quality training to the students.

So the committee concludes that the programme reaches its objectives in an excellent way and stands as a unanimously recognised reference for an international Statistics programme that is focused on training students originating from all over the world.

6.2. Study progress

The committee assesses the study progress as being good for every specialisation.

About 70% of the students registered in the Master of Science in Applied Statistics succeeded between 1999 and 2006 within one year (see Figure 2). About 75% of the students enrolled in the Master of Science in Biostatistics succeeded between 1996 and 2006 within one year (see Figure 3). The committee is convinced that the selection procedure and the intensive coaching contribute to these high success rates, taking into account the heterogeneous background of the students. The committee appreciates this.

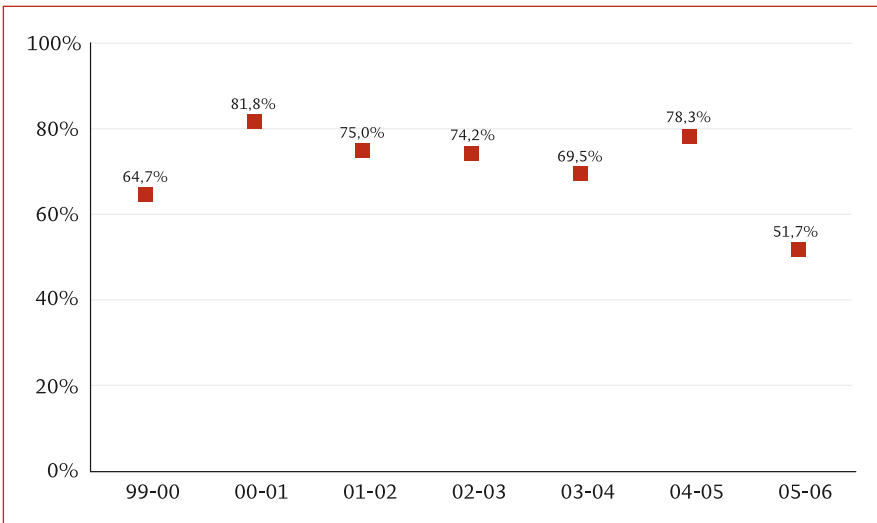


Figure 2: Success rates Master of Science in Applied Statistics, 1999–2006

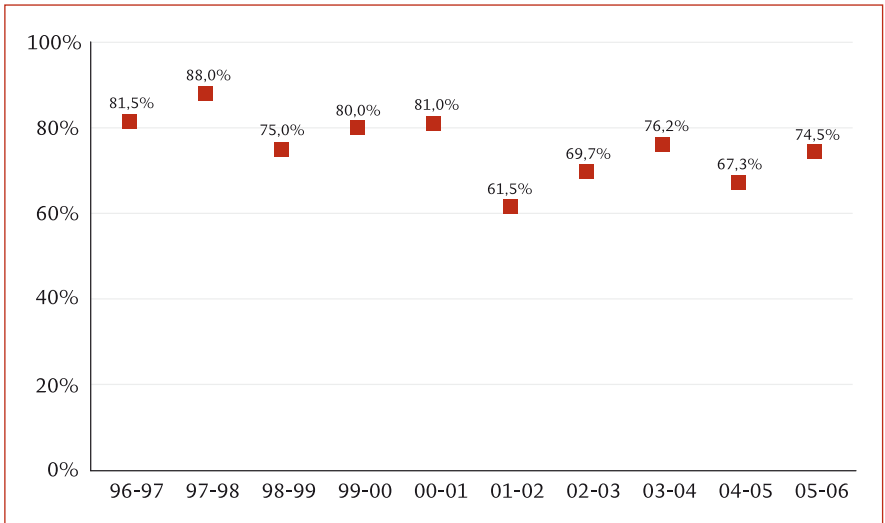


Figure 3: Success rates Master of Science in Biostatistics, 1996-2006

General conclusion related to theme 6: Results

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the results as being positive for every specialisation.

General opinion of the programme

The assessment committee concludes that the Master of Statistics, including its four specialisations, has enough guarantees for generic quality since the different criteria of the six subjects from the accreditation framework are satisfied. The final conclusion of the committee is therefore positive.

Summary of the recommendations of the assessment committee for improvement within the framework of the prospects for improvement.

With regard to improvements to be made in the programme, the assessment committee recommends the following points for implementation:

- To further define and clarify the specific aims and profile of the Applied Statistics specialisation,
- To substantiate the collaboration within the tUL,
- To continue looking for other collaboration opportunities, in particular with the Master of Statistics at K.U.Leuven (complement rather than compete),
- To further increase exchange between the Bioinformatics specialisation and the other specialisations,
- To translate the objective for the Applied Statistics specialisation to be well suited to be combined with a teacher training into the curriculum,
- To improve the curriculum by introducing a course on professional aspects and societal issues related to data (e.g., collection technique, designs, consistency checking, unreliability, incompleteness, imperfection, missingness, privacy and causality),
- To monitor carefully the students' workload and to implement a more formalised follow-up procedure for study load,
- To make the implicit didactic concept more explicit and transparent for all stakeholders,
- To concentrate the research groups on the campus,
- To provide foreign students with an English version of the study guide,
- To add a structured evaluation of the programme as a whole,
- To intensify the use of formal quality assurance procedures and to involve professional field in these procedures,
- To base ICP scholarships on institutional manpower rather than on individual applications.

The panel has been informed that since the site visit several initiatives have been taken to adapt to the above mentioned suggestions. The panel is convinced that such initiatives can positively contribute to the indicated opportunities for further improvement of the quality of the programme.



Katholieke Universiteit Leuven

Master of Statistics

Master in de Statistiek

Foreword

In accordance with its mission, the assessment committee presents in this report its evaluation of the six themes from the frame of reference for accreditation as well as a global assessment, which will form the basis for the NVAO's accreditation. The assessment committee also makes recommendations for further optimisation of the quality of the education.

In accordance with the VLIR/VLHORA-guidelines, the six themes have been assessed on the basis of the aspects defined in the VLIR/VLHORA evaluation framework and on the associated assessment criteria which have been defined in the NVAO's accreditation framework. The committee has formed its assessment on the basis of the information presented in the self-evaluation report. During the assessment visit to the programme (December 18-20, 2007), this information has been completed with conversations with the faculty management, course co-ordinators, lecturers, supporting academic, administrative and technical staff, students and alumni and with documentation of the faculty and the programme, visits to facilities such as classrooms, computer room and library, the study materials made available by the programme and exams, papers and master's theses of students.

Per aspect, the committee grants the score unsatisfactory, satisfactory, good or excellent. The score 'unsatisfactory' indicates that the aspect does not fulfil the basic quality demands and that policy makers should pay attention to the aspect. The score 'satisfactory' implies that the basic quality demands for this aspect of the programme are met. The score 'good' indicates that the quality stands out above the basic quality and the score 'excellent' implies that, on the assessed aspect, the quality of the programme can serve both nationally and internationally as a best prac-

tice. It has been made transparent in the report how the committee came to its score per aspect, taking into account the associated assessment criteria, to make clear on which elements the score has been based. It has been tried to motivate the appraisals as much as possible with facts and analyses. The appraisals are also based on a comparison with internationally used standards in the domain. On the basis of the aspect scores, the committee then gives a summarising evaluation on the theme level. A positive (+) theme evaluation implies that the basic quality demands are met. A negative (-) theme evaluation implies that the basic quality demands are not met. Lastly, the committee gives an overall judgement about the basic quality of the complete programme at the end of the report.

The elements which could be improved and recommendations for quality improvement have been identified together with the relevant aspect in the report. For the programme management, an overview of the recommendations for further optimisation of the quality of the education is repeated at the end of the report.

It was decided to write the self-evaluation report as well as the assessment report in English to make it accessible for students, alumni and the vocational field.

Introduction

The University Centre for Statistics (UCS) was created in 1988 as an interfaculty institute, coordinating all university research groups dealing with statistics. Recently, the name has been changed into Leuven Statistics Research Centre (LStat).

Currently, about 25 research groups, spread over 11 different faculties, are involved in LStat activities. The LStat performs three functions:

- providing and coordinating statistical consulting;
- coordinating the Master of Statistics/Master in de Statistiek programme and organizing short statistical courses;
- coordinating statistical research.

A one-year Master of Science in Statistics was established in the academic year 1992-1993. This one-year programme has been replaced since the academic year 2007-2008 by two two-year programmes: an English 'Master of Statistics' and a Dutch equivalent 'Master in de Statistiek'. Any score or comment in this report about the Master of Statistics also applies to the equivalent Dutch 'Master in de Statistiek'. In case of difference between the two programmes, this will be explicitly mentioned in the text.

Since 2006, there has been a protocol of collaboration between K.U.Leuven and UHasselt, in particular between the UCS at K.U.Leuven and CenStat at UHasselt. This agreement is geared towards a close collaboration between the two universities in terms of educational initiatives in statistics. For the current master programmes, this implies that the universities in general and the bodies responsible for the master programmes in particular strive towards:

- exchanging faculty for selected courses to efficiently use capacity and to enhance the scientific quality of all programmes;
- exchanging students for elective courses so that students have access to a wider and more attractive range of optional courses;
- defining the domains in which they offer statistical education to complement rather than compete;
- adopting a maximum amount of common policies regarding the programmes' administration and organization.

Theme 1: Aims and objectives

The objectives of the programme as formulated in the self-assessment report are as follows.

“The overarching aim of the Master of Statistics – Master in de Statistiek is to offer a wide-ranging training in statistics, meeting high scientific standards and aimed at a number of specific areas of expertise: biomedical statistics, statistics used in the social, behavioural and educational sciences, statistics used in a business or government environment, or in industry. In addition, there is a methodological and a broad all round option.”

These general objectives are translated into the following learning outcomes students are expected to have achieved at the end of the programme.

Knowledge and understanding

1. To have gained a thorough knowledge of a wide range of current statistical techniques and their interrelations.
2. To have extended their knowledge of the above with an emphasis on the underlying theory (research sub-option).
3. To have acquired enough background knowledge linked to the chosen specialization to act as a statistical consultant to subject-matter scientists (professional sub-option).

Skills

1. To be able to analyze problems, to identify and formulate the different aspects of a complex statistical problem.
2. To be able to choose the most suitable analysis technique for a specific problem within their area of specialization.
3. To be able to use the theory creatively, in a theoretical as well as in an application context, thus contributing to scientific research (research sub-option).
4. To be able to apply these analysis techniques autonomously (using software packages), to interpret and communicate the results; e.g. problem solving and the implementation of solutions.
5. To have acquired the necessary oral and written communication skills to read research articles and software documentation, to write statistical reports, to deliver statistical presentations and to communicate with subject-matter scientists.
6. To be able to work independently, systematically and critically in a multidisciplinary team.
7. To be able to search the scientific literature for publications relevant to the analysis, the background or the software solution of a statistical problem.

Attitudes

1. To be motivated to take responsibility for his/her study.
2. To have developed an open attitude towards other cultures and disciplines.
3. To have developed a critical attitude towards ethical problems encountered in a statistical career.

1.1. Level and orientation

The committee assesses the level and orientation of the programme as being good for the English and the Dutch programme.

Based on the information in the self-assessment report and the discussions with all stakeholders of the programme, the committee is of the opinion that the objectives are in consistency with the master's competences in the Decree. The committee observes that the aims of the programme are clearly formulated. The general objectives have been translated carefully into learning outcomes for the course. The programme focuses on training students thoroughly into both theoretical and practical aspects of statistics by introducing participants to basic concepts and tools, and by stimulating a problem-solving attitude towards statistical methodology. To allow students to choose a specific domain of application to their choice, different trajectories are organised. Every trajectory offers the choice between a research and a professional option.

The objectives of the programme are communicated to (future) students through a programme brochure, the LStat-website and the course information on the K.U.Leuven website. Also the Programme Steering Committee (POC) and the Exam Committee communicate the programme's objectives. In addition, each professor provides information on course-specific objectives at the start of the course.

1.2. Discipline-specific requirements

The committee assesses the discipline-specific requirements as being good for the English and the Dutch programme.

The committee recognises the wide scope of the master programmes at the K.U.Leuven. The profile and the objectives are in line with the committee's frame of reference and with international academic practice. The programme seeks to offer a wide-range of options which meet high scientific standards and is aimed at a number of specific application fields. In addition, there is a Methodological and a broad 'All round' option. The programmes integrate all statistical expertise which is present at the K.U.Leuven. This broad profile is unique in Flanders. The committee appreciates that the programme aims to familiarize students with the different ways in which statistics is used in the various disciplines. The wide scope of the programme causes, nevertheless, a lack of focus, which creates difficulties to develop

a clear profile to the outside world. The committee has also noticed that the trajectory Biometrics is similar to the option Biostatistics at the transnational University Limburg. Especially within the frame of the collaboration agreement which exists between the two institutions, the committee suggests to aim for complementary profiles rather than overlapping specialisation options.

The Master of Statistics and the 'Master in de Statistiek', as they are offered since 2007-2008, are initial master programmes, while the traditional target group consisted previously of master graduates. The committee has some doubts whether the latter target group will be interested in a two-year programme. Consequently, the management should pay careful attention to this new target group of graduating bachelors. Moreover, the profile should be defined in a way that it is competitive with other initial master programmes, as most students the committee spoke with viewed this programme as additional to a full basic training in another field of study.

General conclusion related to theme 1: Aims and objectives

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the aims and objectives of the English and Dutch programme as being positive.

Theme 2: Curriculum

Description of the master's programme

The integrated two-year Master of Statistics as it is organised since 2007-2008 consists of four major blocks (corresponding approximately to the four semesters):

1. Basic Courses (30 credits);
2. Main courses in the specialised option (32 credits);
3. Research option or professional option within the specialised option (30 credits);
4. Master thesis (24 credits) + 4 credits for an ethics course.

The following introductory courses are compulsory:

- Basic Concepts of Statistical Modelling (6 credits);
- Statistical Software (3 credits);
- Linear Models: Regression and Analysis of Variance (9 credits);
- Multivariate Analysis (6 credits);
- Generalized Linear Models (6 credits).

Additionally, students choose one of 6 available options. Once students have chosen a specialist option, they take the main courses in this option, amounting to

32 credits (alternatively, in the ‘All round statistics’ option, they choose a number of main courses from the other options for a total of 62 credits).

Within each option (except for ‘All round statistics’), students choose either the research sub-option or the professional sub-option and then select courses for a total of 30 credits from the recommended optional courses in this sub-option. Finally, students also choose a philosophical and/or ethical course (4 credits) and write a Master’s thesis (24 credits).

The structure of the Master of Statistics programme is visualised in Figure 1. Each student chooses a trajectory that starts at the top of the figure and ends at the bottom. The rectangles represent the options, described in detail in the next section.

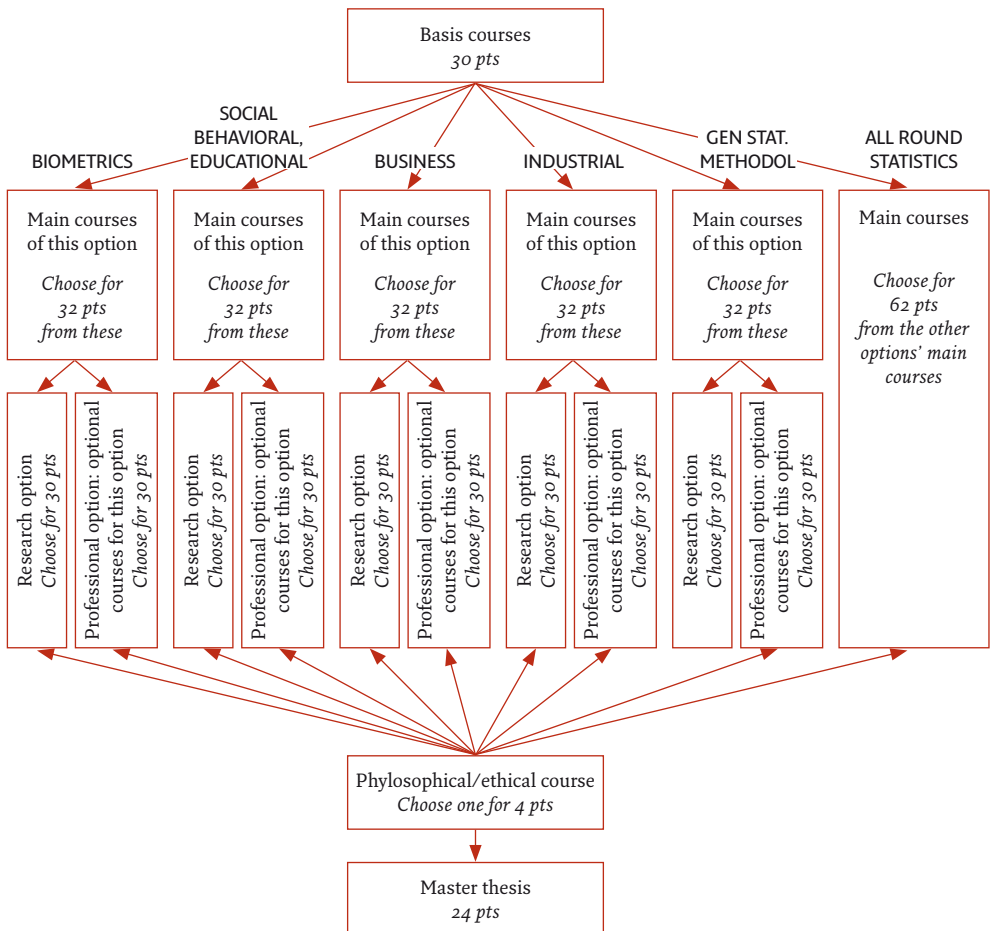


Figure 1: Structure of the Master of Statistics

The structure of the Dutch ‘Master in de Statistiek’ programme is similar to the English master programme. It is visualised in Figure 2. In the Dutch programme, the ‘Statistics and Education’ major is offered instead of the All round statistics profile.

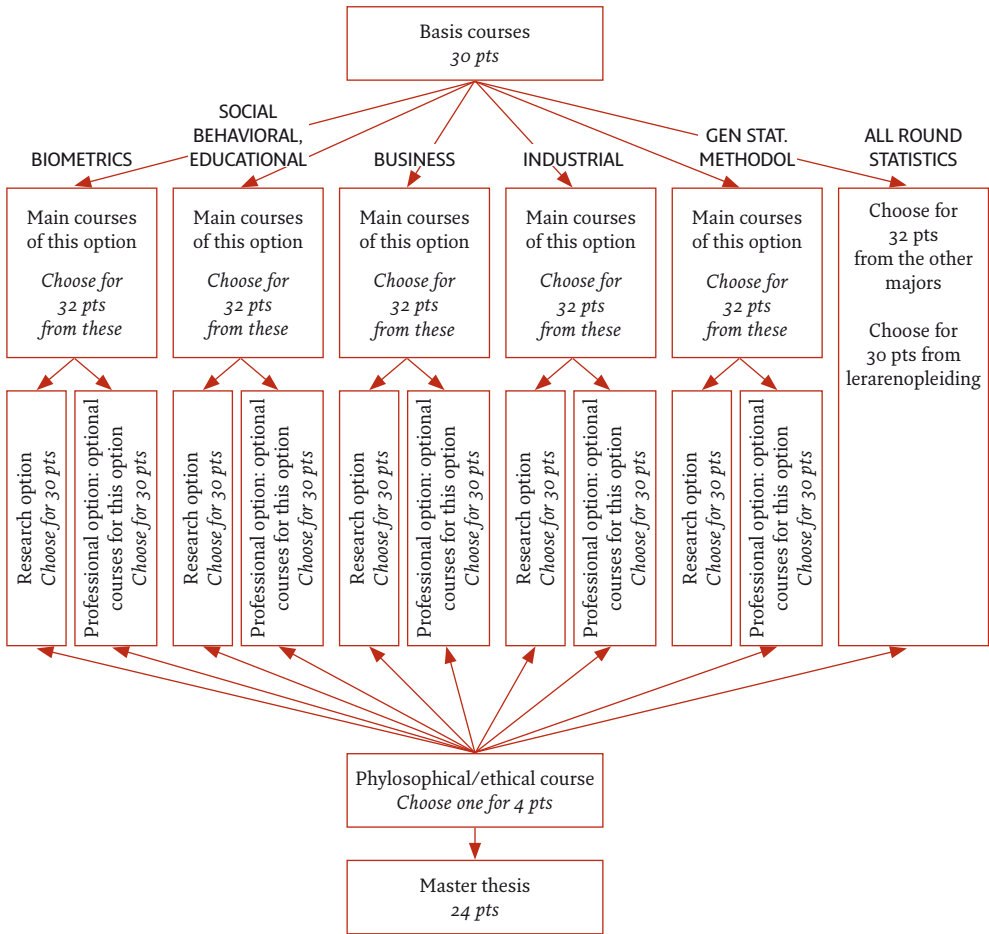


Figure 2: Structure of the Dutch ‘Master in de Statistiek’

2.1. Correspondence between the aims and objectives, and the curriculum

The committee assesses the correspondence between the aims and objectives, and the curriculum as being satisfactory for the English and the Dutch programme.

The committee appreciates the programme as it is presented in the self-assessment report and during the assessment visit and is satisfied with the way the aims and objectives are implemented in the curriculum. A huge amount of work has been done to realise a novel two-year master programme (English and Dutch), in which all statistical expertise of the K.U.Leuven is brought together. In addition, collaboration with Hasselt University has been established to allow students to follow some courses offered in Hasselt.

The committee appreciates the options in which the students can specialise in an application field of statistics. The committee also values positively the fact that within the options the student can choose for a research or professional sub-option. Within the professional sub-option most of the courses are taught together with students from other master programmes. This contributes to the exchange with domain experts, but on the other hand, care has to be taken that the statistical added-value for the statistics students is sufficient.

For all options and sub-options of the programme, the committee recommends paying more attention to data collection mechanisms, as well as to data critical appraisal and privacy aspects. Emphasis is definitely needed on designs, especially non-experimental designs, on causality, on handling imperfect data, on policy implications, on how to deal with non-statisticians (how to translate their questions into statistical terms and models rather than transforming the questions into something that can be handled statistically). The programme definitely lacks a course on such important professional and societal aspects. It is believed that students should be prepared to permanently question themselves and have a critical attitude about datasets related issues, before they actually proceed with data analysis and interpretation.

During the interviews, the students were also positive about the possibility to take the 'General statistical methodology' and 'All round statistics' options in the English version of the programme. The committee recognises the opportunities for students to make a choice for a broader statistical training.

The committee, however, expresses some concern about the complexity of the programme's structure (options and sub-options) and its feasibility. The coordination of such a programme can become cumbersome. There is a potential risk that, for some options or sub-options, the number of students will be too small to create a critical mass of students which allows sufficient interaction to reach the objectives of the programme.

At the moment the committee visited it, the formulated two-year curriculum had only been implemented for the first time. This leaves still room for improvement. Some of the options have been well developed, but a stronger interaction between the staff organising the different options is necessary to achieve real interdisciplinarity. Also organisational issues, such as overlapping courses, still need to be addressed.

The option ‘Statistiek en Onderwijs’, which is only offered in the Dutch language programme for students who want to teach statistics, is appreciated by the committee. However, students told the committee that this option wasn’t completely operational yet, while the students already were following the programme.

2.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation as being good for the English and the Dutch programme.

The committee appreciates the academic orientation of the curriculum. Students receive a strong training in the basic concepts and methodologies of statistics in the first semester. Then, they choose an option which allows them to study one field of application in depth, with a research or professional focus, depending on their choice. This is completed with own research for the Master’s thesis.

The content of the courses is up-to-date and responds well to current research trends and developments. The options and elective courses allow students to explore their specific fields of interest. Specific courses are organised on topics with increasing research interest, e.g., data mining and neural networks, chemometrics and structural equations.

The programme fosters a problem-solving attitude towards statistical methodology and provides students with sufficient background to acquire new methods and knowledge autonomously. Also the development of communication skills is stimulated in the curriculum. In the course ‘Statistical Consulting’, students learn to know the field of statistical consultation, which links their field of study with the professional application of statistics.

2.3. Consistency of the curriculum

The committee assesses the consistency of the curriculum as being satisfactory for the English and the Dutch programme.

The sequential structure of the courses is logic. The first semester is used to offer basic knowledge and the fundamentals of statistical methodology to make sure that all students have a common basic level which allows specialising afterwards in the options. The committee appreciates this flexibility in the programme. In the last semester most of the time can be spent at master's thesis research.

The consistency between the different courses and options could be further improved. Some courses show overlap and some don't link enough to the other courses in the programme.

2.4. Size of the curriculum

The committee assesses the size of the curriculum to be in line with the formal regulations as described in the decree on the restructuring of the Flemish Higher Education. The English and the Dutch master programmes are 120 credit programmes with duration of 2 years.

2.5. Workload

The committee assesses the workload as being satisfactory for the English and the Dutch programme.

Based on discussions with students and staff, success rates and student evaluations, it is clear that the study load of the one-year Master of Science in Statistics was definitely too high. Ninety percents of the students needed at least 12 months to pass all components of the programme, and so didn't graduate in June. Since the number of courses in the new two-year programme has only increased marginally and more emphasis is put on the thesis, the committee expects that the study load will be feasible in the new programme. The committee, nevertheless, advises to implement a system to continuously monitor the study load to guarantee the feasibility of the programme. The committee appreciates that it is planned to check the study load when the new master programme is in place.

2.6. Coherence of structure and contents

The committee assesses the coherence of structure and contents of the programme as being satisfactory for the English and the Dutch programme.

The programme applies the K.U.Leuven didactic concept Guided Independent Learning (GIL). However, it is not clear to the committee what the specific results are of the use of this didactic concept. Teaching involves a combination of lectures and assignments. In lectures, student interaction is stimulated. Assignments consist of exercises, projects or case studies, study of the course material, creative application of the course material in exercises, searching for and studying supplementary material, writing programmes by means of statistical software packages, writing reports, sometimes including an oral presentation. Assignments are either made individually or by a group of students.

The quality of course materials satisfies the committee. The electronic learning environment TOLEDO (based on Blackboard) is mostly used to provide information and to communicate with students. The committee appreciates the use of the VESTAC-tools (Visualization of and Experimentation with STatistical Concepts). This is a collection of computer-based tools to visualise a number of statistical concepts and to allow students to experiment with these concepts. The committee is convinced that these tools, which are freely accessible at the LStat-website, help students to understand the meaning of statistical concepts better.

2.7. Learning assessment

The committee assesses the learning assessment as being good for the English and the Dutch programme.

The committee has investigated samples of the examinations and assignments and appreciates the high quality and relevance of the exam questions. The assessments verify knowledge acquisition as well as development of skills and attitudes, using different tools. Written or oral exams as well as assignments, presentations and reports are organised. Most of these assessments are individual; sometimes teamwork is assessed as an entity. Some lecturers organise 'open book' exams. The committee values the variety of assessment methods. Also students are positive about the way they are prepared for the assessments and state that they are clearly informed on the evaluation criteria.

2.8. Master's thesis

The committee assesses the Master's thesis as being satisfactory for the English and the Dutch programme.

In the old Master of Science in Statistics, the thesis only counted for 7 credits. In the new Master of Statistics - Master in de Statistiek programme, the thesis counts for 24 credits; this is in line with the legal requirements. In the framework of the Master's thesis, the student undertakes research independently, with the guidance of one or more promoters. The thesis comprises a literature review and/or an analysis section. The obtained results are interpreted and reported. The report has to be between 30 and 50 pages.

The objectives of the Master's thesis are:

- to independently analyse real data, under supervision;
- to find access to libraries, journals, software, and online material;
- to use new software tools;
- to report and present results from statistical analyses;
- to work in multidisciplinary teams.

Students taking the professional option are encouraged to collaborate with a company to write their thesis. A sub-commission of the Programme Steering Committee assigns a topic to each student. This is done taking into account the expressed preferences of the students, as well as their background and perceived capabilities. In a focus group evaluation with students, more thesis subjects have been asked.

The promoter is responsible for the guidance of the Master's thesis. Before December 1st, the student has to deliver a short summary (max. 5 pages) of the literature study and the forthcoming steps in his/her thesis work. In March-April, two seminar days are organized: one on the professional thesis topics and one on the research thesis topics. Students are invited to present a 20-minute summary of their work and an overview of what still needs to be done. In June or September, the written thesis is submitted and defended (a presentation plus a question round). The committee appreciates the well developed procedure for the guidance of the Master's thesis. The committee hopes that this procedure will reduce the great differences in guidance in the former Master of Science programme, as reported by students and alumni.

The committee has read a sample of the Master's theses from the one year programme. The scientific quality is evaluated as satisfactory, taking into account that 7 credits were assigned to the Master's thesis. The committee is convinced that the quality of the Master's theses in the new programme will be higher based on the description of the procedure for the Master's thesis, as more time and better guidance will be available.

2.9. Admission requirements

The committee assesses the admission requirements as being satisfactory for the English and the Dutch programme.

The number of (foreign) students, who K.U.Leuven attracts with its Master programme in Statistics, has grown rapidly over the last 10 years. Figure 3 illustrates this increase. In 2003–2004 and 2004–2005, respectively, 59 and 58 students subscribed. Most foreign students come from China (on average 25 since 2003–2004). Other foreign students come from the rest of Europe and some from Africa, Asia and even Canada and Brazil.

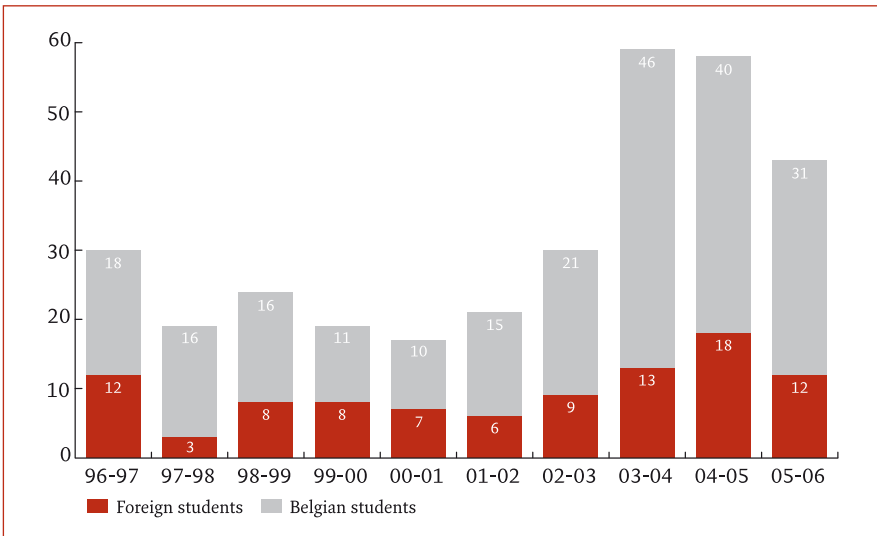


Figure 3: Number of full-time students in the Master of Science in Statistics since 1996–1997

The current number of students is reasonable, although the committee is convinced that a further growth will be necessary to be able to sustain the high number of options and sub-options. The committee indeed sees serious growth potential for the number of students in the programme, as little energy has been invested so far in publicity for the programme. On the other hand, the tuition fees for non-European Higher Education Area students have been increased threefold in 2007. This will probably lower the number of students.

To apply for the Master of Statistics - Master in de Statistiek, candidates must meet the following requirements:

1. successful completion of an academic bachelor's degree with at least one course in introductory statistics;
2. as courses are taught in English, proof of English proficiency is required for non-native English speakers. Additionally, applicants are considered to have proven proficiency in English, if they have received a degree from an approved institution where English is the language of instruction within the last 2 years.

In general, the committee evaluates the entrance requirements as satisfactory. The committee is, nevertheless, of the opinion that the requirement of one course in introductory statistics as a basis to follow the programme is low. The committee doesn't want the programme management to restrict strongly the inflow of students, but it should be clear to students without a strong background in statistics that they will need a lot of self-study to successfully follow the courses. The committee advises to organise a summer course for these students to provide them with good basic knowledge of statistics before they start the programme. Especially for foreign students it is important to be clear on the required prerequisites as they have diverse backgrounds and the lack of prior knowledge in statistics could be one of the reasons for the low success rates.

General conclusion related to theme 2: Curriculum

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the curriculum of the English and Dutch programme as being positive.

Theme 3: Staff

3.1. Quality of staff

The committee assesses the quality of staff as being good for the English and the Dutch programme.

The committee appreciates the creation of LStat, which brings all statisticians at the K.U.Leuven together and stimulates interdisciplinary cooperation, while not imposing a rigid and stringent structure. The committee is positive about the first results of this cooperation, but it is convinced that there are still opportunities to strengthen interdisciplinary cooperation. The committee has learned, further, that the human resources policy possibilities for the programme management are limited. They can not hire themselves any staff members and are completely dependent on the policy decisions made within the faculties where staff members are appointed. So they

don't have any power to decide on priorities to invest in fields of Statistics which are deemed important for the programme. They neither can provide funding to stimulate interdisciplinary cooperation. This lack of impact on personnel policy limits the decision making power of the programme management on the whole programme. The committee advises to look for ways to attribute more decision-making power to the programme management. An option could be to create some academic staff positions within the LStat.

Based on the discussions with students and alumni, the committee is of the opinion that in general the expertise with respect to contents, education and didactics of the individual staff members offering courses in the master programme is good.

Senior academic staff members are appointed in view of anticipated new or adapted teaching programmes, retirement of faculty members, unavailability or dismissal of teaching staff, and temporary teaching assignments. Vacancies are published on the Internet and/or via other channels. Candidates have to submit an extensive dossier including information about their curriculum vitae, research achievements, teaching, and other experience. The assessment committee, which is appointed at the faculty level, investigates the applications and formulates a recommendation for the Group Management Committee (Groepsbestuur), the Common Administration: Board of the Academic Council and the Executive Board. A first appointment as professor is temporary and is offered for a maximum of three years.

The committee appreciates the general policy for appointment and evaluation of senior staff and the professionalisation initiatives taken both at the central and at faculty level. Members of the academic staff are evaluated on their performance every five years. Independent academic staff members are evaluated on the manner in which they have carried out the general duties assigned to them, including teaching tasks, research tasks and, in some cases, service-related tasks. Decisions are made by a general evaluation committee at the group level, i.e. Humanities, Science & Technology or Biomedical Sciences.

Training in teaching techniques is offered both at university and at other levels. At university level initiatives are organized by the central educational support unit (Dienst Universitair Onderwijs or DUO/ICTO). Traditionally, this unit offers target group-specific as well as tailor-made programmes. Target group-specific programmes address specific groups such as novice faculty members. The general programme is open to both faculty members and teaching assistants. Seminars and workshops are organized about relevant didactic themes, such as research-based teaching, evaluation and assessment, collaborative learning, formative evaluation, evaluation using multiple choice questions, et cetera. Special attention is paid to supporting professors' use of TOLEDO. In order to meet the academic community's

needs adequately, the general programme is adapted every year. Most professors of the current Master of Science in Statistics programme have attended some of these seminars and workshops. Besides this central educational support, faculty members and teaching assistants can participate in educational training initiatives within their faculty. A number of educational support units at faculty level have developed discipline-specific support. Individual support is provided to professors who want to optimise their teaching.

3.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation as being excellent for the English and the Dutch programme.

The committee has investigated a sample of the publication titles of the academic staff. There is a broad range of specializations present among the academic staff involved in the programme. All academic staff members involved in teaching the programme performs active research. The committee appreciates the high international standards of this research. Several research groups are internationally renowned in their field of study. Due to the close link between research and teaching activities, up-to-date knowledge is provided to the students. The own expertise is complemented with international guest lecturers with expertise in specific fields of statistical research.

Next to their research activities, teaching staff is also involved in statistical consulting activities, which allows them to link the content of the courses strongly to the application in statisticians' professional activities. This is completed with the courses of some guest lecturers who are working in private companies or government institutions.

3.3. Quantity of staff

The committee assesses the quantity of staff as being satisfactory for the English and the Dutch programme.

The senior academic personnel engaged in the master programme consist of 19 senior academic staff members (17.05 FTE). No junior academic staff is directly involved in the programme. All staff members involved in the programme has also other duties at the K.U.Leuven. On the basis of discussions with students and staff, the committee is of the opinion that the available amount of staff is just about sufficient for the organisation of the programme. Staff members interviewed by the committee during the assessment visit agree on this.

Nevertheless, the committee is of the opinion that LStat as the main organising institute of the master programme would need more academic staff to take care for the day to day management of the course and to strengthen interdisciplinary cooperation between research groups. This would allow strengthening not only of the programme but also of LStat as a whole.

General conclusion related to theme 3: Staff

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the staff for the English and Dutch programme as being positive.

Theme 4: Services

4.1. Facilities

The committee assesses the facilities as being good for the English and the Dutch programme.

During the assessment the committee visited the buildings, classrooms, computer infrastructure and libraries that are used for the master programme. Classes take place in classrooms all over Leuven. The quality of the classrooms is satisfying the committee, the teaching staff and the students. The classrooms are equipped with up-to-date information technology and communication tools. Computer facilities are at students' disposal at several locations in Leuven and Heverlee. LUDIT (Leuven University Centre for Informatics and Telematics) offers services ranging from PC-rooms with extended opening hours, network connections in student housing (KotNet-project), renting and selling of PC at reasonable prices, making software application programmes available through campus licences. Through LUDIT, students also have access to TOLEDO, the helpdesk, wireless access points spread out over the university buildings and campuses, their own mailbox and their own private network storage capacity. The PCs feature specific software for academic purposes, such as SAS, R, STATISTICA, MATLAB and WINBUGS. Extra software can be installed on request. The committee is of the opinion that the computer facilities meet all current standards for educational needs.

The Arenberg Library provides an extensive collection of Statistical sources. An even more extensive range of databases and electronic journals (Librisource) is available to students and academic staff members. Long opening hours maximise access to these sources. At the UCS, there is a small library with an overview of recent statistical literature. This can be consulted by the students. The committee evaluates the available library collection and services as excellent.

4.2. Tutoring

The committee assesses the tutoring as being satisfactory for the English and the Dutch programme.

(Potential) students are informed on admission requirements and on the programme on the website and via brochures. During the course of the programme TOLEDO is used also to inform students. Whenever problems occur, students can contact the LStat coordinator or the ombudsperson. They search, together with the student, for solutions. No specific guidance is offered to foreign students. No complaints were made by students, but the committee suggests the programme management to focus more on guidance for foreign students. This would probably help to raise the rather low success rates of foreign students.

Content wise guidance is offered by the academic staff involved in the programme. The committee is positive about this. Students can always ask for help or extra information. In case of extreme problematic study results after the first semester, students are invited to meet the ombudsperson of the programme to discuss the poor results.

General conclusion related to theme 4: Services

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the services for the English and Dutch programme as being positive.

Theme 5: Internal quality assurance

Description

Quality assurance at the K.U.Leuven is based on four pillars: defining the educational frame of reference, implementation of the education, evaluation of the education and follow-up.

The Programme Steering Committee's (POC) task is to ensure the quality of education. It is responsible for the development of a curriculum which is coherent in content, education and organization. The Programme Steering Committee comprises representatives of the options of the 'Master of Statistics - Master in de Statistiek' programme. The committee is chaired by the programme director, who is a member of the daily management team. Four student representatives are also included in this committee.

Once a curriculum is drawn up and implemented, the POC is responsible for continuous follow-up. It also fulfils a key role in educational innovation initiatives. The POC is responsible for continuous quality assurance in relation to the programme. To this end, the POC or a sub-committee coordinates the periodical evaluation of the curriculum as a whole (at least once every eight years) and of the courses separately (every two years). This current system of course evaluation has been launched recently. The evaluation results are automatically included in the teaching portfolio, after the professor has been able to comment on his/her results. The current Master of Science in Statistics POC meets at least twice a year. If necessary, for instance with the introduction of the new Master programme, meetings might be scheduled more frequently.

Preparing the self-evaluation report, a survey has been sent out to all alumni who graduated since 1992 (November 2006). 27 students responded to this questionnaire. Moreover, a focus group evaluation was organised at the end of June 2006. DUO/ICTO invited 6 students to participate in a focus group and 4 of them did participate in an active way.

5.1. Evaluations of results

The committee assesses the evaluations of results as being satisfactory for the English and the Dutch programme.

The current system of course evaluations has been launched recently. Every course is evaluated at least every two years. The committee appreciates this. On programme level, evaluations are organised as a preparation for external assessments, every eight years. On an informal basis and based on student's comments, the overall programme can be discussed more frequently in the POC. The committee suggests evaluating the programme as a whole also formally more frequently, especially after the recent restructuring of the programme. This would allow monitoring the interdisciplinarity and the consistency of the programme better.

The committee has a positive opinion about the way in which the external assessment has been prepared. Students and alumni have been asked to evaluate the programme. Also the working group preparing the self-assessment report has done a good job. The self-assessment report is well structured and indicates openness to change and to improving the quality of the programme. Strengths and opportunities for improvement have been clearly defined. Also the discussions during the assessment site visit were also held with an open mind and are a good addition to the information outlined in the self-evaluation report.

5.2. Measures for improvement

The committee assesses the measures for improvement as being satisfactory for the English and the Dutch programme.

The most important change was the transformation of the one-year Master of Science in Statistics programme in a two-year initial master programme, as a consequence of the implementation of the Bologna Declaration. Within the new programme, options have been introduced as an answer to requests by students for more specialisations. Other minor changes have been implemented as a result of informal signals or formal evaluation results. A new mandatory course Applied Statistical Analysis was introduced, as well as an optional course Data Mining. The committee appreciates these improvement measures, but the committee sees challenges in further optimising the new two-year programme and strengthening the cooperation within the LStat. For this some academic staff for the LStat itself would be useful.

5.3. Involvement of staff, students, alumni and the professional field

The committee assesses the involvement of staff, students, alumni and the professional field as being satisfactory for the English and the Dutch programme.

Academic staff involved in the programme are spread over 11 different faculties. They are member of the Advisory Board for the LStat. A subgroup of this board takes care for the day to day management of the LStat. In the POC representatives of the different majors are present. Academic staff is thus involved in the programme's decision making.

Students are represented in the POC. The POC meets only twice a year. So in the one year programme formal student participation was rather low. The committee hopes that the formal student participation will grow in the two-year programme. Informally students comment on the programme more frequently. They can also comment the courses in the regular evaluations.

An alumni questionnaire was organised to prepare the external assessment. Next to this alumni and representatives of the professional field are mostly involved informally with the quality assurance of the programme. The committee suggests involving the professional field in a more structured way.

General conclusion related to theme 5: Internal Quality Assurance

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the internal quality assurance for the English and Dutch programme as being positive.

Theme 6: Results

6.1. Achieved learning outcomes

The committee assesses the achieved learning outcomes as being good for the English and the Dutch programme.

Based on discussions with alumni and the good quality of assessment and evaluation, the committee is of the opinion that the one-year programme offered an intensive training and reached its objectives. In the alumni questionnaire, 80% of the alumni agreed on this. Alumni considered the programme up-to-date (74%) with great professional relevance (77%). They stated that the programme fostered a problem-solving attitude towards statistical methodology (81%) and that enough statistical background was provided to acquire new methods and knowledge independently (85%).

Most of the alumni (77%) considered the programme very relevant to their current work as statistical consultant, scientific staff member, senior advisor, software developer, statistical methodologist, or in preparing a PhD. 13.5% of the alumni obtained a PhD-degree after graduation.

The committee is convinced that the new programme will even better fit the needs of students and labour market. Students get the opportunity to specialise in the field of application they prefer and can choose a more research or more professional oriented programme. More time is created for the, already satisfactory, Master's thesis and a better guidance is guaranteed. Graduates will thus have a more in depth knowledge than before.

6.2. Study progress

The committee assesses the study progress as being satisfactory for the English and the Dutch programme.

The old Master of Science in Statistics was clearly too demanding to pass within the expected study time. Nearly all students needed at least the summer to finalise their Master's thesis. About 21% of students graduated after one year. In the end, about 40% of the students graduated. The yearly percentages of Belgian and foreign students who graduated since 1996–1997 are displayed in Figure 4. The success rates for Belgian students are slightly higher than these for foreign students, but both are too low in the opinion of the committee.

The committee is convinced that the study load of the new two-year programme will be more in line with the formal study load. Thus, the committee hopes that more students will pass within the expected study time. This perspective has convinced the committee to evaluate the programme on this facet as satisfactory.

The committee, however, deems it necessary to strive for a better selection of students and for a better follow-up, especially of the foreign students.

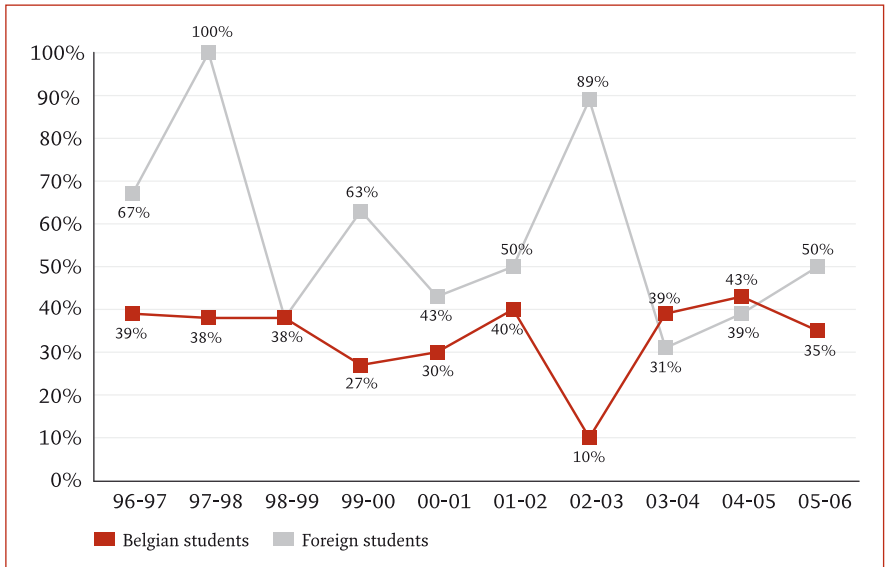


Figure 4: Percentage of full time students who graduated in the Master of Science in Statistics (Belgian and Foreign students) for the period 1996–2006

Table 1 show the effective study time of students who graduated in the Master of Science in Statistics. The average study time of the students who graduate is 1 year and 7 months.

Table 1: Effective study time for students who graduated since 1996-1997

Year of graduation	In time	+1 year	+2 year	+3 year	+>3 year	Total	Average	Years	Months
1996-1997	4	6	4	1		15	2,13	2	2
1997-1998	3	2	4			9	2,11	2	1
1998-1999	7		1		1	9	1,67	1	8
1999-2000	3	4	1			8	1,75	1	9
2000-2001	5		1			6	1,33	1	4
2001-2002	6	2	1			9	1,44	1	5
2002-2003	7	2		1		10	1,50	1	6
2003-2004	16	4	2			22	1,36	1	4
2004-2005	12	10	2			24	1,58	1	7
2005-2006	6	6	2	1		17	1,88	1	11
Total	69	38	18	3	1	129	1,59	1	7

General conclusion related to theme 6: Results

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the results of the English and Dutch programme as being positive.

General opinion of the programme

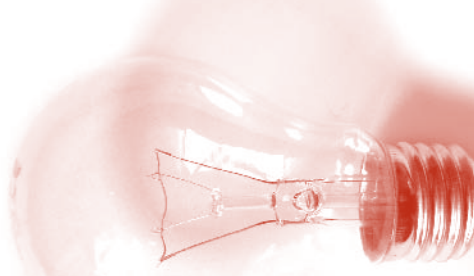
The assessment committee assesses that the Master of Statistics – Master in de Statistiek has enough guarantees for generic quality since the different criteria of the six subjects from the accreditation framework are satisfied. The final conclusion of the committee is therefore positive for the English and the Dutch programme.

Summary of the recommendations of the assessment committee for improvement within the framework of the prospects for improvement

With regard to improvements to be made in the programme, the assessment committee recommends the following points for implementation:

- To care for a clearly focussed profile for the programme, competitive with other initial master programmes,
- To aim for complementary profiles or collaborative programmes rather than for overlapping specialisation options, within the field of statistical programmes offered by the other Flemish universities,
- To ensure that the overall structure of the programme with options and sub-options, in two languages, does not become overwhelmingly complicated and intractable,
- To include in the programme a specific course on critical aspects and societal issues related to data (e.g., collection technique, designs, consistency checking, unreliability, incompleteness, imperfection, missingness, privacy and causality),
- To pay attention to the new target group of graduating bachelors,
- To strengthen interaction between the staff organising the different options in order to reach the expected interdisciplinarity benefits of the programme, in particular to the profit of the students,
- To further address organisational issues, such as overlapping courses,
- To further develop the option 'Statistiek en Onderwijs',
- To implement a system to continuously monitor the study load,
- To harmonise the guidance of the Master's thesis, so that each student receives an equal treatment and counselling environment,
- To publicize, promote and improve the visibility the new Master programme to attract more students, not only from Belgium but also from abroad,
- To inform students better that quite some background in statistics is required to follow the courses and thus clearly state that students without a strong background in statistics will need a lot of self-study to successfully complete the programme,
- To organise a summer course for students with a weak background in statistics,
- To improve the awareness of senior and junior academic personnel, assistants and students of the existing GIL at K.U.Leuven,
- To strive for a better selection of students and for a better follow-up and guidance, especially of the foreign students,
- To foster student mobility, in particular in the Erasmus project,
- To further bring in research incentives among students to increase the number of PhDs,

- To increase decision-making power of the programme management on personnel policy,
- To allocate more academic staff to LStat to take care for the day to day management of the course and to strengthen interdisciplinary cooperation between research groups,
- To evaluate the programme as a whole more frequently in a formal way,
- To involve the professional field in quality assurance procedures in a more structured way,
- To strive for higher success rates of students,
- To improve cross-fertilisation between researchers through LStat to the benefit of the Master programme in statistics.



Vrije Universiteit Brussel

Master in de Actuariële Wetenschappen

Vooraf

Conform haar opdracht geeft de visitatiecommissie in dit rapport enerzijds een oordeel over de zes onderwerpen uit het accreditatiekader en een integraal oordeel over de opleiding waarop de NVAO zich zal baseren bij de accreditatie. Anderzijds heeft de visitatiecommissie in het rapport, met het oog op de verbeterfunctie van de kwaliteitszorg, punten aangegeven die volgens haar kunnen worden geoptimaliseerd en doet zij daarbij aanbevelingen om waar mogelijk te komen tot kwaliteitsverbetering.

De beoordeling van de onderwerpen is, conform de vereisten, gebeurd aan de hand van de facetten en bijbehorende beoordelingscriteria uit het VLIR/VLHORA-beoordelingskader dat is afgestemd op de accreditatievereisten. De commissie heeft zich bij haar oordelen gebaseerd op de in het zelfevaluatierapport ter beschikking gestelde informatie. Deze informatie werd tijdens het bezoek aan de opleiding (27-28 november 2007) aangevuld door gesprekken met het faculteitsbestuur, de opleidingsverantwoordelijken, lesgevers, ondersteunend academisch, administratief en technisch personeel, studenten en alumni en met facultaire en opleidingsdocumentatie, een bezoek aan de faciliteiten zoals de klaslokalen, de computer infrastructuur en de bibliotheek en met studiemateriaal, examenvragen en masterproeven.

Per facet geeft de commissie aan of de opleiding hierop onvoldoende, voldoende, goed of excellent scoort. De beoordeling 'onvoldoende' wijst er op dat het facet beneden de gestelde verwachting ligt en dat beleidsaandacht op dit punt nodig is. De beoordeling 'voldoende' houdt in dat het facet beantwoordt aan de basisstandaard of basisnorm voor dit facet van de master. De beoordeling 'goed' houdt in dat het niveau van het facet uitstijgt boven de basiskwaliteit. De beoordeling 'excellent'

houdt in dat voor het facet een niveau wordt gerealiseerd waardoor de beoordeelde opleiding zowel in Vlaanderen, in België als internationaal als een voorbeeld van goede praktijk kan functioneren. De commissie heeft daarbij inzichtelijk gemaakt hoe zij, rekening houdend met de bijbehorende criteria, tot een beoordeling per facet is gekomen, zodat duidelijk is waarop de beoordeling is gegrond. De oordelen zijn zo goed mogelijk onderbouwd met feiten en analyses en zijn mede gebaseerd op een vergelijking met internationaal gehanteerde normen in het betreffende domein. Op basis van de beoordelingen per facet geeft de commissie vervolgens een samenvattend oordeel op, het niveau van de onderwerpen. Een positieve (+) onderwerpscore houdt in dat voldaan is aan de minimumeisen voor basiskwaliteit. Een negatieve (-) onderwerpscore houdt in dat niet aan de minimumeisen voor basiskwaliteit voldaan is. Ten slotte geeft de visitatiecommissie aan het eind van het rapport een eindoordeel over de basiskwaliteit van de opleiding.

De punten die volgens de visitatiecommissie kunnen worden verbeterd, zijn, samen met aanbevelingen om waar mogelijk te komen tot kwaliteitsverbetering, opgenomen bij de respectieve facetten. Aan het eind van het rapport is ten behoeve van de opleidingen een overzicht opgenomen van verbeteruggesties.

Inleiding

De actuariële opleiding aan de Vrije Universiteit Brussel ontstond in 1980 als een tweejarige licentieopleiding, volgend op een basisdiploma. Deze opleiding werd naar aanleiding van wijzigingen in de wetgeving omgevormd tot een eenjarige GAS-opleiding (Gediplomeerde in de Aanvullende Studies) en een daarop aansluitende eenjarige GGS-opleiding (Gediplomeerde in de Gespecialiseerde Studies). De twee opleidingen zijn steeds beschouwd als één opleidingstraject dat samen 120 studiepunten telt. Alleen wie drager is van beide diploma's mag zich actuaris noemen. Er zal dan ook in dit rapport vaak over 'de opleiding' gesproken worden, ook al worden de formeel gescheiden GAS- en GGS-opleiding bedoeld. Van 1993-1994 tot 1997-1998 werden deze opleidingen gezamenlijk georganiseerd met de K.U.Leuven. Na het aflopen van dit samenwerkingsakkoord werden de GAS- en GGS-opleiding opnieuw door de Vrije Universiteit Brussel apart aangeboden. De organisatie van de opleiding wordt gecoördineerd vanuit de Vakgroep Wiskunde. Voor de organisatie van heel wat opleidingsonderdelen wordt evenwel ook op andere vakgroepen beroep gedaan.

Op het ogenblik van de visitatie werden de GAS- en de GGS-opleiding afgebouwd en omgevormd zodat ze zouden aansluiten bij de bachelor-masterstructuur. Het eerste jaar van de opleiding wordt ingepast in de initiële masteropleidingen Wiskunde (afstudeerrichting: Financiële Wiskunde) en Toegepaste Economische

Wetenschappen: Handelsingenieur (optie Financiën). Het tweede jaar wordt omgevormd in een éénjarige postinitiële 'Master in de Actuariële Wetenschappen' van 60 studiepunten, die vanaf het academiejaar 2009-2010 aangeboden zal worden. De commissie heeft getracht deze nieuwe (master)opleiding te beoordelen op basis van de evidentie met betrekking tot de bestaande GAS- en GGS-opleiding. Op het moment van de visitatie waren de algemene lijnen van het masterprogramma reeds uitgewerkt, maar moest de verdere concretisering nog uitgewerkt worden. De oordelen over de masteropleiding zijn dus gebaseerd op de doelstellingen, eindtermen en de beschrijving van het programma van de masteropleiding en - bij extrapolatie - op de feitelijke gegevens (syllabi, cursussen, handboeken, examenopgaven, slaagpercentages, studierendementen en gegevens met betrekking tot het personeel) en de ervaringen van studenten en staf over de GAS- en GGS-opleiding. Ondanks deze beperkingen heeft de commissie een goed beeld gekregen van de opleiding, mede dankzij het goed geschreven zelfevaluatierapport en de gesprekken die ze tijdens haar bezoek aan de opleiding hield met alle betrokkenen.

Onderwerp 1: Doelstellingen van de opleiding

De doelstelling van het opleidingstraject (zowel voor de oude als de nieuwe opleiding) is, volgens het zelfevaluatierapport,

een gediplomeerde af te leveren die

- zelfstandig het beroep van actuaris kan uitoefenen;
- als actuaris en meer algemeen als verzekeringsdeskundige kan functioneren in ondernemingen, de overheid en de non-profit sector waartoe hij in eerste instantie wordt geacht een bijdrage te kunnen leveren;
- zijn technologische en informatieverwerkende inzichten kan integreren in het actuariële beheer en de actuariel-technische aspecten van een verzekering- of bankbedrijf;
- op basis van deze vorming bekwaam mag worden geacht om zich verder te bekwamen in zijn vakgebied en zich het gebruik eigen te maken van methoden en technieken in de diverse gebieden (Leven, Niet-Leven en Financieel) van actuariel onderzoek, zowel academisch als toegepast.

Met deze doelstellingen en de concrete implementatie ervan in het programma, streeft de opleiding ernaar om te voldoen aan de eisen van de Koninklijke Vereniging van Belgische Actuarissen (KVBA), waardoor afgestudeerden een erkenning als actuaris kunnen krijgen.

1.1. Niveau en oriëntatie

De commissie beoordeelt het niveau en de oriëntatie als voldoende.

De opleidingsverantwoordelijken streven er in de eerste plaats naar om de student goed voor te bereiden op zijn functie van actuaris binnen een verzekeringsmaatschappij, zodat hij 'zelfstandig het beroep van actuaris kan uitvoeren'.

In eerste instantie hoort een actuaris binnen een verzekeringsmaatschappij te waken over

- de rendabiliteit (verantwoorde en rendabele premiebepaling);
- de solvabiliteit (aanleggen van een adequate reservering);
- de stabiliteit (in de jaarlijkse resultaten door invoeren van gepaste herverzekeringprogramma's).

Daarnaast behoort ook de problematiek van de tweede pensioenpijler binnen andere ondernemingen tot zijn actieterrein. Ten slotte beheerst een actuaris ook de theorie en de toepassingen van de wiskundige modellen inzake de diverse financiële technieken.

De actuariële GAS- en GGS-opleidingen zijn aanvullende opleidingen. Ook de nieuwe masteropleiding zal slechts toegankelijk zijn voor studenten die reeds een masterdiploma hebben behaald. Er wordt volgens het zelfevaluatierapport dan ook van uitgegaan dat de studenten al bij de aanvang van de opleiding voldoen aan de eindtermen van hun voorafgaande masteropleiding. Aangezien de studenten reeds over een masterdiploma zullen beschikken, worden zij geacht over een aantal we-

tenschappelijke competenties te beschikken zoals “een kritische ingesteldheid en een abstractievermogen en in staat te zijn op een wetenschappelijke wijze te denken en te handelen”. De opleiding wil ertoe bijdragen dat de studenten deze competenties verder ontwikkelen. Daarenboven wordt van een actuaaris verwacht dat hij grensoverschrijdend kan denken en handelen. “Niet alleen een wiskundige analyse behoort tot zijn taken, hij dient deze ook te plaatsen in een economische context en hij dient bovendien rekening te houden met een soms strak juridisch kader.”

Om de huidige doelstellingen van de GGS-opleiding te behouden in de nieuwe éénjarige masteropleiding, dient erover gewaakt te worden dat de studenten die instromen in de masteropleiding, niet enkel qua academische vaardigheden, maar ook qua kennis van en inzicht in de actuariële wetenschappen, een vergelijkbare basis hebben als de huidige studenten na het succesvol afwerken van de GAS-opleiding. De commissie vindt dit een cruciaal aandachtspunt waarover de opleidingsverantwoordelijken zullen moeten waken.

De commissie is van mening dat de geformuleerde doelstellingen over het algemeen overeenkomen met de eindkwalificaties van een masteropleiding zoals die in art. 58 van het Structuurdecreet (04/04/2003) geformuleerd zijn. De commissie waardeert de centrale plaats die de professionele vorming inneemt in de doelstellingen. Er wordt duidelijk een gevorderd begrip van en inzicht in de wiskundige, economische en juridische aspecten van het actuaariaat nagestreefd. De commissie heeft daarenboven vastgesteld dat de doelstellingen in voldoende mate verwijzen naar het beheersen van algemene wetenschappelijke competenties. Toch beveelt de commissie aan om de aandacht voor academische vaardigheden in de doelstellingen te versterken. De commissie vindt het namelijk belangrijk dat de studenten van een (academische) masteropleiding hun onderzoeksvaardigheden en attitude verder ontwikkelen om voorbereid te zijn op de snel wijzigende context waarbinnen de actuaaris moet functioneren. De masterproef is het instrument bij uitstek om aan deze vaardigheden en attitude te werken.

De doelstellingen zijn vertaald in 19 competentie-onderdelen. Deze competentie-onderdelen worden ondergebracht in de aangeboden opleidingsonderdelen. De commissie waardeert de zorgvuldige vertaling van de doelstellingen in competenties. Voor de formulering van doelstellingen op het niveau van de opleidingsonderdelen is de lesgever verantwoordelijk.

De doelstellingen worden bekend gemaakt aan studenten via de website van de Vrije Universiteit Brussel en het elektronisch leerplatform PointCarré. Ook worden deze mondeling toegelicht aan het begin van het academiejaar. De commissie heeft tijdens de gesprekken kunnen vaststellen dat studenten over het algemeen goed bekend zijn met de doelstellingen.

1.2. Domeinspecifieke eisen

De commissie beoordeelt de domeinspecifieke eisen als goed.

De domeinspecifieke eisen voor actuariële opleidingen (zowel de GAS en GGS als de masteropleiding) worden voornamelijk bepaald door de minimumeisen van de Koninklijke Vereniging van Belgische Actuarissen (KVBA), die vastgelegd zijn in de Belgian Syllabus. Het voldoen aan deze eisen is een voorwaarde voor de afgestudeerde om zich kandidaat te kunnen stellen voor toetreding tot de KVBA. Op Europees vlak betekent dit dat de zusterverenigingen een dergelijke actuaaris ook kunnen aanvaarden als volwaardig lid. De commissie is van mening dat de doelstellingen in lijn zijn met de Belgian Syllabus. De verschillende deeldomeinen die vereist worden, zijn duidelijk aanwezig in de opsomming van de competentie-onderdelen die is opgenomen in het zelfevaluatierapport. De doelstellingen van de opleiding komen eveneens overeen met de eisen die de commissie in haar referentiekader heeft geformuleerd. Er wordt duidelijk gestreefd naar een evenwicht tussen de economische, wiskundige en juridische aspecten van het actuariële beroep.

De commissie waardeert de duidelijk professioneel gerichte profilering van de Brusselse opleiding, die aantrekkelijk is voor academisch geschoolden die reeds actief zijn in de verzekerings- en financiële sector of de stap willen zetten naar het actuariële beroep. Over de noden van deze studenten is er veel informeel overleg met het afnemend veld en ook de inbreng van docenten die zelf actief zijn als actuaaris, versterkt dit profiel. De commissie heeft in gesprekken met afgestudeerden en vertegenwoordigers van het afnemend beroepenveld kunnen vaststellen dat deze profilering sterk op prijs gesteld wordt.

De commissie stelt wel vast dat de inhoud van de doelstellingen voor sommige essentiële opleidingsonderdelen nauwelijks gebaseerd zijn op eigen actueel wetenschappelijk onderzoek. De commissie vindt het essentieel om hieraan in de toekomst meer aandacht te besteden.

Ten slotte vindt de commissie het goed dat er nagedacht wordt over een samenwerking met de Universit  Libre de Bruxelles (ULB), die op dezelfde campus gehuisvest is, en over een samenwerking met de Universiteit Gent in het kader van een breder samenwerkingsakkoord. De commissie is er van overtuigd dat in samenwerking met de actuariële opleiding van de ULB een zeer aantrekkelijke, eventueel twee- of drietalige, opleiding zou kunnen uitgewerkt worden voor Belgische en in het bijzonder Brusselse actuarissen. Een samenwerking met de Universiteit Gent dient, gezien de institutionele samenwerking tussen de beide universiteiten, zeker onderzocht te worden, maar zou volgens de commissie niet mogen leiden tot een afbouw van de opleiding in Brussel.

Algemene conclusie bij onderwerp 1: Doelstellingen van de opleiding

Vermits de twee facetten van dit onderwerp als positief beoordeeld werden en gezien de bovenstaande motivering, beoordeelt de commissie de doelstellingen als positief.

Onderwerp 2: Programma

Beschrijving van het programma

Het huidige programma strekt zich uit over twee jaar. Het eerste jaar: de GAS-opleiding (Gediplomeerde in de Aanvullende Studies) bestaat voor een groot gedeelte uit het verwerven van een basiskennis en/of een vervolmaking van de basisbegrippen nodig voor de actuariële vorming. De volgende opleidingsonderdelen maken deel uit van het programma:

- Intrestberekening 4 stp
- Verzekeringen, groepsverzekeringen en pensioenfondsen 5 stp
- Grondige studie van groepsverzekeringen en pensioenfondsen I 9 stp
- Grondige studie van groepsverzekeringen en pensioenfondsen II 9 stp
- Risicotheorie, schadeverzekeringen en herverzekeringen I 5 stp
- Risicotheorie, schadeverzekeringen en herverzekeringen II 5 stp
- Fiscaliteit 5 stp
- Ondernemingsrecht 6 stp
- Elementen van boekhouden 5 stp
- Stochastische processen 5 stp
- Numerieke analyse I 5 stp
- Financieel management (inclusief financiële analyse) 5 stp
- 'Economie en bedrijfsleven' of 'Economie' 6 stp

Het tweede jaar: de GGS-opleiding (Gediplomeerde in de Gespecialiseerde Studies) focust volledig op de actuariële vorming en de randkennis die daarbij nodig is. Het programma bestaat uit de volgende opleidingsonderdelen:

- Grondige studie van groepsverzekeringen en pensioenfondsen I 9 stp
- Grondige studie van groepsverzekeringen en pensioenfondsen II 9 stp
- Verzekeringsovereenkomsten 5 stp
- Risicotheorie, schadeverzekeringen en herverzekeringen I 5 stp
- Risicotheorie, schadeverzekeringen en herverzekeringen II 5 stp
- Vermogensbeheer 6 stp
- Financiële wiskunde I 3 stp
- Operationeel onderzoek 6 stp
- Stage actuariële wetenschappen 6 stp
- Verhandeling actuariële wetenschappen 20 stp

De nieuwe masteropleiding zal kunnen gevolgd worden na de geschikte vooropleiding of na een voorbereidingsprogramma en zal bestaan uit de volgende opleidingsonderdelen:

- Capita selecta Groepsverzekeringen en Pensioenfondsen	9 stp
- Capita selecta Schadeverzekeringen & herverzekeringen	3 stp
- Capita selecta Financiële Wiskunde	6 stp
- Capita selecta Actuariële methoden	6 stp
- Capita selecta Economie	9 stp
- Capita selecta Verzekeringsrecht	12 stp
- Masterproef	15 stp

2.1. De relatie tussen de doelstellingen en de inhoud van het programma

De commissie beoordeelt de relatie tussen de doelstellingen en het programma als goed.

De commissie waardeert de manier waarop de doelstellingen vertaald zijn in het programma van de GAS- en GGS-opleiding en in de afzonderlijke opleidingsonderdelen. De commissie waardeert ten eerste de sterke professionele gerichtheid van het programma. De aangeboden opleidingsonderdelen zijn zeer relevant voor de actuariële beroepspraktijk. Studenten die de opleiding deeltijds volgen, getuigden tijdens het bezoek van de visitatiecommissie aan de Vrije Universiteit Brussel dat de lesinhouden sterk aansluiten bij hun dagdagelijkse beroepspraktijk, vooral wat betreft onderwerpen die te maken hebben met 'Leven'. Wat 'Niet-Leven' betreft is de opleiding ook goed ingevuld, maar vraagt een aantal studenten om deze opleidingsonderdelen nog meer te contextualiseren en de aansluiting met de beroepspraktijk verder te versterken. De commissie is van mening dat dit de opleiding inderdaad verder kan versterken.

Van vertegenwoordigers van het afnemend beroepenveld heeft de commissie vernomen dat de aandacht voor risicomanagement en modellering in het programma voldoet, maar dat een versterking op dit vlak positief zou zijn. De vraag naar afgestudeerden met een goede theoretische en praktische achtergrond in deze domeinen neemt namelijk sterk toe.

De opleidingsonderdeelfiches en het enthousiasme van studenten, alumni en het afnemend beroepenveld hebben de commissie overtuigd dat de opleidingsonderdelen goed ingevuld worden en de nagestreefde professionele oriëntatie duidelijk in de praktijk brengen. De commissie meent evenwel dat een versterking van de onderbouwing van de specifiek actuariële opleidingsonderdelen door meer eigen wetenschappelijk onderzoek van het academisch personeelskader (*zie ook verder*) de opleiding verder zou kunnen versterken, echter op voorwaarde dat de band tussen dit onderzoek en de concrete beroepspraktijk in het onderwijs duidelijk aanwezig blijft.

De commissie is ervan overtuigd dat het programma zoals het voorligt voor de toekomstige master-na-masteropleiding eveneens een goede vertaling vormt van de doelstellingen en de bestaande sterke punten van de opleiding zal behouden.

2.2. De professionele en academische gerichtheid van het programma

De commissie beoordeelt de professionele en academische gerichtheid als voldoende.

Het programma besteedt veel aandacht aan kennisontwikkeling, zowel op economisch, financieel, juridisch als technisch vlak. Hierbij wordt steeds rekening gehouden met de relevantie van deze kennisontwikkeling voor de actuaris in opleiding. De studenten en alumni met wie de commissie tijdens haar bezoek aan de opleiding sprak zijn van mening dat er een goed evenwicht bestaat tussen de kennisontwikkeling rond 'Leven' en 'Niet-leven'.

De opleiding hecht veel belang aan de band tussen de opleiding en de actuele beroepspraktijk. Deze band wordt gewaarborgd doordat een aantal deeltijdse docenten zelf actief zijn als actuaris. Voltijdse ZAP-leden nodigen soms gastsprekers uit de praktijk uit. De GGS-opleiding voorziet bovendien een stage in een financiële instelling (verzekeringsmaatschappij of bank), in een kantoor van raadgevende actuarissen, in een verzekeringsmakelaarskantoor of in een overheidsdienst die actuariële expertise heeft. Studenten die al actief zijn in een van deze beroepen kunnen evenwel vrijgesteld worden van deze stage. Deze stage vervalt in het nieuwe programma, mede omdat in de feiten de meeste studenten reeds professioneel actief zijn. De commissie waardeert de sterke professionele gerichtheid van het programma.

De academische gerichtheid van het programma is minder uitgesproken. Er wordt uitgegaan van de wetenschappelijke vaardigheden en attitude die de studenten reeds verworven hebben in hun basisopleiding. De opleiding bouwt daarop verder en richt zich op onderzoeksvaardigheden in brede zin, zoals die in het beroep van actuaris essentieel zijn. Het aangeboden onderwijs is evenwel in geringe mate gebaseerd op eigen wetenschappelijk onderzoek. Een aantal docenten, vooral in ondersteunende opleidingsonderdelen zijn actief in wetenschappelijk onderzoek dat verband houdt met de actuariële wetenschap, en gebruiken dit onderzoek ook om hun onderwijs te onderbouwen. Anderen volgen wel het wetenschappelijk onderzoek, maar doen zelf geen of slechts in beperkte mate wetenschappelijk onderzoek.

De commissie is van oordeel dat de academische gerichtheid, in combinatie met de sterke professionele gerichtheid, genoeg is om voor dit facet tot een beoordeling voldoende te komen.

2.3. De samenhang van het programma

De commissie beoordeelt de samenhang van het programma als goed.

De opbouw van het programma is goed doordacht. In de GAS worden eerder basisopleidingsonderdelen aangeboden, terwijl de verdiepende opleidingsonderdelen vooral in de GGS-opleiding worden georganiseerd. In de toekomst zullen de basisopleidingsonderdelen door de student in een initiële master moeten gevolgd worden, of via een voorbereidingsprogramma. Slechts mits het gevolgd hebben/volgen van deze opleidingsonderdelen zal een student toegelaten worden tot de masteropleiding in de Actuariële Wetenschappen. Dit is voor de commissie een essentiële voorwaarde om de vooropgestelde doelstellingen te kunnen realiseren.

De opleidingsonderdelen bouwen over het algemeen verder op de kennis en vaardigheden die verworven zijn in voorafgaande opleidingsonderdelen. De commissie heeft bovendien vastgesteld dat er een goede afstemming bestaat tussen de inhoud van de verschillende opleidingsonderdelen. De verschillende domeinen worden behandeld en er is een goede afstemming tussen de theoretische inzichten en de praktische toepasbaarheid van de leerstof. De masterproef sluit ten slotte niet alleen aan bij de inhoud van het programma, maar kan ook aansluiten bij de beroepspraktijk van de student.

2.4. Studieomvang

De GAS- en GGS-opleiding voldoen aan het decretaal kader met betrekking tot de studieomvang. Ze tellen beide 60 studiepunten. Hetzelfde geldt voor de geplande eenjarige master-na-masteropleiding.

2.5. Studietijd

De commissie beoordeelt de studietijd als voldoende.

De centrale Cel Kwaliteitszorg en Accreditatie peilt, in het kader van de semesteriële bevestigingen onder studenten naar de studietijdervaring en dit op niveau van het opleidingsonderdeel. Enerzijds wordt aan de student gevraagd om, per opleidingsonderdeel, een kwalitatieve inschatting te maken van de in realiteit bestede studietijd in relatie tot de begrote studiepunten, anderzijds wordt aan de student gevraagd om per opleidingsonderdeel een absolute schatting te geven van het aantal in realiteit bestede uren. De resultaten zijn voor slechts een beperkt aantal opleidingsonderdelen representatief. Voor deze opleidingsonderdelen worden door de studenten geen significante afwijkingen gesignaleerd tussen de begrote en de reële studietijd. Enkel voor Financiële Wiskunde, werd een hogere reële studietijd gerapporteerd dan begroot. Indien dit signaal zich herhaalt, zal de opleiding op basis van dit signaal aangepast worden.

Het programma is opgebouwd uit opleidingsonderdelen uit meerdere faculteiten. De opleidingsonderdelen worden vaak aangeboden aan meerdere opleidingen tegelijk. Dit veroorzaakt problemen om tot een voor de studenten optimaal lessenrooster te komen. Soms overlappen de lessen van verschillende opleidingsonderdelen, waardoor studenten niet steeds alle lessen kunnen volgen. Vanuit het vakgroepsecretariaat Wiskunde, worden inspanningen gedaan om deze overlappings tot een minimum te beperken. De studenten, die reeds een basisopleiding gevolgd hebben en over het algemeen reeds professioneel actief zijn, vinden dit echter geen onoverkomelijk probleem. Ze gaan hier flexibel mee om en studeren, waar nodig, op basis van het cursusmateriaal. Toch vindt de commissie het van belang dat studenten die dit wensen alle opleidingsonderdelen kunnen volgen en pleit ze ervoor om in de toekomst dergelijke situaties te vermijden.

De huidige GAS- en GGS-opleiding kunnen deeltijds gevolgd worden. Dit is voornamelijk bedoeld voor de studenten die reeds tewerkgesteld zijn en waarvoor de beroepsactiviteiten het niet toelaten om 60 studiepunten in één jaar te volgen. Bovendien is de mogelijkheid voorzien tot het verkrijgen van vrijstellingen voor studenten met een welgekozen vooropleiding. Hierdoor kan de studiebelasting verlaagd worden, wat studenten toelaat de opleiding makkelijker te combineren met een beroepsactiviteit. In het algemeen blijken de studenten en de alumni tevreden over de studeerbaarheid van de opleiding. Het feit dat de eindverhandeling kan geschreven worden over een thema dat aansluit bij de professionele activiteiten van de studenten, draagt hier ongetwijfeld aan bij.

2.6. Afstemming tussen vormgeving en inhoud

De commissie beoordeelt de afstemming tussen vormgeving en inhoud als voldoende.

De commissie heeft de gebruikte werkvormen besproken met de studenten, alumni en docenten. Naast theoretische lessen met concrete voorbeelden en oefeningensessies worden ook regelmatig gastdocenten uitgenodigd om de praktische bruikbaarheid van de aangeleerde concepten nog verder te duiden. De werkvormen zijn over het algemeen aangepast aan het doelpubliek en afgestemd op de doelstellingen. De commissie betreurt wel dat de opleidingsverantwoordelijken weinig impact hebben op de gebruikte onderwijsvormen, zoals aangehaald in het zelfevaluatie-rapport, aangezien de diverse vakgroepen verantwoordelijk zijn voor de door hen aangeboden opleidingsonderdelen.

De commissie heeft tijdens haar bezoek aan de opleiding het beschikbare cursusmateriaal kunnen inzien. Dit voldoet over het algemeen aan haar verwachtingen. Er is een goed evenwicht tussen handboeken en door de docent uitgewerkt cursusmateriaal. Sommige materialen zijn evenwel aan actualisering toe. De commissie heeft

verder vastgesteld dat het elektronisch leerplatform PointCarré weinig gebruikt wordt binnen de opleiding. Ze beveelt aan om de meerwaarde van dit platform te onderzoeken en er eventueel intensiever gebruik van te maken, te meer daar het doelpubliek vooral bestaat uit werkende studenten, die baat hebben bij een centralisering van alle beschikbare informatie.

2.7. Beoordeling en toetsing

De commissie beoordeelt de beoordeling en toetsing als voldoende.

De commissie heeft in het kader van de visitatie een groot aantal examenopgaven bestudeerd. Ze waardeert de variatie aan examenvormen. Er worden naast schriftelijke en - vooral - mondelinge examens over de theorie, ook schriftelijke oefeningsexamens en permanente evaluaties over practica georganiseerd. Projecten leiden tot een verslag en een mondelinge presentatie. In het algemeen sluiten de examenvragen aan bij de doelstellingen en is er een evenwicht tussen de toetsing van kennis, inzicht en vaardigheden. De studenten zijn over het algemeen tevreden over manier waarop ze beoordeeld worden.

De examenvormen worden via de opleidingsonderdeelfiches bekend gemaakt en in het onderwijs- en examenreglement vastgelegd. Vaak wordt ook toelichting over de examenvormen gegeven tijdens de colleges.

2.8. Masterproef

De commissie beoordeelt de masterproef als voldoende.

In de huidige GGS-opleiding telt de eindverhandeling 20 studiepunten. In de toekomstige masteropleiding zal de eindverhandeling omgevormd worden tot een masterproef die 15 studiepunten telt. Dit voldoet aan de decretale eisen terzake.

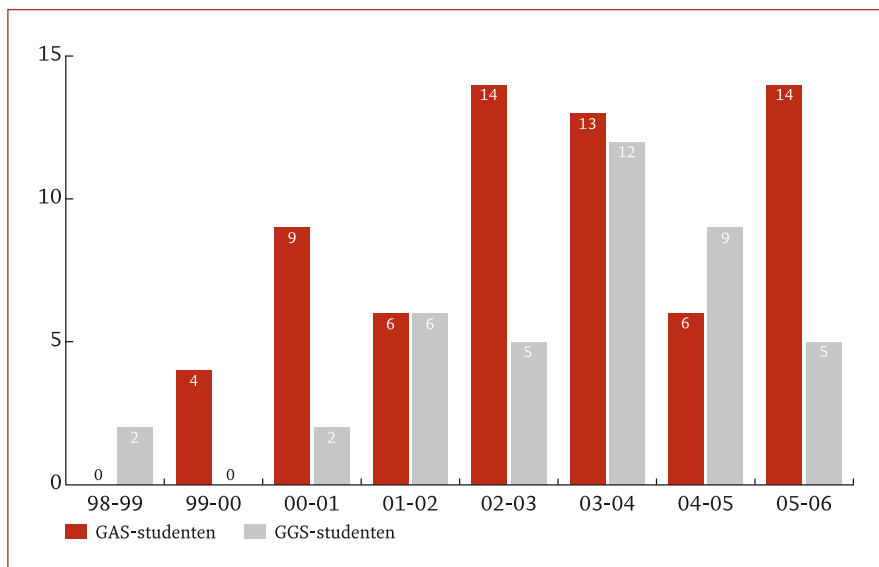
Het onderwerp van de eindverhandeling wordt gekozen in overleg met de promotor. Studenten die reeds zijn tewerkgesteld in de sector opteren eerder voor promotoren die ook beroepshalve actief zijn in de financiële of verzekeringssector, waaruit dan ook volgt dat hun onderwerp nauw aansluit bij de activiteit of het domein waarin de student beroepshalve actief is. De student kan voor zijn eindverhandeling een onderwerp voorstellen dat hij vooraf met zijn werkgever heeft besproken en dat nuttig kan zijn voor de financiële instelling. De academische promotor zal de student in goede banen leiden en hem bronnen aanreiken voor zijn onderzoek. De studenten en alumni met wie de commissie sprak zijn tevreden over de mogelijkheid om zelf onderwerpen aan te brengen en over de begeleiding die zij bij het schrijven van hun eindwerk krijgen.

De commissie heeft voorafgaand aan het bezoek een steekproef van eindverhandelingen grondig doorgenomen en nog een aantal werken ingekeken tijdens het bezoek. De commissie waardeert dat van de studenten wordt verwacht dat zij in hun eindverhandeling oog hebben voor de toepasbaarheid van hun onderzoeksvoorwerp. De commissie heeft echter vastgesteld dat het academisch karakter bij een deel van de eindwerken beperkt is. Zo wordt in een aantal eindwerken nauwelijks uit wetenschappelijke bronnen geciteerd. Bij de omvorming van het eindwerk tot een masterproef, zullen de verwachtingen wat betreft het academische karakter dan ook moeten verhoogd worden om te voldoen aan de eisen voor een masteropleiding.

2.9. Toelatingsvoorwaarden

De commissie beoordeelt de toelatingsvoorwaarden als voldoende.

Grafiek 1 toont de studentenaantallen in zowel de GAS- als de GGS-opleiding sinds 1998-1999. De instroom is vrij beperkt, maar vertoont wel een stijgende trend. In 2006-2007 werd een instroom in de GAS-opleiding van 21 studenten bereikt. De meeste studenten volgen zowel de GAS- als de GGS-opleiding.



Grafiek 1: Studenten in de GAS- en GGS-opleiding (1998-2006)

De actuele formele toelatingsvoorwaarden tot de opleiding van GAS in de Actuariële Wetenschappen zijn:

- houder zijn van het diploma van licentiaat in de Economische Wetenschappen,
- houder zijn van het diploma van Handelsingenieur,

- houder zijn van het diploma van Burgerlijk Ingenieur,
- houder zijn van het diploma van licentiaat in de Wiskunde, de Natuurkunde of de Informatica.

Licentiaten Toegepaste Economische Wetenschappen (en Handelswetenschappen) worden ook toegelaten. Er wordt gepeild naar hun kennisprofiel en ze krijgen de raad om zich door zelfstudie inzake wiskundige voorkennis op het niveau van een handelsingenieur te brengen. Dit alles evenwel zonder een formele verplichting.

Uit de gesprekken met de studenten, alumni en docenten, blijkt dat de instromende studenten over het algemeen zeer gemotiveerd zijn en bereid om tekorten in hun voorkennis zelfstandig bij te werken. Sommige studenten met een economische achtergrond ondervinden evenwel moeilijkheden om alle vereiste wiskundige voorkennis zelfstandig en snel te verwerven. Het lijkt de commissie goed om de studenten goed voor te lichten over de vereiste voorkennis. Op die manier kunnen studenten beter inschatten of ze over de nodige voorkennis beschikken en indien nodig voorafgaand aan de opleiding hun voorkennis bijspijkeren. Het aanbieden van een zomercursus die de belangrijkste voorkennis herhaalt, zou de studenten hierbij kunnen helpen.

Houders van het diploma GAS in de Actuariële Wetenschappen worden toegelaten tot de GGS in de Actuariële Wetenschappen. Op basis van haar gesprekken met alle betrokkenen heeft de commissie kunnen vaststellen dat de overgang tussen de GAS- en de GGS-opleiding vlot verloopt.

In de nieuwe structuur zullen de toelatingsvoorwaarden minder beperkend worden omschreven, maar zal de toelating eerder bepaald worden door de verworven voorkennis (diplomasupplement).

De toelatingsvoorwaarden voor de éénjarige masteropleiding, mits de vereiste basisvoorkennis, studenten met volgende afstudeerdiploma's:

- Master in de Wiskunde,
- Master in de (Toegepaste) Economische Wetenschappen,
- Master in de Toegepaste Economische Wetenschappen: handelsingenieur.

Afhankelijk van de vooropleiding zullen studenten nog onderdelen uit de basisopleiding moeten volgen. Voor zover de actuariële opleiding en de basisopleiding samen de 75 studiepunten niet overschrijden, kunnen studenten deze opleidingsonderdelen samen met de masteropleiding volgen.

Studenten met een ander dan een hiervoor vermeld masterdiploma zullen onderworpen worden aan een voorafgaand bekwaamheids- en geschiktheidsonderzoek, waarin wordt gepeild (o.m. aan de hand van diplomasupplementen) of de kandidaat-

student over voldoende kennis beschikt in een essentieel vakgebied (Wiskunde & Economie). Eventueel kan een voorbereidingsprogramma worden voorgesteld om de vereiste voorkennis te verwerven.

De commissie vindt deze geplande toelatingsvoorwaarden gepast voor de toekomstige opleiding. Ze meent wel dat het van belang is om deze voorwaarden strikt toe te passen en goed te communiceren naar toekomstige studenten, zodat die tijdens hun initiële masteropleiding reeds de juiste keuzes kunnen maken.

Algemene conclusie bij onderwerp 2: programma

Vermits alle facetten van dit onderwerp als positief beoordeeld werden en gezien de bovenstaande motivering, beoordeelt de commissie het programma als positief.

Onderwerp 3: Inzet van personeel

3.1. *Kwaliteit van het personeel*

De commissie beoordeelt het facet 'Kwaliteit van het personeel' als voldoende.

De opleidingsverantwoordelijken zijn bij de aanstelling en vervanging van personeelsleden bijna steeds sterk aangewezen op de goodwill van de vakgroepen of faculteiten waar die personeelsleden aangeworven worden om al dan niet rekening te houden met de noden van de actuariële opleiding. Bij de aanwerving van de docenten Financiële Wiskunde en Statistiek was die goodwill aanwezig. Ook voor het uitbreiden van de academische staf is de opleiding afhankelijk van de faculteit, die zelf de voorbije jaren steeds minder middelen ontvangen heeft van de academische overheid. Het voeren van een degelijk personeelsbeleid voor de volledige opleiding is dan ook zo goed als onmogelijk. Dit is in het verleden al gebleken toen een deeltijdse docent niet vervangen werd en een voltijdse docent vervangen werd door een personeelslid met andere onderzoeksinteresses. Dit is volgens de commissie een belangrijke oorzaak van de beoordeling onvoldoende op facet 3.3. Kwantiteit van het Personeel. De commissie vindt het essentieel dat de opleidingsverantwoordelijken meer controle verwerven over het personeelsbeleid voor de eigen opleiding. De nakende pensionering van twee deeltijdse docenten die een aantal essentiële actuariële opleidingsonderdelen aanbieden vormt namelijk een grote uitdaging voor de opleiding. Als de middelen ontbreken om deze docenten op een goede manier te vervangen, is de toekomst van de opleiding ernstig bedreigd. De commissie miste tijdens haar bezoek aan de opleiding plannen voor een duidelijke strategie om deze vervanging te realiseren. Ook het aantrekken van een aantal doctoraatsstudenten lijkt noodzakelijk om de continuïteit van de oplei-

ding te versterken. Een aantal van de alumni met wie de commissie sprak hebben interesse in een academische loopbaan, maar zien geen kansen daartoe aan de Vrije Universiteit Brussel.

Binnen de Vrije Universiteit Brussel wordt de nodige aandacht besteed aan onderwijskwaliteiten binnen het aanstellingsbeleid en bevorderingsbeleid. Bij een eerste aanstelling of benoeming als ZAP-lid wordt steeds een proefcollege gegeven. Ook bij de aanstelling van assistenten wordt rekening gehouden met de didactische kwaliteiten van de kandidaten. Bij bevorderingen speelt het onderwijsdossier steeds een belangrijke rol. Hierbij spelen niet zozeer eenmalige, op zich staande beoordelingen dan wel trends in opeenvolgende beoordelingen een rol in de appreciatie van de didactische en pedagogische kwaliteit van een docent. De commissie waardeert dit.

Op basis van de uitgevoerde bevragingen en de gesprekken van de commissie met de studenten, is de commissie ervan overtuigd dat de vakinhoudelijke, onderwijskundige en didactische kwaliteiten van het onderwijzend personeel over het algemeen goed zijn. Dit wordt bevestigd door onderwijsbeoordelingen en door de studenten en de alumni met wie de commissie tijdens haar bezoek aan de opleiding sprak. Deze kwaliteit van de individuele docenten, weegt voor de commissie bij de beoordeling van dit facet zwaarder door dan de moeilijkheden om een personeelsbeleid te voeren. De commissie beveelt wel aan om het onderwijzend personeel sterker te stimuleren deel te nemen aan onderwijskundige professionalisering met het oog op vernieuwende onderwijsvormen. Het publiek van vrij mature studenten die vaak reeds in de beroepspraktijk actief zijn, vereist namelijk andere vaardigheden dan het onderwijs aan de voltijdse studenten waaraan de meeste docenten meestal onderwijs verschaffen. De commissie meent dat op dit vlak nog kansen tot verbetering liggen.

3.2. Eisen professionele en academische gerichtheid

De commissie beoordeelt het facet 'Professionele en academische gerichtheid van de staf' als voldoende.

De commissie waardeert de uitgebreide professionele ervaring van de docenten die de specifiek actuariële opleidingsonderdelen onderwijzen. Het gaat om gereputeerde actuarissen die met hun expertise een belangrijke bijdrage leveren aan de opleiding. De commissie betreurt wel dat, gezien het te beperkte personeelskader (*zie facet 3.3. Kwantiteit van het Personeel*), er geen ruimte is voor wetenschappelijk onderzoek binnen de opdracht van de docenten die de kernopleidingsonderdelen van de actuariële opleiding aanbieden. Dit kan de betrokkenen op geen enkele manier ten kwade geduid worden, maar beperkt de mogelijkheden tot de academische onderbouwing van de opleiding sterk. De ondersteunende juridische, economische en wiskundige

opleidingsonderdelen worden over het algemeen wel aangeboden door ZAP-leden die ook actief wetenschappelijk onderzoek doen. Een aantal onder hen doet ook onderzoek naar specifieke actuariële onderwerpen en verwerkt dit ook in het aangeboden onderwijs. Ook de docenten die als actuaire actief zijn in de bedrijfswereld, onderzoeken actuariële problemen binnen de bedrijfscontext, maar dit onderzoek wordt niet onderworpen aan peer-evaluatie en wordt dan ook door de commissie niet meegeteld als academisch wetenschappelijk onderzoek. Voor de commissie wegen de zeer goede professionele inbreng van de ZAP-leden, die kernopleidingsonderdelen onderwijzen, en de academische kwaliteiten van de ZAP-leden, die de andere opleidingsonderdelen onderwijzen, (nipt) zwaarder door dan de te beperkte ruimte voor wetenschappelijk onderzoek naar specifieke actuariële onderwerpen bij de beoordeling van dit facet.

3.3. Kwantiteit van het personeel

De commissie beoordeelt de kwantiteit van de staf als onvoldoende.

Het aantal ZAP-leden dat een lesopdracht heeft binnen de opleiding bedraagt 14. Echter, geen enkel ZAP-lid is voltijds verbonden aan de opleiding. De personeelsbezetting voor actuariel georiënteerde opleidingsonderdelen bedraagt 0,4 VTE, verspreid over 3 deeltijdse ZAP-leden. De andere 11 ZAP-leden verzorgen ondersteunende opleidingsonderdelen. Deze bestaffing is volgens de commissie onvoldoende om de opleiding duurzaam aan te bieden. Enkel dankzij de bijzondere inspanningen van de betrokkenen, wordt de kwaliteit van de opleiding gewaarborgd. De commissie is van mening dat de opleiding nood heeft aan minstens één voltijds ZAP-lid dat gespecialiseerd is in (een van) de kernthema's van het actuaariaat en de opleiding kan dragen. Dit voltijds ZAP-lid moet ondersteund worden door een aantal deeltijdse ZAP-leden wiens hoofdpdracht in de actuariële praktijk ligt, om zo zowel de academische als de professionele onderbouw van de opleiding te verzekeren. Dit kernteam kan dan verder ondersteund worden door ZAP-leden met juridische, economische en wiskundige expertise die ondersteunende opleidingsonderdelen verzorgen, zoals nu reeds het geval is.

Er werden verschillende ideeën in verband met samenwerking met andere instellingen besproken tijdens het bezoek aan de Vrije Universiteit Brussel. De commissie is ervan overtuigd dat dergelijke samenwerkingsverbanden slechts haalbaar zullen zijn, indien de Vrije Universiteit Brussel eerst zelf investeert in de uitbreiding van de eigen academische actuariële staf. De commissie suggereert ook om verder te zoeken naar externe middelen ter ondersteuning van de opleiding en wetenschappelijk onderzoek. Heel wat verzekerings- en financiële ondernemingen blijken bereid om mee te investeren in een goede actuariële opleiding. De unieke ligging, dicht bij de belangrijkste Belgische bedrijven in deze sectoren, kan daarbij zeker uitgespeeld worden.

Conclusie bij onderwerp 3: Inzet van personeel

De commissie is van mening dat door de te beperkte omvang van het huidige personeelsbestand met specifieke actuariële expertise onvoldoende garanties kunnen geboden worden voor het behouden en versterken van de kwaliteit van de opleiding. Daarenboven mist de commissie een strategie om de opleiding in stand te houden bij het wegvallen van de twee deeltijdse hoofddocenten met actuariële expertise die de opleiding dragen, wanneer zij in de komende jaren met emeritaat zullen gaan. De commissie vindt deze redenen van die aard dat het onderwerp inzet van personeel niet als positief kan beoordeeld worden.

Onderwerp 4: Voorzieningen

4.1. Materiële voorzieningen

De commissie beoordeelt de materiële voorzieningen als voldoende.

De opleiding wordt georganiseerd op de campus Etterbeek van de Vrije Universiteit Brussel. De gebouwen op deze campus zijn volgens de commissie niet zeer aantrekkelijk, maar er zijn voldoende collegelokalen en deze beschikken over een up-to-date uitrusting. Op de campus zijn voldoende computerlokalen beschikbaar voor de studenten. De nodige computerinfrastructuur is tevens beschikbaar. De commissie heeft echter kunnen vaststellen dat de Centrale bibliotheek over een zeer beperkte papieren collectie boeken en tijdschriften in verband met actuariële wetenschappen beschikt. De commissie betreurt dit, maar heeft wel vastgesteld dat dit deels gecompenseerd wordt door de uitgebreide elektronische collectie en de goede collectie van de ULB die zich op dezelfde campus bevindt. De elektronische collectie van de bibliotheek, de collectie van de ULB en de beperkte papieren collectie zorgen er samen voor dat de studenten voldoende toegang hebben tot relevante bronnen.

4.2. Studiebegeleiding

De commissie beoordeelt de studiebegeleiding als goed.

De Vrije Universiteit Brussel biedt op haar website en via een aantal brochures informatie aan over de opleiding. Ook de beroepsvereniging geeft een brochure uit en organiseert informatiedagen. Studenten worden tevens vaak informeel gewezen op het bestaan van de opleiding en de arbeidsmarktperspectieven die die achteraf biedt. Toch vindt slechts een beperkt aantal studenten de weg naar de actuariële opleiding, wat echter niet specifiek is voor de Vrije Universiteit Brussel.

Door de kleinschaligheid en het gemakkelijke contact tussen studenten en de ZAP-leden, verloopt de begeleiding voor een groot deel door rechtstreekse persoonlijke contacten en wordt er minder gebruik gemaakt van de formele aanspreekpunten. Studenten en alumni zijn zeer tevreden over de bereikbaarheid van het personeel.

Elk jaar wordt een vast benoemd lid van het ZAP aangesteld tot ombudspersoon. Ook op facultair niveau wordt een ombudspersoon aangesteld. De studenten van de opleiding hebben echter nog geen beroep gedaan op de ombudspersonen. Voor psychosociale begeleiding kunnen studenten terecht bij de welzijnsdiensten, de Dienst Studieadvies en de dienst Handicap en Studie.

Conclusie bij onderwerp 4: Voorzieningen

Vermits de twee facetten van dit onderwerp als positief beoordeeld werden en gezien de bovenstaande motivering, beoordeelt de commissie de voorzieningen als positief.

Onderwerp 5: Interne Kwaliteitszorg

Op universitair niveau is de Centrale Cel Kwaliteitszorg en Accreditatie verantwoordelijk voor de semesteriële anonieme bevraging van de studenten over alle aangeboden opleidingsonderdelen, de opleiding als geheel en de opleidingsfaciliteiten, waarbij gebruik gemaakt wordt van een elektronisch evaluatiesysteem. Iedere student is verplicht zich voor de bevraging te registreren, maar niet om de vragen te beantwoorden. De volledige resultaten worden meegedeeld aan de verantwoordelijke lesgever, aan de decaan en aan de vice-rector. De resultaten maken deel uit van het personeelsdossier van de lesgever en spelen een rol bij de procedure tot bevordering.

De resultaten worden op twee manieren weergegeven. De eerste is een signaalbeoordeling die gericht is op het detecteren en uitfilteren van problemen die zich in het onderwijsproces van een bepaalde opleiding kunnen voordoen. Van een 'probleemsignaal' is sprake, wanneer voor één of meer van de geëvalueerde aspecten van een opleidingsonderdeel ten minste 1/3 van de participerende studenten de beoordeling 'zeer slecht' of 'slecht' geven. In dat geval is het de verantwoordelijkheid van de decaan om dit signaal op te volgen.

Een tweede wijze is een gemiddelde beoordeling uitgedrukt in een cijfer en in een categorie. Deze beoordeling drukt de gemiddelde tevredenheid van de student uit over het opleidingsonderdeel. Dit vormt een algemene tevredenheidsenquête over de kwaliteit van het verstrekte onderwijs, die systematisch en periodiek wordt uitgevoerd in het kader van de decretaal verplichte kwaliteitsbewaking.

Er werd recent een systeem van regelmatige alumnibevragingen opgestart. De opleidingen actuariaal werden als een van de eerste hieraan onderworpen.

De vakgroepsraad en de opleidingsraad spelen een centrale rol bij de interne kwaliteitszorg. De **vakgroepsraad** Wiskunde, waaronder de opleiding ressorteert, bestaande uit alle bij het onderwijs betrokken ZAP-leden, alle AAP- en BAP-leden en het ATP-lid, bespreekt alle vakgroepsgerelateerde aangelegenheden en is bevoegd voor voorstellen en initiatieven inzake het academisch onderwijs en het wetenschappelijk onderzoek, alsook voor benoemingen en vervangingen van het academische personeel van de vakgroep. De vakgroepsraad rapporteert aan de decaan.

5.1. Evaluatie resultaten

De commissie beoordeelt de evaluatie van de resultaten als goed.

De visitatiecommissie staat positief tegenover de systematische elektronische bevragingen van studenten die van op het centrale niveau worden uitgevoerd. Ze vindt het zeer goed dat sinds kort ook vragen over het programma als geheel en over de beschikbare faciliteiten toegevoegd worden aan de elektronische bevragingen. Op die manier beschikken de opleidingsverantwoordelijken niet enkel over evaluatiegegevens van de individuele opleidingsonderdelen, maar ook over het programma als geheel. De commissie waardeert eveneens dat sinds kort ook de aanvullende opleidingen in dit evaluatiesysteem opgenomen zijn. Ze heeft vernomen dat de deelname van de studenten aan de bevragingen vaak nog beperkt is. De commissie beveelt dan ook aan om nog meer aandacht te besteden aan het stimuleren van de studenten om hieraan deel te nemen. Dergelijke bevragingen zijn namelijk een belangrijk middel om aan alle lesgevers de nodige feedback te geven bij hun onderwijsprestaties en voor de opleidingsverantwoordelijken om de kwaliteit van het onderwijs en de opleiding op te volgen.

De commissie waardeert verder ook de invoering van een systeem van alumnibevragingen. De alumni hebben immers een goed beeld op zowel de aangeboden opleiding als op de noden die zij ondervinden wanneer zij als actuaire actief worden. Ze kunnen dan ook waardevolle feedback geven over de opleiding.

De commissie apprecieert verder de inspanningen van de opleidingsverantwoordelijken om naar aanleiding van de visitatie een enquête te organiseren waarbij studenten, alumni en werkgevers bevestigd werden over de opleiding.

De commissie heeft vastgesteld dat eenvoudige problemen, gelet op de kleinschaligheid van de opleiding en de vele rechtstreekse contacten tussen studenten en academisch personeel, rechtstreeks met de betrokken lesgever besproken worden, zonder dat de formele administratieve weg moet worden doorlopen. De commissie vindt dit goed.

Het zelfevaluatie rapport vormt een goede weergave van de opleiding. Het getuigt van een open en zelfkritische ingesteldheid. De gesprekken tijdens het bezoek aan de opleidingen vormden bovendien een waardevolle aanvulling op het zelfevaluatie rapport.

5.2. Maatregelen tot verbetering

De commissie beoordeelt de maatregelen tot verbetering als voldoende.

De commissie heeft vastgesteld dat door de studenten aangebrachte problemen in de mate van het mogelijke opgelost worden en dat de nodige flexibiliteit getoond wordt door de docenten om in te spelen op specifieke noden van de werkende studenten van de actuariële opleiding. Praktische problemen die te maken hebben met de beperkte inbedding van de opleiding in de universiteit, zoals het overlappen van lessen die aangeboden worden vanuit verschillende faculteiten, laattijdige aankondiging van uurroosters en de beperkte papieren collectie van de bibliotheek, blijven echter voorkomen. Ondanks deze moeilijkheden, blijkt dat waar nodig inhoudelijk ingespeeld wordt op nieuwe evoluties door de aanpassing van bestaande opleidingsonderdelen of de invoering van nieuwe opleidingsonderdelen. De commissie hecht aan deze goede inhoudelijke opvolging bij de beoordeling van dit facet een groter belang dan aan de beperkte vooruitgang wat betreft de randvoorwaarden voor deze opleiding.

5.3. Betrokkenheid van medewerkers, studenten, alumni en beroepenveld

De commissie beoordeelt de betrokkenheid van medewerkers, studenten, alumni en beroepenveld als voldoende.

De commissie apprecieert de inspanningen van de opleiding om naar aanleiding van de visitatie via een schriftelijke bevraging studenten, alumni en het afnemend veld te bevragen over de opleiding. Ook via de centrale onderwijsbeoordelingen binnen de Vrije Universiteit Brussel worden zowel studenten als alumni betrokken bij de interne kwaliteit zorg van de opleiding. Verder zijn er frequente informele contacten met studenten, alumni en het beroepenveld (in het kader van activiteiten van de beroepsvereniging).

De commissie waardeert het informeel overleg dat bestaat tussen de lesgevers van de opleiding. De commissie betreurt echter wel dat er weinig geformaliseerd overleg bestaat binnen de opleiding. De groep docenten die de opleiding verzorgt, komt jaarlijks slechts eenmaal samen, in het kader van de besprekingen van de examencommissie. In de vakgroepsraad wiskunde die verantwoordelijk is voor de opleiding, zijn niet alle lesgevers betrokken. Er zijn evenmin studentenvertegenwoordigers uit de opleiding vertegenwoordigd in de vakgroepsraad. De commissie heeft begrip voor het feit dat een dergelijk overleg niet eenvoudig is met voornamelijk deeltijdse

ZAP-leden, en studenten die meestal beroepsactief zijn, maar de commissie is ervan overtuigd dat regelmatig overleg helpt om problemen vroegtijdig op te sporen en snel op te lossen.

Conclusie bij onderwerp 5: Interne kwaliteitszorg

Vermits alle facetten van dit onderwerp als positief beoordeeld werden en gezien de bovenstaande motivering, beoordeelt de commissie de interne kwaliteitszorg als positief.

Onderwerp 6: Resultaten

6.1. *Gerealiseerd niveau*

De commissie beoordeelt het gerealiseerd niveau als goed.

De commissie vindt dat de beoogde competenties door middel van het programma goed worden bereikt. De opleiding slaagt erin om wiskundigen en mensen met een economische vooropleiding een gedegen, professioneel gerichte, vorming te bieden. De studenten, de alumni en het afnemend beroepenveld tonen grote tevredenheid over de kwaliteit van de opleiding. Studenten worden goed voorbereid op het beroep van actuaaris. De opleiding voldoet ook aan de eisen die de Koninklijke Vereniging van Belgische Actuarissen (KVBA) aan actuariële opleidingen stelt, zodat het diploma nationaal en internationaal erkend wordt. De overgrote meerderheid van de afgestudeerden van de opleiding komen terecht in de actuariële beroepspraktijk (zowel privé- als overheidssector). Een minderheid bouwt een academische carrière uit.

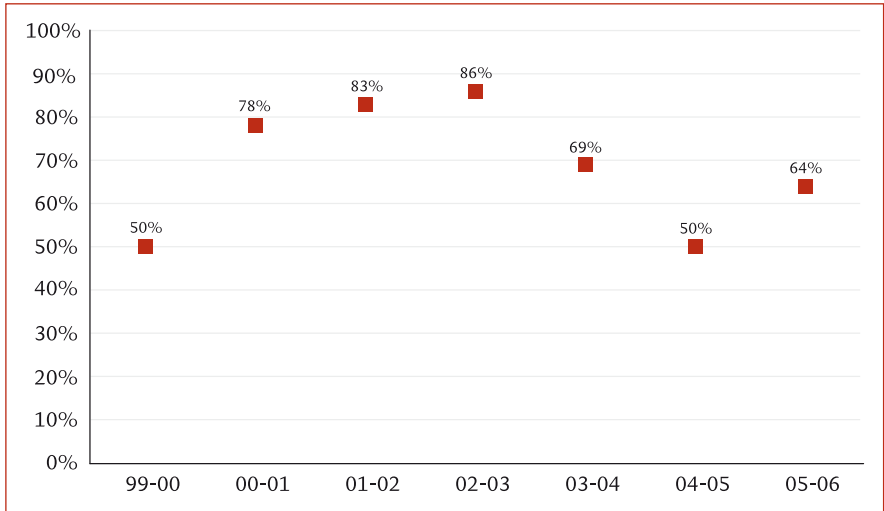
De waardering van het afnemend beroepenveld blijkt tevens uit het feit dat de voorbije 5 jaar 4 maal een student van de Vrije Universiteit Brussel de jaarlijkse prijs voor een eindverhandeling van de KVBA gekregen heeft. De commissie maakt daarbij wel een kanttekening dat de wetenschappelijke oriëntatie van de eindverhandelingen die zij onderzocht heeft beperkt is (*zie hoger*). De commissie heeft ook examenvragen ingekeken om inzicht te krijgen in het niveau dat verwacht wordt van de studenten. Dit niveau ondersteunt haar algemeen oordeel dat het gerealiseerde niveau goed is.

In het verleden is er geen internationale studentenmobiliteit mogelijk geweest en ook voor de toekomst bestaan nog geen concrete plannen in die zin. Gezien het (reeds beroepsactieve) doelpubliek is internationale studentenmobiliteit volgens de commissie geen prioriteit, ook al zou Brussel als hoofdstad van Europa een grote aantrekkingskracht kunnen hebben op buitenlandse studenten.

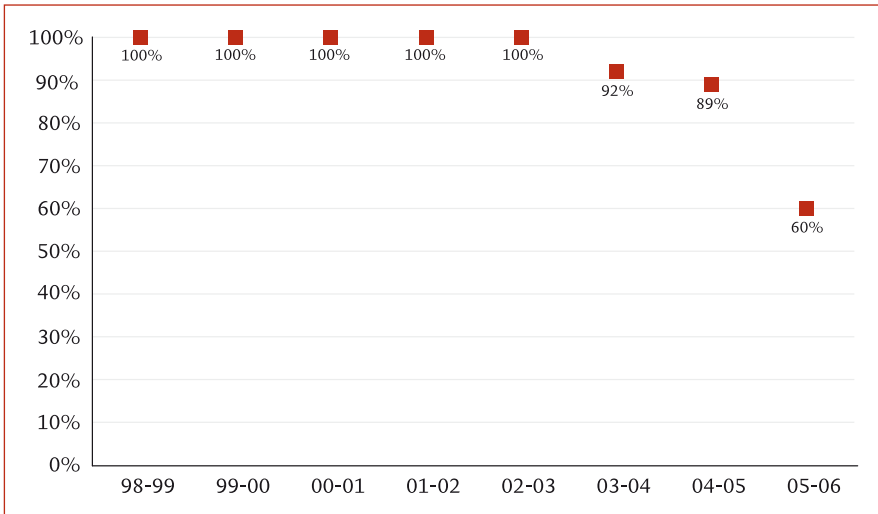
6.2. Onderwijsrendement

De commissie beoordeelt het onderwijsrendement als goed.

De slaagpercentages van de GAS- en GGS-opleiding worden respectievelijk weergegeven in grafiek 2 en 3. In de GAS-opleiding bedraagt het slaagpercentage sinds 1999 gemiddeld ongeveer 70%. In het tweede jaar van de opleiding, de GGS-opleiding, is het slaagpercentage gemiddeld hoger dan 90%. De commissie vindt deze slaagpercentages, zeker gezien het doelpubliek dat de studie vaak combineert met professionele activiteit, goed.



Grafiek 2: Evolutie slaagpercentages van de studenten van de GAS-opleiding (1999-2006)



Grafiek 3: Evolutie slaagpercentages van de studenten van de GGS-opleiding (1998-2006)

Tabel 1 geeft de doorstroomanalyse van de opleiding sinds 1999 weer. Van de 30 studenten die sindsdien afgestudeerd zijn, hebben slechts 4 studenten studieduurvertraging opgelopen. De commissie vindt deze doorstroomcijfers goed.

Tabel 1: Doorstroomanalyse van de GAS- en GGS-opleiding (1999-2006)

Afstudeerjaar	Op tijd	+ 1 jaar	+ 2 jaar	Totaal	Gem	Jaren	Maanden
1999-2000	2			2	2,00	2	0
2000-2001	2			2	2,00	2	0
2001-2002	6			6	2,00	2	0
2002-2003	3			3	2,00	2	0
2003-2004	7	1	1	9	2,33	2	4
2004-2005	4	2		6	2,33	2	4
2005-2006	2			2	2,00	2	0
Totaal	26	3	1	30	2,10	2	1
Procentueel	86,7%	10,0%	3,3%	100,0%			

Conclusie bij onderwerp 6: Resultaten

Vermits de twee facetten van dit onderwerp als positief beoordeeld werden en gezien de bovenstaande motivering, beoordeelt de commissie de resultaten als positief.

Algemeen eindoordeel

De commissie is van oordeel dat de masteropleiding Actuariële Wetenschappen, gezien de onvoldoende beoordeling op het onderwerp Personeel, niet voldoende generieke kwaliteitswaarborgen kan bieden en haar eindoordeel is bijgevolg negatief.

Ondanks dit negatieve oordeel over de opleiding ten tijde van de visitatie en het gebrek aan duidelijk uitgewerkt toekomstplan op dat moment, is de commissie van oordeel dat de opleiding een mooie toekomst voor zich kán hebben. De opleiding heeft ten eerste een lange geschiedenis en een goede reputatie. Afgestudeerden van deze opleiding hebben een sterk professioneel gericht profiel en zijn goed opgeleid om hun taak als actuaaris op te nemen. De goede contacten met het afnemend beroepenveld en de kwaliteiten van deeltijdse docenten die ook deeltijds actief zijn als actuaaris zijn hier niet vreemd aan. Ook het feit dat de opleiding in Brussel georganiseerd wordt, dicht bij de hoofdkwartieren van belangrijke verzekeraars en financiële instellingen, biedt een niet te onderschatten kans om studenten die de opleiding samen met hun professionele bezigheid willen volgen, te blijven aantrekken. Gezien dit specifieke studentenpubliek heeft de opleiding voor een éénjarige master-na-masteropleiding gekozen die aansluit bij een tweejarige initiële masteropleiding in de wiskunde of de (toegepaste) economische wetenschappen. Alle andere Belgische instellingen hebben gekozen voor een tweejarige initiële masteropleiding in de actuariële wetenschappen, zij het dat deze aan de K.U.Leuven tot op heden nog niet in die vorm werd goedgekeurd. De commissie heeft er in dit rapport op gewezen dat de kwaliteit van de éénjarige master-na-masteropleiding enkel zal kunnen gewaarborgd worden op voorwaarde dat de voorkennis van de instromende studenten voldoende hoog is.

Rekening houdend met het feit dat de kern van de opleiding op heden gevormd wordt door drie deeltijdse ZAP-leden, van wie er twee bovendien niet ver van hun emeritaat staan, vindt de commissie dat er dringend bijkomende investeringen in de opleiding noodzakelijk zijn. De opleiding verdient een sterkere verankering in de Vrije Universiteit Brussel, door middel van minstens één voltijds ZAP-lid dat gespecialiseerd is in (een van) de kernthema's van het actuaariaat en de opleiding kan dragen. Dit pleidooi doet niets af aan de kwaliteiten van de huidige deeltijdse docenten en de voltijdse ZAP-leden die ondersteunende opleidingsonderdelen aanbieden. Zowel deeltijdse ZAP-leden met praktijkervaring als voltijdse ZAP-leden uit ondersteunende domeinen zijn strikt noodzakelijk voor het aanbieden van een kwalitatieve opleiding, maar de universitaire realiteit vereist een verankering in de vorm van een voltijds ZAP-lid, dat de opleiding kan coördineren, maar ook de nodige onderzoeksprojecten kan uitbouwen en jonge onderzoekers aantrekken, ondermeer via externe financiering. Een sterke onderzoeksgroep is namelijk essentieel om een plaats binnen de universiteit te behouden en de nodige middelen te verwerven om de opleiding te blijven aanbieden.

Ten slotte wenst de commissie haar steun uit te spreken voor samenwerkingsplannen die uitgewerkt worden. Ze heeft tijdens haar bezoek aan de opleiding van een aantal vertegenwoordigers van het afnemend beroepenveld vernomen dat die voorstander zouden zijn van een samenwerkingsverband tussen alle Belgische aanbieders van actuariële opleidingen (UCL, K.U.Leuven, ULB en de Vrije Universiteit Brussel zelf). De opleidingsverantwoordelijken denken onder andere aan een versterking van de samenwerking met de Universiteit Gent en de Université Libre de Bruxelles. Al deze opties bieden volgens de commissie kansen voor de versterking van de actuariële wetenschap binnen de Belgische universiteiten en de verhoging van de studentenaantallen en verdienen dus grondig onderzocht te worden. De Vrije Universiteit Brussel zal echter sowieso extra moeten investeren in de actuariële wetenschappen om samenwerking ook voor een andere instelling mogelijk te maken. De commissie hoopt van harte dat de Vrije Universiteit Brussel dit zal doen. Een groei van het aantal afgestudeerden is namelijk zeer wenselijk. De vraag naar actuarissen blijft groeien en het beroepenveld waarin actuarissen terechtkomen, wordt steeds breder.

Samenvatting van de aanbevelingen van de visitatiecommissie, in het kader van het verbeterperspectief

In het kader van het verbeterperspectief beveelt de commissie voor de opleiding Actuariële Wetenschappen in eerste orde aan:

- minstens één voltijds ZAP-lid aan te werven dat gespecialiseerd is in (een van) de kernthema's van het actuariaat en de opleiding kan dragen,
- een of meerdere doctoraatsstudenten aan te trekken om de continuïteit van de opleiding te versterken,
- AAP-leden aan te werven die onderzoek doen naar (een van) de kernthema's van het actuariaat,
- de opleidingsverantwoordelijken meer controle te geven over het personeelsbeleid voor de eigen opleiding,
- daarnaast verder te zoeken naar externe middelen ter ondersteuning van de opleiding en het wetenschappelijk onderzoek,
- de voordelen van mogelijke samenwerkingsverbanden, in het bijzonder met de ULB, te onderzoeken en deze samenwerkingsverbanden uit te bouwen,
- de aandacht voor wetenschappelijke vaardigheden in de opleiding te versterken, in het bijzonder in het kader van de masterproef,
- erover te waken dat de studenten die instromen in de nieuwe éénjarige master-na-masteropleiding een vergelijkbare basis hebben als de huidige studenten na het succesvol afwerken van de GAS-opleiding,
- studenten tijdig en goed voor te lichten over de vereiste voorkennis, zodat zij ook al in de initiële masteropleiding het meest geschikte traject kunnen volgen.

Verder beveelt de commissie ook aan:

- de opleidingsonderdelen die betrekking hebben op 'Niet-Leven' nog meer te contextualiseren en de aansluiting met de beroepspraktijk verder te versterken,
- de aandacht voor risicomanagement en modellering verder te versterken,
- overlappingsen (in de tijd) van opleidingsonderdelen te vermijden,
- de meerwaarde van het gebruik van het elektronisch leerplatform PointCarré te onderzoeken en er eventueel intensiever gebruik van te maken,
- onderwijzend personeel sterker te stimuleren deel te nemen aan onderwijskundige professionalisering met het oog op vernieuwende onderwijsvormen,
- nog meer aandacht te besteden aan het stimuleren van de studenten om aan onderwijs-evaluaties deel te nemen,
- regelmatig gestructureerd overleg te voeren met de ZAP-leden betrokken bij de opleiding.

De commissie heeft vernomen dat sinds haar bezoek concrete stappen gezet zijn om tegemoet te komen aan een aantal essentiële verbeter suggesties. De commissie meent dat dergelijke initiatieven een positieve bijdrage kunnen leveren aan de gesignaleerde aandachtspunten.

IV



Katholieke Universiteit Leuven
Master of Financial and Actuarial Engineering

Foreword

In accordance with its mission, the assessment committee presents in this report its evaluation of the six themes from the frame of reference for accreditation as well as a global assessment, which will form the basis for the NVAO's accreditation. The assessment committee also makes recommendations for further optimisation of the quality of the education.

In accordance with the VLIR/VLHORA-guidelines, the six themes have been assessed on the basis of the aspects defined in the VLIR/VLHORA evaluation framework and on the associated assessment criteria which has been defined in the NVAO's accreditation framework. The committee has formed its assessment on the basis of the information contained in the self-evaluation report. During the assessment visit to the programme (December 18–20, 2007), this information has been completed with conversations with the faculty management of the involved faculties, course co-ordinators, lecturers, supporting academic, administrative and technical staff, students and alumni and with documentation of the faculty and the programme, visits to facilities such as classrooms, computer room and library, the study materials made available by the programme and exams, papers and master's theses of students.

Per aspect the committee grants the score unsatisfactory, satisfactory, good or excellent. The score 'unsatisfactory' indicates that the aspect does not fulfil the basic quality demands and that policy makers should pay attention to the aspect. The score 'satisfactory' implies that the basic quality demands for this aspect of the programme are met. The score 'good' indicates that the quality stands out above the basic quality and the score 'excellent' implies that, on the assessed aspect, the quality of the programme can serve both nationally and internationally as a best practice. It has been made transparent in the report how the committee came to its score per aspect, taking into account the associated assessment criteria, to make clear on

which elements the score has been based. It has been tried to motivate the appraisals as much as possible with facts and analyses. The appraisals are also based on a comparison with internationally used standards in the domain. On the basis of the aspect scores, the committee then gives a summarising evaluation on the theme level. A positive (+) theme evaluation implies that the basic quality demands are met. A negative (-) theme evaluation implies that the basic quality demands are not met. Finally, the committee gives an overall judgement about the basic quality of the complete programme at the end of the report.

The elements which could be improved and recommendations for quality improvement have been identified together with the relevant aspect in the report. For the programme management, an overview of the recommendations for further optimisation of the quality of the education is repeated at the end of the report.

It was decided to write the self-evaluation report as well as the assessment report in English to make it accessible for students, alumni and the vocational field.

Introduction

At the K.U.Leuven, actuarial courses were first organized during the academic year 1941-1942 and students' results have been recorded manually since then in a special register. Until the end of the 1960s, the two-year programme mainly focused on the life insurance actuary. In 1968 full-time actuarial professors were appointed for the first time. The programme was reformed by introducing non-life insurance courses. In the beginning of the 1990s, a 5-year collaboration agreement was signed between the actuarial departments of Vrije Universiteit Brussel and K.U.Leuven. The programme was reformed and professors from both universities were teaching in Leuven. The agreement, however, was not renewed. After this collaboration, the K.U.Leuven professors of the actuarial department felt the need to attract students from abroad, to increase the numbers of students, as well as to be able to attract the best international PhD students. At that time, this internationalization was only possible by splitting the traditional actuarial two-year programme (offered by the Faculty of Economics and Applied Economics) into two one-year programmes: a one-year 'Master in Verzekeringen' organised in Dutch, and a one-year Master of Financial and Actuarial Engineering (MFAE), taught in English and organized jointly by the Faculty of Economics and Applied Economics and the Faculty of Sciences. Only the Master of Financial and Actuarial Engineering programme is subject to this external assessment.

The programme management sees the current situation of two one-year programmes as sub-optimal and wants to integrate the two programmes again in a two-year initial master programme taught in English. Several plans have been elaborated, but until the assessment visit no formal approval had been obtained.

Theme 1: Aims and objectives

The main goal of the programme is “to provide the students with a sound knowledge of finance and actuarial science. They develop the capabilities to understand current and future problems and solutions in the actuarial and financial context. After graduation and being graduated in the ‘Master in de Verzekeringen’, students satisfy the requirements of the ‘Koninklijke Vereniging van Belgische Actuarissen’ (KVBA – Royal Association of Belgian Actuaries).”

This main goal is translated in the following learning outcomes:

After having completed the programme successfully, the students:

- are equipped with fundamental and conceptual knowledge of the mathematical and economic aspects of financial theory and insurance techniques;
- are able to select, combine and apply quantitative methods and models to find creative solutions for complex financial/actuarial problems that involve risk or uncertainty;
- possess enhanced capacities that are essential to be successful in a rapidly changing business environment (analytical, critical, conceptual, problem solving and decision making capabilities and skills);
- are able to actively participate in new knowledge development processes by conducting research, not only in an academic context, but also in view of a professional career;
- are able to stay up-to-date with the advances in actuarial sciences by following up and familiarizing themselves with new insights, developments, results and methods;
- are able to communicate and report adequately on financial and actuarial topics.

1.1 Level and orientation

The committee assesses the level and orientation of the programme as being excellent.

The assessment committee observes that the aims of the programme are well formulated. The final objective has been translated carefully in learning outcomes for the course. The teaching staff clearly knows and applies these aims and objectives.

The alignment of the objectives with the master’s competences in the Decree is very consistent. The programme focuses on offering advanced knowledge of and insight into the mathematical and economic aspects of financial theory and insurance techniques, including recent scientific developments. Further, the master programme emphasizes on developing the capacity to conduct and apply scientific research both in an academic and in a professional banking or insurance context. Moreover, the attitude of life long learning is promoted strongly and communication skills are an explicit objective.

The main source of information for potential applicants of the MFAE programme is the MFAE-website. In addition, there is an annual information day organized at

K.U.Leuven for prospective students. Often the university is also present with brochures, posters and staff at other fairs. Incoming students receive further information through an information session that is organized at the start of the academic year. Further, each instructor of the programme informs the students of the goals of his course.

1.2. Discipline-specific requirements

The committee assesses the discipline-specific requirements as being good.

The more than 60 years of experience in actuarial education have led to a well-defined profile of the programme. The Dutch language ‘Master in de Verzekeringen’ and the English language ‘Master of Financial and Actuarial Engineering’ are seen as one trajectory to become a recognised actuary. This trajectory meets very well the requirements set by the Royal Belgian Society of Actuaries. The fulfilment of these criteria leads to automatic recognition as an Actuary in Belgium and abroad. In the ‘Master in de Verzekeringen’, the fundamental concepts of the insurance business are taught. The MFAE builds on this programme to teach actuarial techniques and mathematical finance through a thorough quantitative perspective. The profile and the objectives are completely in line with the committee’s frame of reference and international academic practice. The committee values specially the focus on both the development of research and professional skills.

The profile of the programme is, however, mostly focused on the actuarial training, while the title of the programme suggests also a strong financial engineering component in the programme. The committee fully welcomes the actuarial profile of the programme and suggests keeping the current profile of the programme. The committee, nevertheless, sees the current title as a bit misleading as the financial engineering component in the programme could be stronger. This is also indicated by some foreign students who did not assess the profile of the programme correctly and aren’t (completely) satisfied with the programme due to the less emphasized financial engineering component. So, the committee suggests changing the title of the programme to clearly indicate that the main objective is an actuarial training, although with a significant financial component.

The MFAE has a strong international focus. It aims at attracting good international students who want to specialise in actuarial techniques and mathematical finance. Exchange programmes exist with several foreign universities and foreign researchers are invited regularly to give guest lectures. Plans are being developed for a collaborative international programme in Finance and Insurance together with some partner institutions. Up to the moment of the assessment visit, no recognition was received for this initiative.

The separate existence of two one-year programmes, which form together the recognised training for an actuary, is not optimal. The programme management thus seeks for integration in one two-year initial master programme. The committee is convinced that this integration would contribute to an even stronger profile of the programme (*see further*).

General conclusion related to theme 1: Aims and objectives

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the aims and objectives as being positive.

Theme 2: Curriculum

Description of the master's programme

Scheme 1 gives an overview of the programme of the Master of Financial and Actuarial Engineering. There are three main groups of courses: Actuarial courses (18 credits), Finance courses (18 credits), and Statistics (6 credits). The MFAE programme is completed by a master's thesis (18 credits). There are no elective courses.

Scheme 1: Master of Financial and Actuarial Engineering

1st semester (32 credits)				
Advanced Non-life Insurance Mathematics (6 credits)	Advanced life Insurance Mathematics (6 credits)	Actuarial Models (6 credits)	Fundamentals of Financial Mathematics (6 credits)	Master's thesis (8 credits)
2nd semester (28 credits)				
Advanced Topics in Risk-Management (6 credits)	Financial Engineering (6 credits)	Statistical Modelling of Risk (6 credits)	Master's thesis (10 credits)	

2.1. Correspondence between the aims and objectives, and the curriculum

The committee assesses the correspondence between the aims and objectives, and the curriculum as being excellent.

Based on the investigation of course materials and interviews with students, alumni and staff, the committee concludes that the correspondence between the objectives of the programme and the content of the curriculum is very good. The curriculum as it is organised clearly enables the students to attain the formulated final qualifications. The contents of the course components are up-to-date, based on high level research and clearly contribute to the final goals of the programme. The curriculum builds on the knowledge and insight gained in the Master in de Verzeke-

ringen. It equips the student with fundamental and conceptual knowledge of the mathematical and economic aspects of financial theory and insurance techniques and enhances students' capacities to be successful in a rapidly changing business environment.

The committee furthermore supports the integration of the MFAE with the Master in de Verzekeringen. This would also allow to integrate the two master's theses and to free some space in the programme for additional courses.

2.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation as being good.

The course clearly focuses on broadening and deepening the knowledge of students in risk theory, finance and statistics. The courses are taught taking into account new advancements in knowledge and integrate recent research findings. Use is made of recent international textbooks and papers, several of which are written by the course coordinators themselves.

Most courses are taught by active and high level researchers and are strongly related to current important issues in the related fields. The master's thesis gives students the opportunity to perform individual or team research, under the supervision of the academic staff. This research can be either practically oriented, in which case the student applies advanced research methodologies to specific insurance and finance problems, or theoretically oriented, in which case the student takes part in the related research activities of the research group.

A student evaluation in 2006 indicates that the professional orientation of the programme is less explicit. In some courses, guest lecturers from industry are invited. The course coordinators suggest to increase the professional orientation of the programme by integrating input from practice in each course, e.g. by regular invited lectures by practitioners. The committee supports this idea. The (non-compulsory) traineeship that most students perform allows them to become up-to-date with market practices and to be of immediate value for their employers. Furthermore, the programme is linked with the Dexia Financial Engineering Fund and the Fortis Chair and several events have been organized in collaboration with the industry partner (company visits, joint workshops, seminars...).

2.3. Consistency of the curriculum

The committee assesses the consistency of the curriculum as being good.

The sequential structure of the programme is appreciated by the committee (especially when the two one-year programmes are considered as a whole), starting from basic life and non-life actuarial mathematics and then moving smoothly to more advanced topics. Financial mathematics is also covered from fundamentals to specialized subjects. It should be stressed that risk management issues, which become an essential part of the modern actuarial profession, are explicitly dealt with. The interrelations between the course components evaluated positively by the committee. The curriculum strikes a good balance between specialization (advanced courses, the master's thesis) and general education (interdisciplinary courses). In the second semester, time is foreseen for the master's thesis which performs a central role in the research training of the students. The student evaluation carried out in May 2006 indicates that the students are positive about the consistency of the programme. No significant overlap between courses is reported.

All courses are compulsory. A suggestion for further improvement would be to introduce some optional courses allowing the students to specialize in some topic of interest, especially if the programme is integrated with the Master in de Verzekeringen (*see before*).

2.4. Size of the curriculum

The committee assesses the size of the curriculum to be in line with the formal regulations as described in the decree on the restructuring of the Flemish Higher Education. The master programme is a 60 credit programme with duration of 1 year. It follows a one-year Dutch language 'Master in de Verzekeringen' programme. As stated before the committee agrees with the programme management that an integration of these two programmes in a new two-year programme would be positive.

2.5. Workload

The committee assesses the workload as being satisfactory.

The Permanent Steering Committee (POC) has used questionnaires and hearings in order to evaluate study time. The committee values positively that the workload for students is evaluated regularly.

Students and alumni indicate that the combination of the full programme with a part-time job is feasible. This indicates to the committee that the workload is probably slightly too low. In a questionnaire 22 out of 23 students felt that the overall workload is acceptable. The programme management sees this also as an indication that the workload could be slightly raised. This is confirmed to a certain extent

by the hearings organised. The committee suggests evaluating again carefully the workload, and if results indicate a too low workload, considering increasing it by adding some relevant aspects to the course programme.

2.6. Coherence of structure and contents

The committee assesses the coherence of structure and contents of the programme as being satisfactory.

Teaching involves a combination of ex-cathedra lessons with homework, practical exercises sessions and case studies. A limited number of guest lectures guarantee the link between theory and practice. The used teaching methods are in line with the objectives of the programme. The programme management indicates that the K.U.Leuven didactic concept Guided Independent Learning (GIL) is applied in the programme. However, it is not clear to the committee what the specific results of the use of this didactic concept are.

The committee has checked the course materials and evaluates the quality of these materials as good. The electronic learning environment TOLEDO (based on Blackboard) is mostly used to provide information and to communicate with students.

2.7. Learning assessment

The committee assesses the learning assessment as being satisfactory.

The assessments methods are determined by the programme committee, based on the proposal of the concerned lecturer. A variety of evaluation methods is used. Written or oral exams are organised at the end of each semester. Permanent evaluation is used to assess exercises, workshops, seminars and excursions. The committee is satisfied with the variety of assessment methods.

The committee has investigated samples of the examinations and assignments and is positive about the quality and relevance of the exam questions. Knowledge acquisition as well as development of skills and attitudes is tested. The assessments relate to the objectives of the course. The committee concludes that the students are properly tested and assessed.

The K.U.Leuven website and the teaching staff inform the students about the used evaluation methods. Teaching staff is clear on the evaluation criteria. This is confirmed by the students in the 2006 student evaluation and by the students the committee interviewed. According to the committee, the students are well informed in advance regarding the evaluation system.

2.8. Master's thesis

The committee assesses the Master's thesis as being satisfactory.

The number of credits allocated to the master's thesis is 18, which is in line with the legal requirements.

The master's thesis aims at describing, discussing and/or solving an up-to-date actuarial and/or financial problem. The student has the choice between a more practically-oriented versus a more theoretically-oriented approach. The subject of the thesis may be based on a case study concerning a (re-)insurance or banking company, a regulator, etc. On the one hand, it is expected that relevant and recent theories concerning the chosen subject are studied and discussed. On the other hand, students are supposed to make a personal and critical contribution. The chosen subject should be approached from an actuarial, financial or statistical point of view. Students have to contact their work leader and/or promoter regularly (at least twice per semester) to report on the progress of his/her work. Students are encouraged to work on a thesis subject in collaboration with another student. In any case, each student has to submit his/her own thesis. Each submitted thesis should contain a section written by the submitter individually in which he/she explains his/her own contribution as well as the collaborator's contribution to the joint work. The committee has read a sample of theses and is satisfied with the quality of these theses. The students show analytical and problem-solving capacity. The master's theses reflect also the student's general critical-reflecting attitude and research orientation.

In a questionnaire, students were asked whether they found that the master's thesis is an essential part of the programme. Half of the students answered positively, half of them negatively. In a focus group discussion, students indicated that a relatively large difference in difficulty level of the subjects and the broad field of topics may be reasons for differences in appreciation. The programme steering committee (POC) defined guidelines for thesis criteria based on this evaluation. The committee suggests continued follow up to guarantee good guidance for the master's thesis.

As mentioned before, the programme coordinators would like to integrate the master thesis in the Master of Financial and Actuarial Engineering and the one in the 'Master in de Verzekeringen' (15 credits). The committee is convinced that the integration of the two Master's theses would allow strengthening both the guidance and the quality of the research done in the frame of the integrated master's thesis.

2.9. Admission requirements

The committee assesses the admission requirements as being satisfactory.

Table 1 indicates the number of students in the Master of Financial and Actuarial Engineering since 2004-2005. The programme attracted around 50 students in the academic year 2004-2005 and 2005-2006. The introduction of higher tuition fees for non-European students in 2006-2007 had led to a decrease of the student number to 31. This student number is considered as sustainable for the programme.

Table 1: Number of students in the Master of Financial and Actuarial Engineering since 2004-2005

Academic Year	Belgian Students	Foreign Students
2004-2005	21 (39.6%)	32 (60.4%)
2005-2006	28 (56.0%)	22 (44.0%)
2006-2007	23 (74%)	8 (26%)

The programme is aimed at students with a sufficiently sound mathematical background. The following academic masters are admitted: Master of Insurance, Masters of Mathematics, Master of Statistics, Master of (Applied) Economics and Masters in Commercial Engineering. Equivalent masters are admitted on an individual basis.

Next to evidence on the former education, good verbal, analytical and quantitative skills need to be confirmed by a sufficient score on the international Graduate Management Admission Test (GMAT), or equivalent and English-language skills need to be confirmed, either by a degree from a partly or completely English-language institution, or by presenting a sufficient score on a language test (e.g. TOEFL/IELTS). The language test can be waived on the basis of an interview or if English-language proficiency is otherwise clear. All applications are considered individually by the Admission Committee. The application deadline is August 1st for all EU students other than those who enter through the 'Master in de Verzekeringen', and March 1st for non-EU students.

The broad selection criteria allow to the programme both students interested in obtaining recognition as an actuary, and students interested in improving their knowledge of finance and insurance. The former students need to take the Master in de Verzekeringen before entering the master programme as they need the two degrees for recognition. These students are well prepared and have obtained the necessary prior knowledge and skills. The committee appreciates this. The latter students enter with varied background and aren't always well informed about the content of the programme. In the opinion of the committee, it is essential to inform these students well about the exact profile of the programme. Students and staff indicated to the committee that this is not always the case. The committee values positively

the introductory sessions on software packages (e.g. Matlab, SAS and R) which are provided for interested students in the beginning of the academic year.

General conclusion related to theme 2: Curriculum

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the curriculum as being positive.

Theme 3: Staff

3.1. Quality of staff

The committee assesses the quality of staff as being good.

The committee appreciates in general the high quality of the individual staff members offering courses in the master programme. Students testify that staff has good expertise with respect to contents, education and didactics.

The committee appreciates senior staff's commitment to teaching. Junior academic staff is, however, less involved in teaching and in discussions about the programme. The junior academic staff the committee spoke with doesn't appear to be completely part of the didactical team providing the programme. The committee suggests that junior staff becomes more involved in the teaching of the programme. Junior staff can contribute to new and relevant inputs.

Senior academic staff members are appointed in view of anticipated new or adapted teaching programmes, retirement of faculty, unavailability or dismissal of teaching staff, and temporary teaching assignments. Vacancies are published on the Internet and/or via other channels. Candidates have to submit an extensive dossier including information about their curriculum vitae, research achievements, teaching, and other experience. The assessment committee, which is appointed at the faculty level, investigates the applications and formulates a recommendation for the Group Management Committee (Groepsbestuur), the Common Administration: Board of the Academic Council and the Executive Board. A first appointment as professor is temporary and is offered for a maximum of three years.

Members of the academic staff are evaluated on their performance every five years. Independent academic staff members are evaluated on the manner in which they have carried out the general duties assigned to them, including teaching tasks, research tasks and, in some cases, service-related tasks. Decisions are made by a general evaluation committee at the group level, i.e., humanities, science & technology or biomedical sciences.

Training in teaching techniques is offered both at university and at other levels. At university level initiatives are organized by the central educational support unit ('Dienst Universitair Onderwijs' or DUO/ICTO). Traditionally, this unit offers target group-specific as well as tailor-made programmes. Target group-specific programmes address specific groups such as novice faculty members. The general programme is open to both faculty members and teaching assistants. Seminars and workshops are organized about relevant didactic themes, such as research-based teaching, evaluation and assessment, collaborative learning, formative evaluation, evaluation using multiple choice questions, et cetera. Special attention is paid to supporting professors' use of TOLEDO. In order to meet the academic community's needs adequately, the general programme is adapted every year. Besides this central educational support, faculty members and teaching assistants can participate in educational training initiatives within their faculty. A number of educational support units at faculty level have developed discipline-specific support. Individual support is provided to professors who want to optimise their teaching.

3.2. Requirements for professional/academic orientation

The committee assesses the requirements for professional/academic orientation as being excellent.

The committee has investigated a sample of the publication titles of the academic staff. The academic staff members, involved in teaching the programme, perform active high level fundamental research. The programme can rely on the scientific support of joint research programmes: GOA 2002-2006 (Actuarial, Financial and Statistical Aspects of Dependencies in Insurance and Financial Portfolios) and GOA 2007-2012 (Risk Modelling and Valuation of Insurance and Financial Cash Flows, with Applications to Pricing, Provisioning and Solvency). The committee appreciates the high international standards of this research. According to several surveys, the K.U.Leuven actuarial research is ranked amongst the top-10 research groups worldwide.

Due to the close link between research and teaching activities, up-to-date knowledge is provided to the students. The own expertise is complemented with international guest lecturers with expertise in specific fields of actuarial research.

Next to their research activities, teaching staff is also involved in actuarial consulting activities, which allows them to link the content of the courses to the application in actuaries' professional activities. This is completed with the courses of some guest lecturers who are working in private companies or government institutions. As an illustration, the course 'Banking and Insurance Solvency' is taught by the head of the Solvency II project at the European Commission.

3.3. Quantity of staff

The committee assesses the quantity of staff as being satisfactory.

The senior academic personnel engaged in the Master of Financial and Actuarial Engineering consists of 5 staff members (4.35 FTE). All of them are also actively involved in teaching in other programmes. The junior academic staff of the departments of 'Statistics' and 'Accountancy, Finance and Insurance' is giving a limited number of exercise courses or acts as a work leader for a master's thesis. A part-time administrative secretary supports the programme and takes care for administrative and admission procedures.

The staff capacity is satisfactory when related to the student number compared with other programmes. However, because of the situation where in the two years of actuarial education ('Master in de Verzekeringen' and MFAE), the teaching staff involved needs to supervise the master theses in both years and this brings the capacity to a critical level. Steps are already taken to enhance this situation. Last year a part time position was created. Collaborations with the industry (Actuarial Contact Program (Fortis, KBC, Dexia, Swiss Life), the Fortis Chair on Financial and Actuarial Risk Management and the Dexia Financial Engineering Fund) allow part of the thesis supervision to be performed by qualified personnel from industry. The committee values these initiatives positively. The committee hopes that the funding for the programme can be further increased, as a larger staff would allow attracting more students. In this way, the K.U.Leuven could contribute to reducing the lack of actuaries on the labour market.

General conclusion related to theme 3: Staff

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the staff as being positive.

Theme 4: Services

4.1. Facilities

The committee assesses the facilities as being good.

During the assessment, the committee visited the buildings, classrooms, computer infrastructure and libraries that are used for the master programme. Classes take mostly place in the Hogenhevelcollege. The quality of the classrooms is satisfying the committee, the teaching staff and the students. The classrooms are equipped with up-to-date information technology and communication tools. Computer facilities are at students' disposal at several locations in Leuven. LUDIT (Leuven University Centre

for Informatics and Telematics) offers services ranging from PC-rooms with extended opening hours, network connections in student housing (KotNet-project), renting and selling of PC at reasonable prices, making software application programmes available through campus licences. Through LUDIT, students also have access to TOLEDO, the helpdesk, wireless access points spread out over the university buildings and campuses, their own mailbox and their own private network storage capacity. Within the Faculty of Business and Economics, all information technology matters are centralized and arranged by the Information Technology Service. Under the guidance of the Faculty Commission for Information Technology, the service is responsible for the planning, implementation and maintenance of all hardware and software purchases, as well as other related services. PCs in computer rooms feature, apart from the normal Office applications, specific software for academic purposes, such as SAS, SPSS, E-Views, STATPro, GAMS, Delphi and Eiffel. A few computers are equipped with specific academic software. The committee is of the opinion that the computer facilities meet all current standards for educational needs, although the availability of computer rooms with the right specific software at the places where teaching is provided isn't always high in the opinion of some students the committee spoke with.

The Bob Vanes and the Arenberg Library are the two most frequently visited libraries for MFAE students. The committee emphasises the extensive and valuable hard copy and electronic collection of relevant journals and books available in the two libraries. In order to allow the students enough time during the week to conduct research, the libraries have long opening hours. Extended opening hours apply before and during examination periods.

4.2. Tutoring

The committee assesses the tutoring as being satisfactory.

Potential students are informed on admission requirements and on the programme through the Leuven School of Business and Economics website and brochures. Also informal contacts and participation at fairs and other information sessions are used to inform potential students. As said before, the information about the profile of the programme could be improved, concerning the committee, especially for the foreign students. During the course of the programme TOLEDO is used to inform students. The Administrative Secretary deals with all administrative procedures and helps students with all kind of study-related administrative questions.

The programme has opted for instructional teams. For each course, an instructional team is formed with the senior academic staff member responsible for the course, possibly supported by one or more members of the junior academic staff. The instructional team is responsible for the guidance of the learning process (e.g. through the study material on offer, the active processing of subject matters, forma-

tive feedback, etc.), but has also a role in the psychosocial guidance of the student. For psychosocial problems which require special expertise, students are referred to centrally organised university services. International students get information and assistance from the Social Service International Students. Based on the discussion with the students and alumni and the evaluation results, the committee is of the opinion that the study guidance is satisfying.

If problems occur during the exam period, students can report this to the Ombuds-person, a teaching assistant assigned with the task of hearing student complaints and mediating between students and teaching staff. Students can also contact their POC representative to discuss the problem in the POC, or they can discuss the problem with the Programme Director. If the problem is not resolved, the student can lodge a formal complaint with the chairperson of the Examination Committee. Over the last few years, no major problems were reported with respect to the MFAE programme exams.

General conclusion related to theme 4: Services

As the two aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the services as being positive.

Theme 5: Internal quality assurance

Description

Quality assurance at the K.U.Leuven is based on four pillars: defining the educational frame of reference, implementation of the education, evaluation of the education and follow-up.

The Programme Steering Committee's (POC) task is to ensure the quality of education. It is responsible for the development of a curriculum which is coherent in content, education and organisation, goes beyond the specific domain and gives the necessary attention to value development. The POC is chaired by the programme director, and consists of senior and junior academic staff and student representatives. It meets at least twice a year.

Once a curriculum is drawn up and implemented, the POC is responsible for continuous follow-up. It also fulfils a key role in educational innovation initiatives. The POC is responsible for continuous quality assurance in relation to the programme. To this end, the POC or a sub-committee coordinates the periodical evaluation of the curriculum as a whole (at least once every eight years) and of the courses separately (every two years). This current system of course evaluation has been launched recently. The evaluation results are automatically included in the teaching portfolio, after the professor has been able to comment on his/her results.

Preparing the self-assessment report, a survey has been sent out to a number of alumni working in the insurance/banking industry. Moreover, focus group discussions have been organised at the end of June 2006 to get an in-depth view of the programme. Lastly, the results of the yearly student evaluation of the courses and the programme have served as a basis for the self-assessment report.

5.1. Evaluations of results

The committee assesses the evaluations of results as being satisfactory.

The current system of course evaluations has been launched recently. Every course is evaluated at least every two year. The committee appreciates this. On programme level evaluations are organised as a preparation for external assessments, every eight years. On an informal basis and based on student's comments, the overall programme can be discussed more frequently in the POC. The committee suggests evaluating the programme as a whole also formally more frequently. This would allow monitoring the interdisciplinary and consistency aspects of the programme better.

The committee has a positive opinion about the way in which the external assessment has been prepared. Students and alumni have been asked to evaluate the programme. Also the POC sub-committee preparing the self-assessment report has done a good job. The self-assessment report is well structured and indicates openness to change and to improving the quality of the programme. Strengths and opportunities for improvement have been clearly defined. The discussions during the assessment site visit were also held with an open mind and are a good addition to the information outlined in the self-evaluation report.

5.2. Measures for improvement

The committee assesses the measures for improvement as being good.

The programme management updates the programme continuously based on feedback from students, teachers, alumni and the professional field as well as based on the Belgian Syllabus, which defines the requirements for a programme to get its graduates recognised as actuaries. For instance, a new course in 'Advanced Topics in Risk Management' has been introduced in 2007-2008 to pay more attention to risk management. Furthermore, several course titles have been changed to better describe the course content and clearer expectations for the master's thesis have been defined. The introduction of a Fortis chair and a Dexia Fund create new opportunities to strengthen education.

5.3. Involvement of staff, students, alumni and the professional field

The committee assesses the involvement of staff, students, alumni and the professional field as being good.

The teaching staff meets not only during the POC meetings, but quite often in a more informal way, to discuss current issues concerning research and education. The junior staff has also representatives in the POC, but in the perception of the committee the junior staff is not actively involved in internal quality assurance within the programme.

Student involvement is mostly guaranteed by the above-mentioned evaluations and through POC meetings. Moreover focus group discussions are planned to take place yearly. Also informally they can comment on the programme. Alumni have been involved in the preparation of the external assessment through a questionnaire. The committee suggests involving alumni regularly in internal quality assurance of the programme too.

Contacts are organised with the insurance and finance industry via the Actuarial Contact Programme (ACP) which supports regular meetings between the members of the teaching staff and representatives of Fortis, KBC, Dexia and Swiss-Life. During these meetings, recent research developments and pedagogical changes of the MFAE programme are discussed. Also the 'Fellows of the Hogenhevelcollege', a group of respected captains of industry, are asked about their opinion concerning the MFAE programme. Also informal exchange between teaching staff and the professional field occurs frequently. The committee values the initiatives which are taken to get feedback on the programme from the professional field.

General conclusion related to theme 5: Internal Quality Assurance

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the internal quality assurance as being positive.

Theme 6: Results

6.1. Achieved learning outcomes

The committee assesses the achieved learning outcomes as being excellent.

The programme realises its objectives and it is producing academically well-trained actuaries. The student evaluations indicate that the 2005–2006 programme attained the major goals of the programme. Based on the discussions with students and alumni, the committee is convinced that the strong interaction with renowned researchers and the relevance of the teaching for professional practice help students achieving the aims of the programme. The student evaluation carried out in 2005–2006 confirmed the fact that students consider the programme as appropriate in allowing them to develop their capabilities in independently formulating, analyzing and solving problems, in providing useful knowledge and skills for their future careers and in helping them meet challenges in the international banking/insurance environment. As described before, the committee is also positive about quality of examination and assignments and the quality of master's theses. In sum, the committee is convinced that at the end of the course, students are very well prepared for their work in insurance or banking industry.

The master programme has a strong international focus. More than half of the students are foreign. Every year also some Erasmus-Socrates students from different regions are welcome. Belgian students willing to take part in an exchange programme are dealt with on an individual basis. Formal exchange treaties exist with the University of Barcelona and the University of Turin, amongst others. Until now, no Belgian students have taken part in an exchange programme. The main reason for this is that most of the Belgian students work part-time, in the framework of a traineeship, which makes them less flexible in terms of studying abroad.

6.2. Study progress

The committee assesses the study progress as being good.

The programme started in its current form in 2004–2005. The average success rate amounts 80%. The committee is convinced that the thorough selection procedure contributes to the high success rate, although Belgian students are doing better than foreign ones (89% versus 70%). As seen in Table 2, among graduated students, 90% do so within the expected study time of 1 year. The committee evaluates this as good.

Table 2: Effective study time for graduating students since 2004

Graduation year	On time	+ 1 year	Total	Average	Years	Months
2004-2005	42		42	1,00	1	0
2005-2006	30	8	38	1,21	1	3
Total	72	8	80	1,10	1	1
Percentage	90%	10%	100%			

General conclusion related to theme 6: Results

As all the aspects of this theme have been evaluated positively and given the above formulated motivation, the committee assesses the results as being positive.

General opinion of the programme

The assessment committee assesses that the Master of Financial and Actuarial Engineering has enough guarantees for generic quality since the different criteria of the six subjects from the accreditation framework are satisfied. The final conclusion of the committee is therefore positive.

Summary of the recommendations of the assessment committee for improvement within the framework of the prospects for improvement

With regard to improvements to be made in the programme, the assessment committee recommends the following points for implementation:

- to integrate the two one-year programmes into a two-year master programme which corresponds to the recognised training for an actuary,
- to publicize and improve the visibility of the programme to attract more students and henceforth satisfy the large demand on the market place,
- to change the title of the programme to clearly indicate that the main objective is an actuarial training,
- to clearly inform potential students about the profile of the programme,
- to foster collaboration with other universities and student mobility,
- to further increase the professional orientation of the programme by integrating input from practice in each course, e.g. by regular invited lectures by practitioners,
- to introduce some optional courses,
- to evaluate again carefully the workload, and if results indicate a too low workload, to consider increasing it by adding some relevant aspects to the course programme,
- to improve awareness of senior and junior teaching staff and students of the GIL policy at K.U.Leuven,
- to continuously follow up master's thesis guidance,
- to take care that junior staff is more involved in the teaching of the programme,
- to evaluate the programme as a whole formally more frequently (more than once every eight years) to get better feedback not only from the students and alumni but also from the working field, and
- to enhance contacts with alumni.





Bijlage 1

Curricula vitae

Adelin Albert studied mathematics at the University of Liège and graduated in 1970. He trained for one year at the Department of Computing and Statistics, Clinical Research Centre, Northwick Park Hospital, Harrow, Middlesex and obtained in 1972 a certificate in medical statistics at the London School of Hygiene and Tropical Medicine. In 1978, he defended a PhD thesis on discriminant analysis at the University of Liège. From 1980 to 1982, he sojourned at the Laboratory of Applied Studies, Division of Computer Research and Technology, National Institutes of Health, Bethesda, Maryland, as a Fogarty international research fellow. Upon return to Belgium, he passed the degree for higher education in biomedical sciences at the Faculty of Medicine, University of Liège. In 1988, he was appointed professor of medical computing and biostatistics. He also teaches applied and theoretical statistics at the Faculty of Sciences. He is currently director of the School of Public Health and vice-dean of the Faculty of Medicine. Member of several scientific associations, he was president of the Belgian Medical Informatics society, the Adolphe Quetelet society and more recently the Belgian Statistical Society. In 2004, he was nominated as member of the Belgian Royal Academy of Medicine. Since 1989, he serves as statistical expert for the Belgian External Quality Assessment programme in laboratory medicine, Ministry of Public Health. His research interests include multivariate logistic regression, survival analysis, clinical decision-making, quality control and epidemiology. Author or co-author of five books and numerous scientific papers in the field of biostatistics and medical computing, he has a wide expertise in the development and application of statistical methods in medicine and biomedical sciences.

Willy Lenaerts graduated in mathematics at the Université Libre de Bruxelles (ULB) in 1967 and obtained a degree in actuarial sciences from the same university in 1970. He worked as a research assistant for a couple of years and taught a course on damage insurance in the actuarial programme at the Vrije Universiteit Brussel (VUB). The major part of his career has been spent in the public or semi-public sector, mostly in the insurance department of a public saving bank ASLK-CGER, until he retired in 2003. He also worked for Fortis and other financial institutions. He was the president of the Supervisory Office for Insurance in Belgium and also an attaché to the office of the Ministry of Economic affairs. For 8 years, he officiated as the general secretary of the International Association for Actuaries. He organised several workshops and round tables, promoting and organising the actuarial profession. In particular, he organised and chaired the World Congress of Actuaries which took place in Brussels in 1995. He possesses not only a remarkable and long-standing experience but also a unique vision of the world of insurance and finance in Belgium and on the international scene. His advices in the domain of actuarial sciences are highly esteemed.

Jacques Hagenaars studied sociology at the University of Tilburg. He specialized in social science research methodology and graduated in 1969. During the years 1969 and 1970 he was a fellow at the Political Centre of the Institute for Social Research, University of Michigan. He obtained his PhD in 1985 at Tilburg University with a thesis on the loglinear analysis of longitudinal categorical data and latent class models. Since 1987, he is full professor of Social Science Research Methodology at the Faculty of Social Sciences, Tilburg University. His main research interests concern the related subjects of causality, research design, and quality of surveys, as well as the analysis of longitudinal data, categorical data analysis, and latent variable (class) models. He published numerous articles on these topics in international, leading journals. He also wrote a Dutch textbook on social science methodology, three books on longitudinal loglinear analysis and latent class models, two edited volumes on applied latent class analysis and on the results of the European Values Study, respectively. He has served Tilburg University in many capacities (vice-president of the University Council, Department Chair, vice-dean for research and dean of the Faculty of social sciences) and has been chair or member of many national and international standing and ad hoc committees in the scientific field. He has been guest professor at Catholic University Leuven, Catholic University Brussels, Universities of Delaware, Nebraska, and Ljubljana and has taught many courses in these and other universities. At present he is chair of the board of the Dutch national PhD school in psychometrics and sociometrics (IOPS) and member of the steering committee of the European Values Study and chair of its Methodology Committee.

Michel Denuit graduated in mathematics (option statistics) in 1994 and in actuarial science in 1996 at the Université Libre de Bruxelles (ULB). He obtained a PhD degree in statistics in 1997 from the same university. He currently teaches actuarial sciences at the Université Catholique de Louvain (UCL), where he was appointed professor in 1999. His research activities have focussed in the area of risk theory and non-life ratemaking. He specialized in applying advanced probabilistic and statistical methods to solve actuarial problems. He is on the editorial board of several international scientific journals, including *Insurance: Mathematics & Economics* and the *ASTIN Bulletin*. He has written over 100 refereed journal articles and 7 influential books which span most aspects of actuarial science. He participated in the writing of the Syllabus of the Royal Association of Belgian Actuaries, which describes the requirements and eligibility criteria to qualify as an actuary in Belgium. His research has been awarded by several prizes, including the 1997 Olbrechts-Tyteca Prize, the 2000 Prize of the Belgian Academy of Science, the 2003 American Casualty Actuarial Society (CAS) Prize, and the 2006 Giuseppe Ottaviani Prize in Insurance by the Italian Institute of Actuaries. He is honorary professor at the Faculty of Actuarial Science and Statistics, Sir John Cass Business School, City University, London. He founded with several colleagues at UCL a spin-off consulting firm offering services

to financial institutions and conducted several projects with major European (re) insurance companies and banks. Besides his teaching and research activities, he currently chairs the renowned UCL Institute of Statistics. Despite his young age, he is recognized as a leading figure of actuarial science in Belgium and abroad.

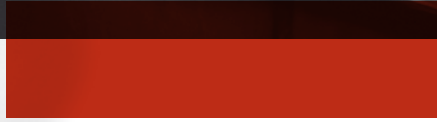
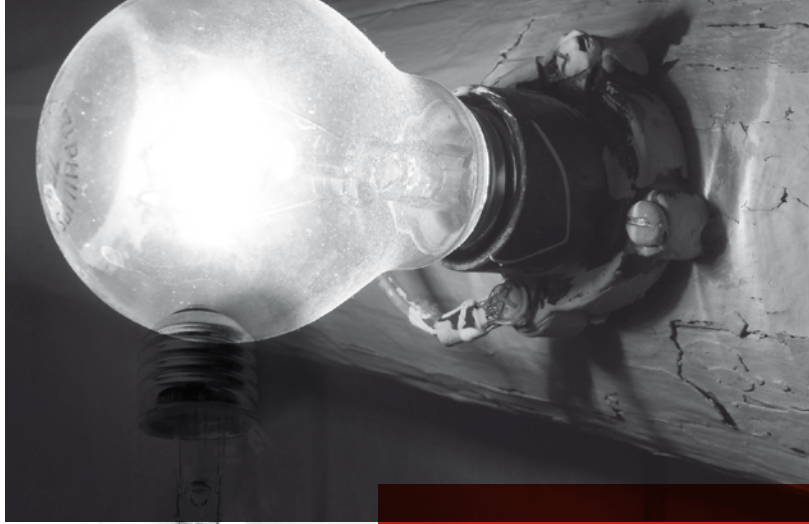
Matthias Löwe studied mathematics and physics at the University of Bielefeld and graduated in 1990. He specialized as a research assistant in probability and statistics and obtained his PhD in 1992. From 1992 until 1998, he worked as a post-doc and assistant at the University of Bielefeld. During that period he was a visitor at the Weierstrass Institute for Applied Analysis and Stochastics in Berlin in 1996. From 1998 until 2000, he sojourned as a post-doc at EURANDOM in Eindhoven and in the meantime he obtained his 'habilitation' in mathematics from the University of Bielefeld. In 2000, he was appointed as an assistant professor for mathematical finance and stochastics at the University of Nijmegen and became associate professor at the same university in 2002. Since 2003, he holds the chair for probability and statistics at the University of Münster, where he also leads a large research group in the domain. Since 2007, he also acts as director of the Institute for Statistics at the same university. Lastly, he is the responsible contact person for the bachelor, master and diploma programme in mathematics in Münster. He frequently teaches abroad and has expertise in educational aspects of the teaching of mathematics and related branches. In 2006–2007, he was a member of the QANU Commission of accreditation in mathematics in the Netherlands.

Fred van Eeuwijk studied biology and philosophy at the University of Utrecht where he graduated in 1985. He worked as consulting statistician at the Foundation for Plant Breeding in Wageningen (1985–1997) and obtained his PhD on the statistical analysis of genotype by environment interaction in plant breeding in 1996. He worked successively as an associate professor in the Department of statistics (1997–2000) and in Plant breeding (2000–2006) at Wageningen University. In 2006, he was appointed full professor in applied statistics at Wageningen University. His main research interests focus on statistical genetics and genomics, systems biology and bioinformatics. He published about a hundred papers in refereed journals and some 20 book chapters, and was frequently member of scientific committees for international conferences as well as invited speaker. Current positions include being president of the Biometric Section of Eucarpia (the European society of researchers in plant breeding), being on the Council of the International Biometric Society (IBS), being a member of the board of the IBS Channel group (collaboration of British, Belgian, French and Dutch IBS regions), and being editor of Theoretical and Applied Genetics. He twice won the Biometry Award for the best biometric publication written by a statistician working in the Netherlands. In Wageningen, he leads a group of about 25 statisticians, is responsible for the statistics courses and presently supervises a dozen of PhD students and post-doc students. Lastly, besides being involved

in the statistical education at Wageningen University, he is also strongly involved in the coordination, development and teaching of international courses in statistics, in close collaboration with the International Centre for Agronomical Studies in the Mediterranean Area (IAMZ-CIHEAM, Zaragoza, Spain) and the Generation Challenge Program (“Cultivating plant diversity for the resource-poor”; CIMMYT, Mexico).

Amparo Yovanna Castro Sanchez studied statistics at the National University of Colombia in Bogota where she graduated in 2001. She then worked in the same university as a statistician until 2006, mainly in database management and data analysis. During this period, she got involved in the sampling design of Survey of Household Payment Ability for Bogota. Since 2006, she studies applied statistics and biostatistics in the ICP programme at the transnational University of Limburg, campus Diepenbeek.

Mario Vanherle graduated in mathematics from the Katholieke Universiteit Leuven (KUL) in 2005 and currently finishes a master of financial and actuarial sciences in the same university.





Bijlage 2

De bezoekschema's

Bezoek transnationale Universiteit Limburg - Campus Diepenbeek

Woensdag 24/10/2007

08u45 - 10u30	internal meeting of the assessment committee
10u30 - 12u00	interview with decision makers on faculty and programme level
12u00 - 12u45	interview with first year students, including students involved in educational consultation
12u45 - 13u45	lunch break
13u45 - 14u30	interview with biostatistics students, including students involved in educational consultation
14u30 - 15u15	interview with biostatistics students, including students involved in educational consultation
15u15 - 16u00	interview with assisting academic staff
16u00 - 16u15	break
16u15 - 17u00	interview with independent academic staff applied statistics
17u00 - 17:u45	interview with independent academic staff biostatistics
17u45 - 18u00	internal meeting of the assessment committee and Review of handbooks, readers, exam sets, assignments and other course material
18u00 - 18u40	interview with alumni
18u40 - 19u40	informal meeting with the representatives of the decision makers and the study programme
19u40 - 19u55	transport to the hotel
19u55 - 22u10	dinner assessment committee

Donderdag 25/10/2007

09u00 - 09u45	interview with independent academic staff bioinformatics
09u45 - 11u15	site vist: lecture rooms, library, computer rooms, laboratryies, learning and research environment
11u15 - 12u00	interview with Student Service, Administrative support (selection), Ombudsperson, Student support and advice (central and course spec), Responsible internal quality assurance, Library, Informatic services, Alumni
12u00 - 12u30	private conversation with assessment committee on demand
12u30 - 13u30	lunch break
13u30 - 14u15	Interview with decision makers
14u15 - 17u00	internal meeting of the assessment committee, preparation of the public report
17u00 - 17u30	public report of the first impressions of the assessment committee

Bezoek Vrije Universiteit Brussel

Dinsdag 27/11/07

09u00 - 11u00	intern beraad visitatiecommissie
11u00 - 12u30	bestuur van de faculteiten, opleidingsverantwoordelijken, de opstellers zelfevaluatie, student betrokken bij onderwijskundig overleg
12u30 - 13u30	middagmaal
13u30 - 14u30	bezoek commissieleden onderwijsruimten, practicumlokalen, bibliotheek e.d.

14u30 - 15u15	assisterend academisch personeel, inclusief AAP betrokken bij onderwijskundig overleg
15u15 - 16u00	nabespreking commissie, extra gelegenheid tot inzage cursussen, nota's en examenopgaven
16u00 - 16u45	gesprek met verantwoordelijken studieadvies en -begeleiding (facultair en centraal), ombudspersoon, verantwoordelijke internationalisering (facultair), verantwoordelijke interne kwaliteitszorg (facultair en centraal)
16u45 - 17u45	studenten master, inclusief studenten betrokken bij onderwijskundig overleg
17u45 - 18u30	gesprek met afgestudeerden van de opleiding
18u30 - 19u00	gesprek met vertegenwoordigers van het afnemend beroepenveld
19u00 - 20u00	informele ontmoeting met een vertegenwoordiging van de academische overheid, het faculteitsbestuur en opleidingsafgevaardigden
20u00 - 20u30	verplaatsing naar hotel
20u30 - 22u30	avondmaaltijd visitatiecommissie
Woensdag 28/11/07	
08u30 - 09u45	zelfstandig academisch personeel master
09u45 - 10u15	spreekuur en aanvullende gesprekken op uitnodiging van de commissie
10u15 - 10u45	nabespreking commissie, extra gelegenheid tot inzage cursussen, nota's en examenopgaven
10u45 - 11u30	gesprek met het bestuur van de faculteit, facultair coördinator, opleidingsverantwoordelijken
11u30 - 12u15	nabespreking commissie, extra gelegenheid tot inzage cursussen, nota's en examenopgaven
12u15 - 13u15	middagmaal
13u15 - 15u00	intern beraad van de commissie, voorbereiding mondelinge rapportering
15u00 - 15u30	mondelinge rapportering

Bezoek K.U.Leuven

Dinsdag 18/12/2007

13u45 - 15u30	intern beraad visitatiecommissie
15u30 - 16u30	bestuur van de faculteit, opleidingsverantwoordelijken, de opstellers zelfevaluatie, student betrokken bij onderwijskundig overleg - Master in de Statistiek - Master of Statistics
16u30 - 16u45	pauze
16u45 - 18u00	studenten Master in de Statistiek - Master of Statistics, inclusief studenten betrokken bij onderwijskundig overleg
18u00 - 18u45	gesprek met afgestudeerden van de Master in de Statistiek - Master of Statistics
18u45 - 19u15	gesprek met vertegenwoordigers van het afnemend beroepenveld - Master in de Statistiek - Master of Statistics
19u15 - 20u00	informele ontmoeting met een vertegenwoordiging van de academische overheid, het faculteitsbestuur en opleidingsafgevaardigden
20u00 - 22u00	avondmaaltijd visitatiecommissie

Woensdag 19/12/2007

08u45 - 10u00	academisch personeel Master in de Statistiek - Master of Statistics (ZAP en BAP)
10u00 - 11u15	bezoek commissieleden onderwijsruimten, practicumlokalen, bibliotheek e.d. Campus Heverlee
11u15 - 11u45	spreekuur en aanvullende gesprekken op uitnodiging van de commissie
11u45 - 12u00	nabespreking commissie, extra gelegenheid tot inzage cursussen, nota's en examenopgaven
12u00 - 13u00	middagmaal
13u00 - 13u15	transport naar Stadscampus
13u15 - 14u00	intern beraad visitatiecommissie
14u00 - 15u00	bestuur van de faculteit, opleidingsverantwoordelijken, de opstellers zelfevaluatie, student betrokken bij onderwijskundig overleg - Master of Financial and Actual Engineering
15u00 - 16u15	studenten Master of Financial and Actual Engineering, inclusief studenten betrokken bij onderwijskundig overleg
16u15 - 16u30	pauze
16u30 - 17u15	assisterend academisch personeel, inclusief AAP betrokken bij onderwijskundig overleg - Master of Financial and Actual Engineering
17u15 - 17u45	nabespreking commissie, extra gelegenheid tot inzage cursussen, nota's en examenopgaven
17u45 - 18u30	gesprek met afgestudeerden van de Master of Financial and Actual Engineering
18u30 - 19u00	gesprek met vertegenwoordigers van het afnemend beroepenveld
19u00 - 20u00	informele ontmoeting met het faculteitsbestuur en opleidingsafgevaardigden - Faculty club
20u00 - 22u00	avondmaaltijd visitatiecommissie

Donderdag 20/12/2007

08u30 - 09u00	ophalen in hotel
09u00 - 10u00	bezoek commissieleden onderwijsruimten, practicumlokalen, bibliotheek e.d. - Stadscampus
10u00 - 11u15	zelfstandig academisch personeel Master of Financial and Actual Engineering
11u15 - 12u00	gesprek met verantwoordelijken studieadvies en -begeleiding (facultair en centraal), ombudspersoon, verantwoordelijke internationalisering (facultair), verantwoordelijke interne kwaliteitszorg (facultair en centraal)
12u00 - 12u30	spreekuur
12u30 - 13u30	middagmaal
13u30 - 14u00	gesprek met het bestuur van de faculteit, facultair coördinator, opleidingsverantwoordelijken - Master in de Statistiek - Master of Statistics
14u00 - 14u30	gesprek met het bestuur van de faculteit, facultair coördinator, opleidingsverantwoordelijken - Master of Financial and Actual Engineering
14u30 - 17u00	intern beraad van de commissie, voorbereiding mondelinge rapportering
17u00 - 17u30	mondelinge rapportering



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