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UNIVERSITEIT GENT

Faculty of Sciences

MareLac – MASTERS SCIENCE DEGREE COURSE – GHENT UNIVERSITY

Advanced Studies in Marine and Lacustrine Sciences

Self-evaluation report

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Introduction

The Master of Science programme 'Advanced studies in marine and lacustrine sciences' (or MARELAC) is a 1-year advanced training course organized since October 2001 for a total of 60 ECTS credits in the Faculty of Sciences at Ghent University. Originally the course has been organized as a postgraduate course (so called *GGS: Gediplomeerde in Gespecializeerde Studies*). The incoming students were licentiates or equivalent graduates with minimum 4 years of higher education in various science-oriented disciplines (for details see admission requirements). From October 2004 onwards, with the start of the Bachelor-Master curriculum in Flanders, the MARELAC programme is provided as a subsequent Master programme (Master after Master) with inflow of Masters or equivalents in science-related disciplines (see also new admission requirements for details).

However the Flemish ministry of education recently (27th of May 2005) approved 2-years Master programmes for the courses of the Faculty of Sciences. The MARELAC programme will thus be extended to a 2-year Master programme with intake at the Bachelor degree (based on 3 years of higher education) from October 2007 onwards.

This self-evaluation report is written on the basis of the results and evaluation of the ongoing 1-year programme (Subsequent Master).

At the end of this report, the scope and final attainments for the 2-years MARELAC programme are explained. Since the decision for a 2-years Master programme is only taken recently, the detailed programme is not yet developed. The content of the 2-years MARELAC Master will be presented by the end of 2005.

Organizational context of the MARELAC programme

The organization of the educational programme is the responsibility of the Faculty Board, which submits its decisions for approval, depending on the matter, to the Board of Directors or to the Management Committee of Ghent University.

The Faculty Board, chaired by the dean, is advised on each educational matter by the educational committees or by the director of the Quality Centre for Education of the Faculty of Sciences. Chairpersons or other representatives of the educational committees meet in the Quality

Centre for Education in order to discuss general educational matters and to give advice to the Faculty Board and the dean.

The educational committee of the Master programme MARELAC is responsible for the co-ordination of all educational related activities in the MARELAC programme.

Since the MARELAC is a multidisciplinary course, lecturers from different faculties, departments, and even universities (VUB – Vrije Universiteit Brussel, UCL – Université catholique de Louvain), national and international institutes (such as VLIZ – Flemish Marine Institute, NIOO – Netherlands Institute of Ecology) are involved in the organization of the educational programme.

The educational committee is therefore not exclusively associated with a particular department of the Faculty of Sciences but represents a broad field of expertise, although the main input comes from the departments of Biology and Geology of the Faculty of Sciences.

The chair of the educational committee is Prof.dr. Magda Vincx (Biology) and the vice chair is Prof.dr. Jean Pierre Henriet (Geology). Other representatives are: for ZAP (Tenured Academic Staff) Prof.dr. Ann Vanreusel (Biology), Prof.dr. Carlo Heip (Biology), Prof.dr.Marc De Batist (Geology), Prof.dr. Eric Coppejans (Biology), Prof.dr. Wim Vyverman (Biology), Prof.dr. Colin Janssen (Faculty of Bioscience engineering), Prof.dr. Frank Maes (Faculty of Law); for AAP (Assisting Academic Staff): dr. Vera Van Lancker (Geology), dr. Dirk Verschuren (Biology), dr. Geert Huys (Microbiology). Six students are represented in the educational committee as well; these are for the academic year 2004-2005 : Dino De Waen, Pieter Provoost, Claudia Aracena, Sarah O'Flynn, Sam Delye, Marisa Wyckmans.

The Examination Committee is composed of all lecturers including visiting professors at Ghent University.
The chair is Prof.dr. Ann Vanreusel (Biology), the secretary is Prof.dr. Wim Vyverman (Biology).
The other members are :

Faculty of Sciences :

Biology WE11 : Prof.dr. Eric Coppejans, Prof.dr. Magda Vincx, dr. DirkVerschuren, Prof.dr. Carlo Heip

Geology WE13 : Prof.dr. Jean Pierre Henriet, Prof.dr. Marc De Batist, dr. Vera Van Lancker

Biochemistry, physiology and microbiology WE10: dr. Geert Huys

Faculty of Bioscience engineering :

Animal production LA13: Prof.dr. Patrick Sorgeloos

Applied ecology and environmental biology LA09 Prof.dr. Colin Janssen

Faculty of Law

International law RE6V : Prof.dr. Frank Maes, Prof.dr. Eduard Somers, Prof.dr. An Cliquet

Faculty of Engineering :

Civil Engineering TW15: Prof.dr. Julien De Rouck

Other Institutes (but visiting Professors at Ghent University) :

Prof.dr. Hugues Goose (UCL), Prof.dr. Frank Dehairs (VUB), Prof.dr. Jan Mees (VLIZ), Prof.dr. Karline Soetaert (NIOO), Prof.dr. Peter Herman (NIOO), Prof.dr. Jack Middelburg (NIOO).

Also the promotors of the MARELAC dissertations (post-docs of the several research groups) are member of the Examination Committee.

The daily management of the MARELAC programme is taken by Prof.dr. A. Vanreusel.

Historical context of the MARELAC programme

Several national and international funded projects (Belgian Science Policy, National Science Foundation, EC, ...) in the 90's have initiated the collaboration between different marine and lacustrine research groups from Ghent University. With the establishment of the Flemish Marine Institute (VLIZ) in 1999 the marine research in Flanders was given more visibility. The increasing call for multidisciplinary research at national and international levels has resulted even more in strong marine and lacustrine consortia at Ghent University (relevant research projects are : TROPHOS, ENDIS-RISKS, BWZEE, HABITAT, HERMES, MARBEF, MARE, DASM, BALANS, GAUFRE,...information of these projects is given in the websites of the research groups). Many of these projects are implemented together with other internationally prominent marine and lacustrine research groups in Belgium and Europe.

Ghent University has a long lasting expertise in many marine and lacustrine related disciplines. Internationally renowned research groups in

Marine Biology (M. Vincx, A. Vanreusel), Marine and Lacustrine Geology (JP. Henriet, M. De Batist, V. Van lancker), Protistology and Aquatic Ecology (W. Vyverman, K. Sabbe), Phycology (E Coppejans), Paleo-limnology (D. Verschuren), Microbiology (G. Huys) Aquaculture (P. Sorgeloos), Eco-toxicology (C. Janssen), Law of the Sea and environmental law (E. Somers, F. Maes, A. Cliquet,) and Coastal Engineering (J. De Rouck) take lead positions in European research initiatives in specific fields resulting in high quality research output (see appendix 13 and 14).

Since a few years, the collaboration between these departments is becoming more intense (see Table 1) :

Table 1 : Collaboration between the research groups of Ghent University

Research groups 1 – 10	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Marine Biology	-	X	X	X		X	X	X	X	X
2. Marine&Lacustrine Geology	X	-		X	X				X	
3. Phycology	X		-	X		X				
4. Protistology and Aquatic Ecology	X	X	X	-	X	X				
5. Palaeo-limnology		X		X	-					
6. Microbiology	X		X	X		-				
7. Aquaculture	X						-			
8. Eco-toxicology	X							-		
9. Law of the Sea	X	X							-	
10. Coastal engineering	X									-

The presence of Ghent research groups at the leading edge of many research fields projected on a background of an increasing, worldwide demand for multidisciplinary research in international programmes, has underpinned the need for a multidisciplinary training programme on marine and lacustrine systems. The goal is to train students towards a more integrated fundamental and applied approach of the marine and lacustrine environments, in all their facets (biological, geological, chemical). Furthermore, the sustainable development of the sea and lakes (lacustrine environment) in terms of biological resources, energy resources, telecommunication and public works is a matter of policy, which draws upon an integrated view of the relationship between system functioning and socio-economical activities.

In those fields where expertise was lacking at Ghent University, research groups from outside Ghent University have been invited. This was mainly in the field of Chemistry (Prof.dr.F. Dehairs, Vrije Universiteit Brussel), Biogeochemistry (Prof.dr. J. Middelburg, Prof.dr. C. Heip, Netherlands Institute of Ecology), Physical Oceanography (Prof.dr H. Goosse, Université catholique de Louvain), Ecological Modeling (Prof.dr. K. Soetaert and Prof.dr. P. Herman, Netherlands Institute of Ecology) and Fisheries (Prof.dr. J. Mees, Flemish Marine Institute).

The programme combines marine (oceans, seas) and lacustrine (lakes) environments for several reasons:

(1) many biological, physical, chemical and geological processes in addition to human activities are very similar (or parallel) in marine environments and lakes;

(2) the observation and research tools are similar or even identical for both systems;

(3) the absence of any competing international curriculum adhering to a similar vision;

(4) substantial expertise in both disciplines (marine and lacustrine) is available at Ghent University.

As the fundamental but multidisciplinary scientific approach together with the combined marine and lacustrine expertise and interest was relatively unique in Europe, it was decided to organize the course in English in order to attract an international audience.

The main idea of this 1-year master programme is to provide advanced knowledge such as to prepare people for a professional career in many fields linked in one way or another to the marine or the lacustrine environment.

Other related MSc programmes in Belgium

In Belgium there are two other related MSc programmes : (1) the international programme on ECOlogical MArine MAnagement (ECOMAMA), a 2-year Master programme organized at the Vrije Universiteit Brussel and (2) the 2-years programme 'Diplôme d'études appronfondies en Océnologie' organized at the University of Liège.

The programme ECOMAMA covers the ecology of the marine system to be managed. It is an International Course Programme supported by VLIR and it provides individual scholarships for people from third world countries. This course is aimed at training multidisciplinary ecologists with a focus on the management of marine, mainly coastal (tropical) ecosystems. In comparison, the MARELAC programme trains multidisciplinary scientists combining knowledge in marine (including deep-sea and polar seas) and lacustrine systems with mainly a research related objective. At this stage where MARELAC is only provided as a 1-year programme, only one course (Ecological Modeling) is attended by students from both programmes. When MARELAC is organized as a 2-year programme (from 2007 onwards) collaborations between both programmes will be discussed. However, not only the origin of the incoming students is different but also the MARELAC programme is more oriented to fundamental science.

The programme 'Diplôme d'études appronfondies en Océanologie' organized at the University of Liège has common objectives with MARELAC , although it has a stronger physical oceanography component. The D.E.A. does not include a lacustrine component and it is not an international programme in the sense that is provided in French. This explains why there is few interaction with the MARELAC programme.

Realization of the self-evaluation report

The educational committee has appointed Prof. dr. Ann Vanreusel, coordinator of the MARELAC course, as chair of a working group for the realization of the self-evaluation report. Prof.dr. An Cliquet, dr. Geert Huys and Prof.dr. Jan Mees volunteered to be part of the working group, together with the MARELAC students Pieter Provoost and Dino De Waen. Magalie Soenen and especially Veronique De Bruyne, both members of Logistic Department for Teaching Affairs of the Faculty of Science reported on general educational information. Jos Van der Veken (Department of Educational Affairs, Rectorate UGent) provided the results of the inquiry on study load ('*studeerbaarheid*'), while Joke Claeys (Department of Educational Affairs) generated the data on the student in- and outflow. Both MARELAC Alumni Wouter Willems and Marijn Rabaut were responsible for the Alumni inquiry and the processing and interpretation of its results (chapter 6).

The draft report was discussed at two meetings which were attended by the MARELAC lecturers, both Alumni and Veronique De Bruyne. The students were not represented in these meetings since they were finishing their dissertation at that time.

Alumni and student inquiries

A consultation was organized among the students (20) registered in the MARELAC programme for the academic year 2004-2005. The inquiry was organized at the end of the examinations of the first semester (February 2005), hence neither the second semester courses nor the dissertation work have been evaluated. The results of this inquiry are each time summarized in a paragraph "Evaluation by the students". In chapter 6 the results of an inquiry performed among all Alumni (three consecutive years) are presented.

The content of chapters 1 to chapter 6 is based on the actual implementation of the MARELAC programme (academic year 2004-2005), organized as a subsequent Master.

Chapter 1 Objectives of the MARELAC programme

1.1. Level and orientation

The course catalogue of the Ghent University provides the objectives and summary of the study programme as follows (and which repeats in the first place the historical context as mentioned earlier) :

"The Master of marine and lacustrine sciences originates from collaboration between several marine and lacustrine research groups respectively in Biology, Microbiology, Geology, Applied Biological Science, Civil Engineering and Law at Ghent University. Collaboration in the field of research between several of these research groups has evoked the need for a multidisciplinary educational approach of different marine and lacustrine systems in order to train students to get a more integrated fundamental and applied knowledge of the marine and lacustrine environment in all its aspects (biological, geological, chemical). In addition knowledge of the exploitation of the sea and deep lakes, in terms of engineering, biological resources and the present policies are essential in order to get an integrated view of the relationship between system functioning and socio-economical activities. Within this masters programme collaboration takes place with experts from other renowned institutes and research groups outside Ghent University mainly in the field of chemistry, biogeochemistry, physical oceanography, modeling and fisheries. The programme covers one academic year (from 1st October to 30th of June) and is given in English. The first semester covers mainly theoretical courses as indicated in the programme table. The second semester covers a dissertation and module 4. ".

In addition to this summary provided by the course catalogue, we have formulated the aims and final attainment levels for the 1-year Master programme as follows.

Objectives

The main objectives for a subsequent Master programme of 1-year are as follows :

- Training towards a multidisciplinary scientist who thinks and works across disciplines and who is specialized in marine and lacustrine systems.

- Educating practice supporting tools in function of data acquisition and data processing.
- Stimulating critical thinking where scientific problems are dealt with in a wider socio-economic and socio-ecological context (policy supporting and advising).
- Providing an integrated concept and view on marine and lacustrine systems.
- Simulating communication skills in function of scientific communication, education and outreach.

Final attainment levels

1. The Master in Marine and Lacustrine sciences has a broad and cross-boundary scientific knowledge about the marine and lacustrine environment.
2. The Master has achieved practical skills in fields related to marine and lacustrine sciences at the level of data acquisition and data processing.
3. An important point is awareness of applied activities and their impact in relation to a sustainable development of the marine and lacustrine environment.
4. Knowledge of the relevant legislation, international conventions and principles of law of the sea and protection of international environment law is an inherent part of their scientific luggage.
5. The Master is trained as a full fledged multidisciplinary scientist with attention for cross-disciplinary thinking and communication skills.

1.1.1. Harmony with structure decree

The structure decree states that the goals for a master programme are

1. Acquiring general competences on an advanced level.
2. Acquiring general scientific competences on an advanced level.
3. Acquiring an advanced understanding and insight in the scientific knowledge characteristic for the discipline.
4. Mastering competences needed for independent scientific research.

The final attainments as formulated for the MSc MARELAC are in accordance with these goals.

General competences at an advanced level:
The MARELAC programme is an advanced training programme. It builds partly on the expertise achieved at Master (Licentiate) level. It further stimulates critical cross-disciplinary thinking and communication skills. More than at master level, attention is being paid to integration of knowledge. Also the use of advanced tools for research, communication and information is stimulated during the programme.

General scientific competences at an advanced level:
The MARELAC graduate is trained as a critical scientist through integration of knowledge, critical thinking and communication skills.

Advanced understanding and insight in the scientific knowledge characteristic for the discipline:
Knowledge is achieved in multiple disciplines related to marine and lacustrine systems. From fundamental scientific knowledge to applied sciences, practical knowledge and legislation the most relevant insights are provided in marine and lacustrine related subjects.

Competences needed for independent scientific research:
Special attention is given to competences like consultancy of correct information sources, synthesis of information, advanced scientific research, and scientific writing.

1.1.2. International dimension in the objectives

The objectives are global in the sense that they are not focused on national priorities. The fact that MARELAC is organized in English, that all nationalities are invited to attend the programme, illustrates the international character.

1.1.3. Attention for competence oriented learning and for academic skills

In relation to its advanced level the objectives of the MARELAC programme are oriented towards three general aspects: multi-disciplinary information, critical thinking and integration of knowledge. The programme includes a wide spectrum of disciplines which are all related to the marine and/or the lacustrine environment. Furthermore the achievement of general competences in terms of use of information technology, communication skills, analytic and problem solving abilities is evidently included in the

objectives in order to train fully fledged, internationally recognized and competent marine and lacustrine scientists.

1.1.4. Knowledge of the objectives by the students and personnel

The objectives and final attainment levels have been formulated within the educational committee and distributed among all lecturers associated with the programme. The students have been informed through the website and at info-sessions organized by the coordinator before and at the start of the academic year.

The student inquiry shows that not all students felt sufficiently informed about the objectives of the course before starting but 64 % was aware of the objectives.

1.1.5. Legal and financial boundary conditions

The legal boundary conditions for both the educational aspects and examinations are determined by the Board of Directors of Ghent University and published in the Regulations on Education and Examinations. They are published on the web and in the course catalogue that is handed out to students and staff. Unfortunately, this document is not available in English.

The Board of Directors divides the funding of the University among the Faculties using a key that takes educational load (85 %) and scientific activities (15%) into account. The number of courses offered by a department and the number of students that take the courses, are variables used to estimate the educational load. Classes with small numbers (< 5) of students have a negative impact on the funding since this effort is not taken into account.

Also the university personnel policy is based on the educational load of the faculties. Within the Faculty of Sciences, the warranted amount of staff is divided over the departments.

1.2. Discipline related requirements

1.2.1. Profiling of the programme and view on the discipline

Because of the growing importance of multidisciplinarity in international and national marine and lacustrine research projects, it was recognized that there was a demand and need for additional training in the field of marine and lacustrine sciences for people with different background (e.g. biologists, geologists, geographers but also bio-engineers and others). The idea was to

broaden the knowledge and insight of scientists across disciplines but at the same time to focus on particular environments (oceans, seas and lakes). For instance a biologist (geologist) might have sufficient background in Marine and Lacustrine Biology (Geology) but might need additional knowledge in Marine and Lacustrine Geology (Biology), Oceanography but also in Law of the Sea, etc.. The integration of knowledge over disciplines must add value for any position related to the marine or lacustrine environment in any country.

1.2.2. Tuning of the objectives to the labor market

In relation to the requirements of the labor market, the objectives of MARELAC are rather broad in the sense that they attempt to support different professional profiles related to the marine and lacustrine environment. The MARELAC programme is not profession-oriented since it does not provide training in function of a particular position or profile.

The actual objectives of MARELAC (still organized as a subsequent master) are building upon a sound scientific academic level and should give an added value to a variety of science and engineering graduates (bachelor, masters or licentiates).

The programme MARELAC has a focus on three aspects in relation to professional orientation: (1) multidisciplinary research, (2) policy supporting profile and (3) outreach.

1.2.3. Tuning of the objectives to the expectations of peers

The research units which are supporting the MARELAC programme have a strong background in international peer-reviewed research projects and publications. Students integrated in these research groups get trained up to these international standards.

1.2.4. Genesis of discipline specific objectives

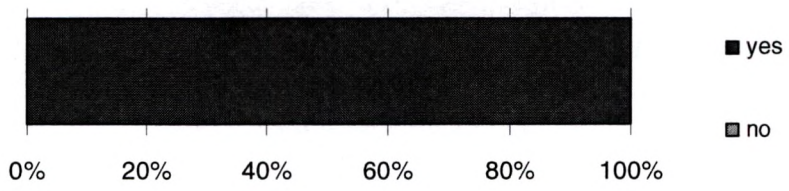
A general field survey has been performed in order to compare MARELAC with other European Master programmes. The discipline specific objectives have been discussed within the founding Educational Committee. On the basis of this, a unique 1-year postgraduate Master programme has been presented and approved by Ghent University.

1.2.5. Evaluation by the students

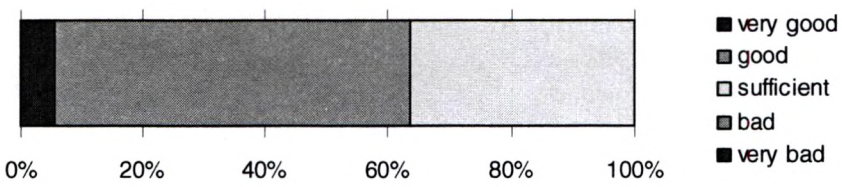
We asked the 20 students from this academic year (2004-2005) how they experienced the educational philosophy and course aims. Together with

specific questions, a summary of the answers is documented below. **The horizontal bars have to be read each time from left to right in decreasing order of appreciation.** The results of the consultation have been processed by the two student representatives in the visitation working group.

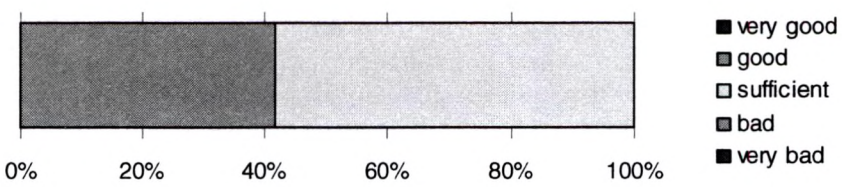
a) Are you aware of the goals of this programme?



b) How well are these goals realized?



c) How well are these goals adapted to the current demand of the scientific community/industry?



General comments as summarized by the student representatives:

The MARELAC programme has succeeded in being a multidisciplinary course in marine and lacustrine sciences. It has broadened our view and gave us a very good overview of all the possible sciences that we may come in contact with. A big plus is the fact that the teachers are well-known scientists attracted from other research centres and universities as well, this in order to give us different ways of thinking. MARELAC prepares the students well for possible future careers in science.

On the down side most of the students pointed out one shortcoming, which is the lack of practical scientific research. A few students also pointed out the lack of industry oriented thinking; this is an area where bright young minds are needed too.

Chapter 2 Programme

The MARELAC programme (60 ECTS) consists of 4 modules and a dissertation (18 ECTS).
All courses count for 4 ECTS except the module 4 courses which are counting for 6 ECTS.

Module 1 : general courses (**COMPULSORY**)
- Chemical and Physical Oceanography
- Law of the Sea
- Tools in Oceanography
- Biogeochemical Cycles
Module 2: - students graduated in Biology or Geology should take ONE of these courses; - students graduated in other areas of study should take BOTH courses,
- Marine and Lacustrine Biology
- Marine and Lacustrine Geology
ELECTIVE COURSES
Module 3: - students graduated in Biology or Geology should take 4 courses;- students in other areas of study should take 3 courses, the courses are taken from the following list, and one course can be taken from the academic study programmes of the second cycle, from the complementary and specialised studies or from the Master's programmes of UGent
- Marine and Lacustrine Microbiology
- Dredging and Offshore Works
- Paleoceanography and –climate
- Ecological Modeling
- International Environmental Protection of Oceans and Seas
- Aquatic Toxicology and Environmental Risk Assessment
- Aquaculture and Fisheries

Module 4: Marine and Lacustrine Systems: one course to be chosen from the following list:
- Extreme Environments
- Coastal Systems
- Margin Systems
- Lacustrine Systems
MASTER DISSERTATION

2.1. Relation between the objectives and the content of the programme

2.1.1. Translation of the objectives in the programme

The objectives of the programme were translated into final attainment levels. The final attainment levels refer to five main levels of knowledge and skills which are particularly important in the MARELAC programme.

It concerns (1) fundamental scientific knowledge, (2) practice supporting insight, (3) knowledge on applied sciences and their impact, (4) concepts on legislation (5) research and communication skills.

From these five levels, fundamental scientific knowledge and research and communication skills get most attention.

In general the objectives are focused on multidisciplinarity and field-crossing insights.

1) Fundamental scientific knowledge is obtained in the disciplines of marine and lacustrine Biogeochemistry, Physics, Chemistry, Biology, Geology, Microbiology and Paleo-sciences. Basic knowledge is provided on characteristics, processes and interactions in bio- and geosphere that drive marine and lacustrine systems in general and in specific environments. Each of these courses provides the main knowledge in one specific discipline for the marine and lacustrine environment, but also focuses on interactions between (past and present) physical, chemical, geological and biological processes in oceans and lakes. The courses on Chemical and Physical Oceanography, and Biogeochemical cycles are compulsory since these subjects received little to no attention in most bachelor and master

programmes of the Faculty of Sciences. The geology course is compulsory for non-geologists since it is assumed that geologists received sufficient training on Marine and Lacustrine Geology during their previous training and vice versa for Marine and Lacustrine Biology for biologists. Microbiology and Paleo-oceanography and Climate are optional courses, open to all students.

2) Practice supporting insight is provided in the compulsory course on Tools in Oceanography which gives an overview of the present-day methodologies and techniques to obtain geo-environmental information of marine and lacustrine settings. The tool of Ecological Modeling is provided as an optional course. This course provides the ability to translate ecological problems into mathematical equations and teaches the principles and practice of model construction, solution and evaluation. Recently the students identified the need for a GIS course (Geographic Information System) which was discussed during the meeting of the Educational Committee of November 2004. Therefore a programme modification was suggested from 2005-2006 onwards. It was decided and approved by the Faculty of Sciences to include an extra option in module 3 in order to allow the student to select any academic course on the condition that it is in accordance with the general MARELAC objectives (to be approved by the Educational Committee). Similarly, there was demand for a course on applied statistics, although knowledge on this field is assumed to be gained during the licentiate (bachelor/master training). Other practical knowledge is gained during the dissertation work in specific disciplines.

3) Knowledge on applied sciences is dealt with in the courses Aquaculture and Fisheries, Aquatic Toxicology and Environmental Risk Assessment, Dredging and Offshore works, which are optional courses in module 3. They provide information on applied activities in marine and lacustrine environments. In some cases also their impact on the (eco)system is dealt with.

4) Concepts on legislation are provided in Law of the Sea. This is a compulsory course which provides general information on any legislation related to the marine environment, including transport, management, industry and exploitation. The optional course on International Environmental Protection of Ocean and Seas is oriented towards legislation in relation to protection and marine nature conservation.

5) Research and communication skills are provided by the dissertation. In addition individual or group projects associated with numerous courses prepare the MARELAC students for their dissertation work and communication skills.

In the fourth module each student chooses one course on a particular group of systems: 1. Extreme Environments, 2. Margin Systems, 3. Coastal Systems and 4. Lacustrine Systems. In these courses it is originally aimed at to provide a multidisciplinary, holistic insight in particular systems. For instance the extreme marine environment of the Southern ocean is dealt with from chemical, physical, geological and biological point of view in order to get integrated knowledge of the most important bio-geosphere interactions. For these courses, internationally renowned experts from both Belgian and foreign research groups are invited, resulting in advanced, up to date knowledge. However it remains impossible to fully cover all aspects of the wide range of environments within a system in the time frame of the course.

Extreme environments ; this course focus on the Antarctic environment and the deep-sea. For the Antarctic the main physical, chemical and geological features and processes which are characteristic for this remote environment are dealt with. Against this background biological characteristics and processes are further discussed in detail. Specific deep-sea systems such as abyssal plains, soft sediment slopes, oxygen minimum zones, seamounts, trenches, hydrothermal vents and cold seeps are discussed in an integrated context unraveling the main bio-geosphere interactions.

Margin systems: the 'Margin systems' module connects the student to the important present momentum of European research on continental margins, and focuses on the most stimulating and provocative topics in this research: gas hydrates, carbonate mounds and deep water coral ecosystems, slope instabilities, etc. Both planning opportunities (R/V Belgica, TTR) and the small number of students have hitherto allowed a quasi systematic embarkation of the Margin students on multi-disciplinary oceanographic cruises in the Gulf of Cadiz.

Coastal systems : the coastal systems are discussed from a global and a more regional perspective with emphasis on habitat classification, biodiversity, food-web ecology, biological valuation, geological stability, human impact, coastal zone management and environmental protection. Many case studies

are originating from the North Sea which is the area explored by several research groups involved in the MARELAC programme.

Lacustrine systems : In this course invited speakers from the own or other research groups present a series of lectures grouped into a limited number of themes. Each theme is dealt with within 2-4 contact hours. The course contents vary from year to year, depending upon the specific research interests of the students and the availability of researchers.

In each of these courses the students get an assignment which is linked to the themes discussed within the lectures and present this in a series of short seminars. The presentation, discussion and the possibly the written report on the assignment comprise the basis for the evaluation of the student.

2.1.2. Level and content of the programme components

The course catalogue contains a detailed outline of the different subjects (with information about keywords, objectives, contents, teaching and learning material, references, study coaching, teaching methods, evaluation methods and examination methods). For each course, this information, the so-called ECTS fiches, is given in appendix 3.

There are mainly two groups of courses aiming at different levels of education:

(1) Due to the different background of students, some more general courses are provided (mainly compulsory courses) in order to bring all students at the same level of knowledge in different fields (module 1 and 2).

(2) The specialized knowledge is at the level of fully updated information and recent trends in ongoing research in marine and lacustrine sciences (module 3 and 4).

The module 1 courses, including Physical and Chemical Oceanography, Biogeochemical Cycles, Law of the Sea and Tools in Oceanography, aim at providing the basic insights and knowledge in their field. Since none of these courses is lectured at undergraduate level in any of the incoming student disciplines, these courses were identified as being essential and relevant for future marine and lacustrine scientists. They provide basic knowledge, although in relation to the marine and lacustrine environment. These courses

in specific areas are new to students and therefore are an introduction in these disciplines.

The module 2 courses are organized within the same philosophy except that they are only compulsory for non-biologist and/or non-geologists. They provide respectively a basic introduction to Marine and Lacustrine Biology and Geology, at an undergraduate biology or geology level.

Module 3 offers seven courses of which three to four (depending on the background of the student) have to be selected. All these courses attain advanced knowledge on specific disciplines. Also the most recent technological developments related to the subjects are presented, at least in a theoretical manner, in terms of potentials and promises and type of information gained. These courses should allow to understand and interpret recent literature. The practical aspects (training) are however not always dealt with, except for the Ecological Modeling, where PC classes are organized. This course is, in contrast to the others within this module, rather practically oriented.

Module 4 courses are organized as a series of seminars inviting specialists in different disciplines in the context of particular marine or lacustrine systems (coastal, extreme, margin and lacustrine). Although the idea is to provide an integrated view on systems, it is impossible to cover all aspects within the time frame provided. Again and even more than within module 3, information is provided at the most recent level of acquisition, often prior to scientific publication.

Because of the close connection of lecturers with ongoing research through participation in international projects, conferences and individual communication levels, the latest news and trends in science are provided.

2.1.3. Development of discipline-crossing elements

The whole programme as such aims at the training of multidisciplinary scientists. The main discipline-crossing elements present in the programme are situated in module 4, The aim of this module is indeed to approach different aquatic systems in a multidisciplinary way including geological, biological, physical, biochemical and policy aspects. In this way students achieve a better understanding of the present patterns and processes.

2.1.4. International dimension

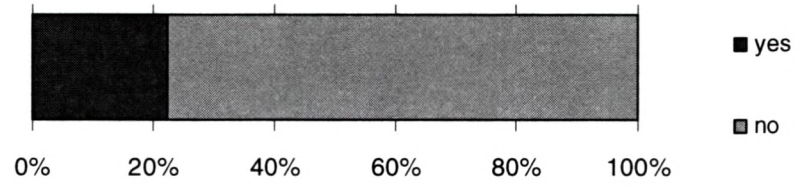
Since the programme aims at international education, all courses are provided in English. The education as such is generally organized to cover global and not local (Belgian or even European) scales. Processes and systems from all over the world are dealt with. There is no particular focus on European systems but possibly more case studies have a European context.

Student and teaching staff mobility are stimulated in the sense that international experts are invited for seminar teaching whereas students can travel in function of their dissertation.

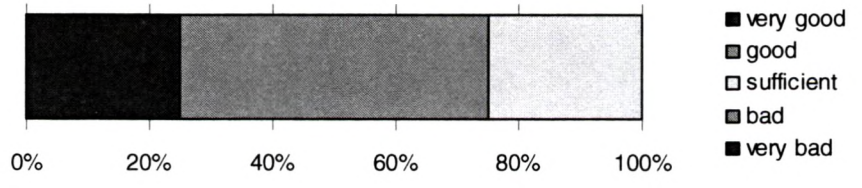
2.1.5. Evaluation by the students

Below are the results of a consultation of the students (2004-2005) on some aspects of internationalization.

a) Are you a foreign student?



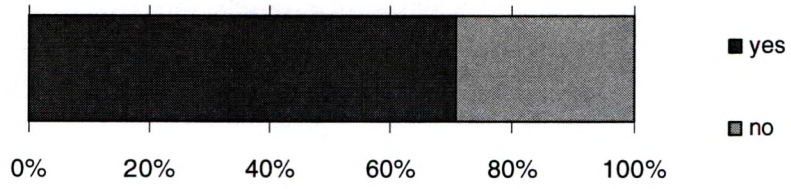
If so, how well are you being looked after in Ghent? How is the support and help?



What was your motivation to study abroad?

The multidisciplinary nature of the course and the opportunity to study abroad.

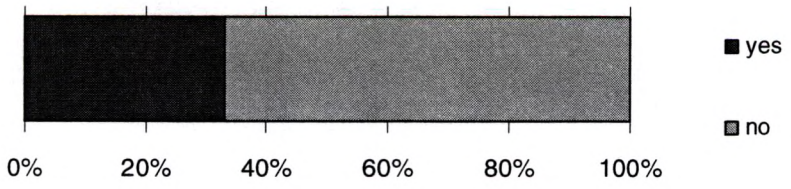
b) Are you aware of other marine and lacustrine sciences courses?



Why did you choose to follow this course in marine and lacustrine sciences and not one of the others?

Ghent is a university with a great reputation. The course is also very multidisciplinary and it is a 1-year course. It also helps that universities in Belgium are not that expensive.

c) Are you planning to go abroad this year, in relation to the course?



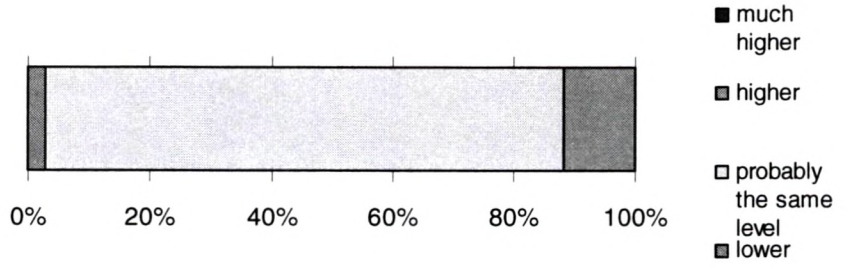
If not, which was the most important factor that kept you here?

Availability of scholarships and information are the major reason students stay in Belgium. No need to leave when a good lab is available here in Belgium.

d) Where did you hear about MARELAC for the first time?

The internet seems to play a major role in attracting future students. The second important source was through friends who promoted this course. Posters and information placed in other universities were also very important.

e) How high do you estimate the level of this course compared to the level of similar courses elsewhere?



Comments

People hope that the level is at least equal to other courses. If the level would be higher, a lot of students would not object to the change. They would even welcome it due to the simple fact that it is more fulfilling to succeed in something difficult.

2.1.6. Realization of recent international and national educational developments

Because of the Bologna declaration (1999) and the consequently BACHELOR-MASTER decree assigned at the Flemish level, it was discussed at the Educational Committee (EC-MARELAC) how the MARELAC course (specialized – post graduate course) would fit in the BACHELOR-MASTER structure.

According to the EC-MARELAC, the programme, as provided now is a specialized course which needs four years of previous higher education, so the course is organized as a subsequent Master.

From 2007 onwards, the MARELAC programme will be organized as a 2-years Master programme in the Faculty of Sciences, following a Bachelor programme.

A 2-year Master programme provides 'room' for both general and specialized courses in order to train valuable marine and lacustrine scientists. The focus of this 2-year Master programme is formulated at the end of this report. The detailed programme will be developed by the Educational Committee in the near future (it was only decided on 27 May 2005 that the Master programmes in the Faculty of Sciences will be 2 years programmes).

A 1-year Master programme (3+1 structure) is insufficient for obtaining the final attainment levels as formulated earlier, when the incoming students have only 3 years of academic training at the bachelor level (and not 4 as it is now the case).

2.1.7. Curriculum revision and innovation: procedures and concerned parties

Curriculum revision is considered, when a need is identified by different parties related to the programme. These parties include the students, the involved research groups and associated lecturers, and possibly indirectly the job market. The annual programme evaluation also gives feed back on possible needs for curriculum revision.

Request for curriculum revision are dealt with in the Educational Committee and after structural discussion decided upon. The Faculty meeting (Faculty of Sciences) has to approve the revision, in order to be forwarded for final agreement to the highest university authorities.

2.2. Academic orientation of the programme

2.2.1. Attention to knowledge development

In general knowledge is developed by 4 main strategies

1. by lecturing (ex cathedra courses, course notes and examination on the provided knowledge) ➔ courses of module 1, 2 and 3;
2. by consulting scientific literature (individual learning) and by developing individual synthesis on specific subjects ➔ Fisheries, International Environmental Protection of Ocean and Seas, Aquatic

Toxicology and Environmental Risk Assessment, Paleo-oceanography and Climate, Microbiology, and the courses of module 4;

3. by field courses or practical exercises ➔ Marine and Lacustrine Biology, Tools in Oceanography, Aquaculture, Ecological Modeling, Margin Systems;
4. by seminars given by experts on very specific topics ➔ module 4;
5. by individual research projects on specific subjects ➔ master dissertation.

For each course within the 4 (first) modules the content is summarized in the ECTS fiches (see appendix 3).

2.2.2. Attention for skills

The MARELAC programme has attention for the continuous development of skills partly achieved during undergraduate training but further enhanced in order to train students to multidisciplinary scientists. Next to the development of active knowledge in different fields of Marine and Lacustrine science, the following skills are in particular developed during the MARELAC programme:

➔ integrated and cross-discipline thinking;
➔ scientific communication;
➔ scientific research (see also 2.2.4.).

Integrated and cross-discipline thinking is stimulated by providing knowledge in the fields of natural, applied and social sciences focused on marine and lacustrine systems. In contrast to the bachelor and most other master programmes in the Faculty of Sciences, the MARELAC programme is delineated by physical borders (seas, oceans and lakes) rather then by disciplines. Further, the Module 4 courses are intended to approach particular marine or lacustrine environments from a multidisciplinary point of view in order to get an integrated understanding of these systems.

Scientific communication skills are particularly aimed at by the MARELAC programme. These skills are only weakly developed in undergraduate programmes. Nevertheless it concerns one of the most fundamental and relevant skills of a scientist, next to knowledge and logic thinking. Scientific communication skills are developed in different steps. First there are the individual projects related to specific courses where particular subjects have to be dealt with. It concerns identification and

consultation of reliable information sources, analysis and synthesis of the available information and communication of the synthesis by means of a written report (Fisheries, Paleo-oceanography and Climate, Aquatic Toxicology and Environmental Risk Assessment, International Environmental Protection of Ocean and Seas) and/or oral presentation (Biogeochemical Cycles, Microbiology, module 4 courses). The second phase for development of communication skills is the dissertation work. Here, the focus is even more than at undergraduate level at communicating the results of an individual research project. The results have to be processed in a scientific paper which aims at the standards in format and quality of a medium to large sized, peer-reviewed scientific paper. In comparison with most licentiate (Master) dissertations in Biology (MSc) and Geology (MSc), the dissertation of the MARELAC programme is more focused on processing the data rather than on collecting them. Research questions are more focused on some testable hypothesis, and less descriptive. Much attention is paid to the format of the paper. Finally, the paper is presented orally which aims at the standards of a presentation at (inter)national conferences and meetings.

2.2.3. Research related education

Because of the specialized and advanced character of the MARELAC programme, lecturers were selected based on their expertise in particular domains of marine and lacustrine sciences. In appendix 15 a recent publication list per research group is included illustrating the expertise associated with the MARELAC programme. Students are confronted with new findings, sometimes even before being published in scientific journals.

Through small individual projects and the dissertation work, students are stimulated to consult the most recent scientific literature in relation to knowledge and applied techniques. The dissertation subjects often fit within larger (inter)national research initiatives or projects.

2.2.4. Attention for research skills

As pointed out before (2.2.2) much attention is paid to cross-discipline thinking and communication which are essential skills for today's active researchers. In addition to these aspects of research, the students are trained as scientists through their dissertation work. By providing high quality subjects aiming at the production of peer reviewed papers, the students get acquainted with all stages of scientific research at an advanced level (including literature or other information consulting, data (collection and)

processing, generation of hypothesis, statistical analysis, paper writing and oral communication). The research training aspect in the MARELAC programme is successful since 42 % of the Alumni are preparing a Ph.D.

2.2.5. Interaction between the master programme and social awareness

The students are stimulated to critical thinking where scientific problems are dealt with in a wider socio-economical and socio-ecological context. Mainly courses on legislation like Law of the Sea and International Environmental Protection of Ocean and Seas, but also on socio- economic activities and their impact like Dredging and Offshore works, Aquaculture and Fisheries, and Aquatic Toxicology and Risk Assessment make the bridge between marine and lacustrine bio-geosphere sciences and social relevant and significant aspects or activities. In this way the MARELAC programme aims to prepare students for policy supporting and advising tasks in relation to sustainable use and development of marine and lacustrine systems.

2.3. Coherence of the programme

2.3.1. Structure and coherence

All courses from the modules 1, 2 and 3 (except for Dredging and Offshore works) are scheduled (including the examinations) in the first semester (October – January). Module 4 courses and the dissertation work is planned in the second semester (February – June).

The module 1 contains compulsory courses which provide basic knowledge in the field of marine legislation, physics and (bio)-chemistry and tools for observation. None of these courses is lectured at undergraduate level in the main incoming student programmes (biology, geology, geography, bio-engineering,..). The module 2 courses have the same philosophy as the module 1 courses in addition to the fact that they aim at bringing students from diverging background at a similar basic level of knowledge in the fields of marine and lacustrine biology and/or geology. The geology course is for non-geologists, and the biology course for non-biologists.

The module 3 courses build largely on courses from module 1 and 2 since they are more specialized and allow the student to focus on particular topics and disciplines. The courses offered in module 3 are not related to each other and the students are free to choose.

The module 4 courses also build on module 1 and 2. They specialize in particular environments rather than in fields. They are multidisciplinary and include physical, (bio)chemical, geological and biological aspects of restricted ecosystems. Therefore this module is scheduled in the second semester.

2.3.2. Proportion compulsory and optional courses

Table 2 illustrates the relative proportion of compulsory/optional courses and dissertation work. In terms of ECTS credits, there is a maximal distribution over these three groups. Each represents between 30 and 37 % in study credits depending on the background of the incoming student .

Table 2: Relative proportion of compulsory and optional courses

	Compulsory	**Conditional compulsory**	**Optional**	**Dissertation**
Module	**1**	**2**	**3 and 4**	
ECTS	16	4 or 8	18 or 22	18
% study points	26,6	6,6 or 13,3	30 or 36,6	30

2.3.3. Tuning of the programme on collaboration with other institutions

All courses from modules 1, 2 and 3 are pooled in the first semester (including the examinations) in order to allow the student to concentrate on the dissertation work in the second semester. It also allows the student to travel in function of his/her dissertation or to perform the dissertation work at another institute or university than Ghent University (cf. 2.1.4). Students are in principal also allowed to travel through SOCRATES agreements and attend courses in other European universities. However, since MARELAC is still a 1-year programme, and if students would travel for the complete first semester this would mean that in that case almost 90 % of the courses are followed at another university in order to get a diploma from the Ghent University.

Up to now, students only travel for their dissertation work. They can perform their dissertation work at the home institute or university of all the visiting professors associated with the MARELAC course (VUB, UCL,

NIOO and VLIZ). Finally, students can stay abroad in any research group on the condition that they find a MARELAC lecturer willing to be a promoter.

2.3.4. Flexible learning routes

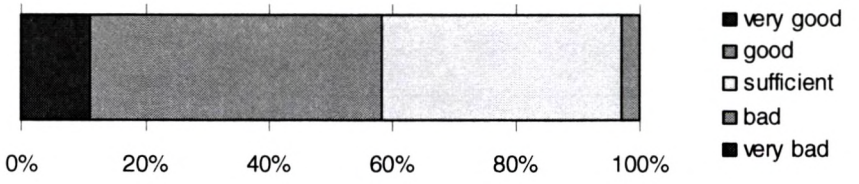
The student can attend the MARELAC programme on a part-time basis. Students interested in a part time programme should agree on this with the Examination Committee. The courses should be successively taken from the modules 1-4. The dissertation is completed in the final year.

Scores of 10 and more are valid over a period that the content of the course did not change without having to complete an actualisation programme.

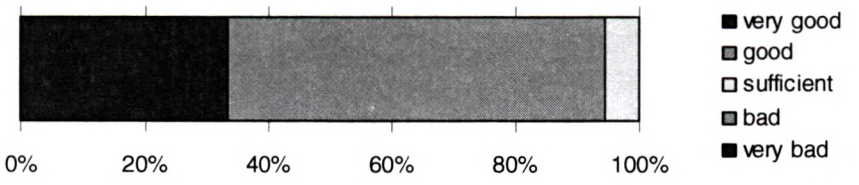
2.3.5. Evaluation by the students

We consulted the students (2004-2005) on how they experienced the programme by the following questions.

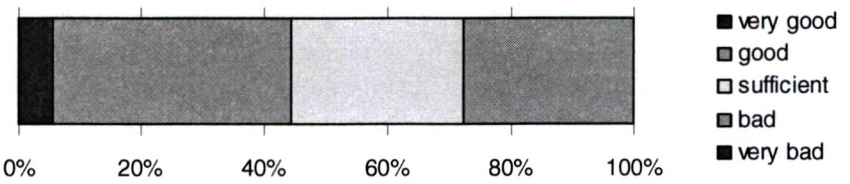
a) What do you think of the courses given (content, depth, actuality, emphasis, number of subjects...)?



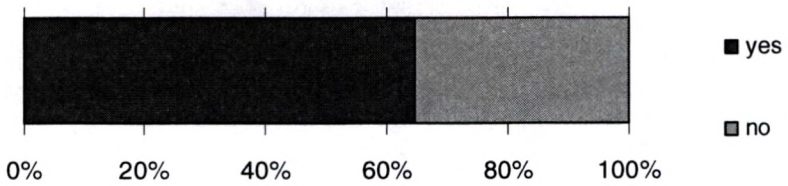
b) How is the transition between your past curriculum and this programme?



c) What is your opinion on the overall compatibility of the subjects given? How well did they tell the story without overlapping?



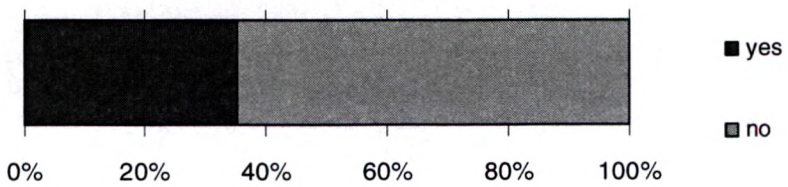
d) Are there any courses lacking?



In case there are, which ones?

GIS, statistics (biological and/or geological) and data processing were mentioned most frequently. Further more, in-depth marine biology for biologists, hydrology.

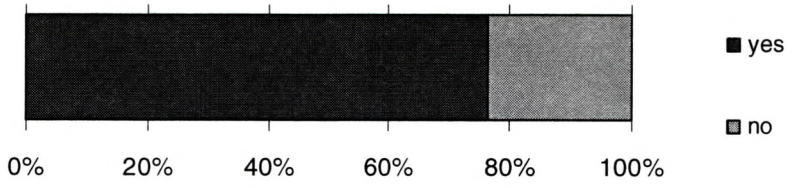
e) Are there any redundant courses?



In case there are: which ones?

Both oceanography courses (chemical and physical) are too much alike and there is also a slight overlap with Biogeochemical cycles.

f) Are the courses sufficient to help you with your dissertation work?



2.4. Study time and study load

2.4.1. Study load of the programme

The programme runs over 1 year and counts for 60 ECTS. This equals a study time between 1500 and 1800 hours.

2.4.2. Study time measurements

A consultation was organised in the 2nd semester of the year 2003-2004. Students were asked to estimate the study time for each of the MARELAC courses. On a total of 17, only 7 students completed the questionnaire for the first semester, and only 3 for the second semester. Due to the low participation, we can not draw any firm conclusions, only some general comments are given.

For the total measured study load of the programme (Appendix 4) a score of 3,4 was achieved for the 1st semester on the Likert scale of 6 (for explanation see Appendix 4) which means between nor low nor high and rather high. For the second semester the study load was rather high (4.3/6) . The overall satisfaction with the programme is about 5,1 on 6 in the 1st semester and 5,0 in the 2nd semester, which indicates that the students are satisfied for both semesters.

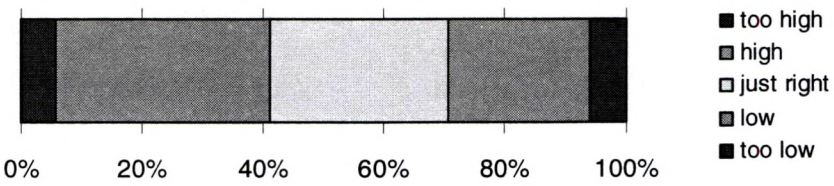
The students estimated an average weekly workload until the Xmas holiday of about 36 hours. During the Xmas holiday the work load

increased up to 53 hrs, while during the provided study period and the examinations of the 1st semester a load of 54 hrs was measured. For the second semester this was 37 hrs for the second semester (Easter Holiday, study period and examinations excluded). During the Easter Holiday the weekly load decreased to 33 hrs, while during the study and examination period of the 2nd semester a load of 40 hrs per week was measured.

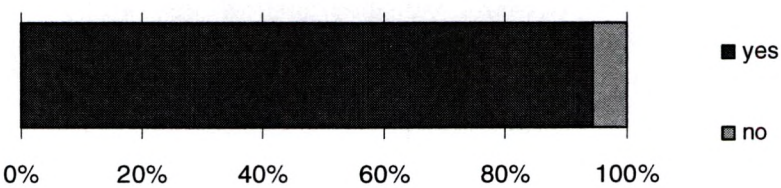
2.4.3. Evaluation by the students

The students of the academic year 2004-2005 were inquired about their general experience of the work and study load with the following questions:

a) How was the study pressure ?



b) Did the professors help enough to solve problems, was there enough guidance?



Comments

The lecturers are with some exceptions very motivated and are a great help in the learning process.

2.5. Tuning between format and content

2.5.1. Formats

Theoretical courses :
All courses consist mainly (some exclusively) of a theoretical part. The subjects of tuition are provided in course notes and/or by references to books. Course notes are in general schematically presented and projected during the lessons. They are also distributed as handouts so that notes can be added during the lessons. These notes are also distributed electronically in most cases through the Minerva facilities (E-learning software) or by providing CD-roms.

Practical courses :
The practical courses are organized in different ways depending on the topic of the course. Some theoretical exercises are performed individually or in PC classes. Only of few field courses are available. Also individual or group projects were organized in particular courses.

The table below shows for each course in which way the practical component is organized.

Table 3 : Summary of the practical component of each course in the MARELAC programme

	course	**format**
Module 1	Physical and chemical oceanography	Individual theoretical exercises
	Biochemical cycles	Group project
	Law of the sea	
	Tools in oceanography	Training at sea (2 days)
Module 2	Marine and Lacustrine Biology	Field trip (3 days)
	Marine and Lacustrine Geology	
Module 3	Microbiology	Individual project
	Palaeo-oceanography and climate	Group project
	Ecological modeling	PC class

	Aquatic Toxicology and environmental risk assessment	Group project
	International environmental protection of ocean and seas	Individual project
	Aquaculture and fisheries	Excursion (1 day) and individual project
	Dredging- and offshore	
Module 4	Extreme environments	Individual project
	Coastal systems	Individual project
	Margin systems	Training at sea + individual project
	Lacustrine systems	Individual project

The time schedule of the programme is available in appendix 1. Some courses are organized in a condensed way, while others are spread on a weekly base over the whole semester.

2.5.2. Educational tools

The theoretical courses are presented *ex cathedra*, although the small number of students allows some interactive way of teaching. In practice this remains restricted in many cases, maybe partly because of lack of tradition among lecturers and students to stimulate discussions. The courses are supported by overhead or power point projections, and occasional black-board writing or drawings. Course notes are provided, in many cases as handouts of the slides. Also relevant literature is cited. Sometimes copies are made from the most relevant chapters of recommended books or relevant textbooks are strongly advised to buy.

The course on Ecological Modeling is supported by the use of a PC room which allows students to make exercises on an individual base but supervised by the lecturers. The large number of individual projects requests the frequent consultation of the internet or other information sources like Web of Science or other library facilities.

Ghent University provides the E-learning platform *Minerva* since 2003-2004. The E- learning facilities are at this stage not yet optimally used and many options are not yet fully explored by the lecturers. Documents and slides are provided electronically for many courses on this platform. However, a fully integrated interactive E-learning project needs time to be

developed by the teaching staff. It requires also full time access for students to internet facilities, also outside working hours (at night and during weekends).

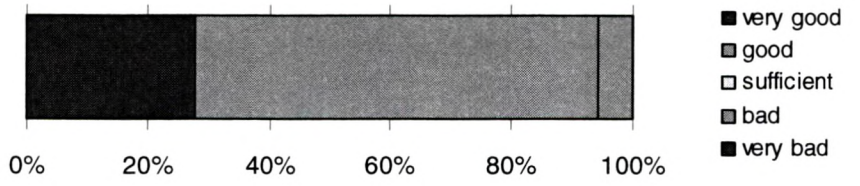
Practical laboratory and PC experience is mainly achieved during the dissertation work. At that stage, students are fully integrated in the research groups and have access to all facilities.

Training at sea takes place on board of the Belgian research vessel BELGICA.

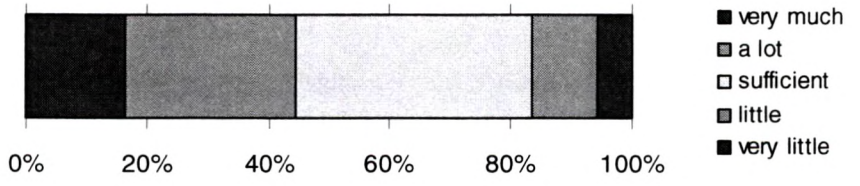
2.5.3. Evaluation by the students

The students (2004-2005) were inquired about the lessons with the following questions:

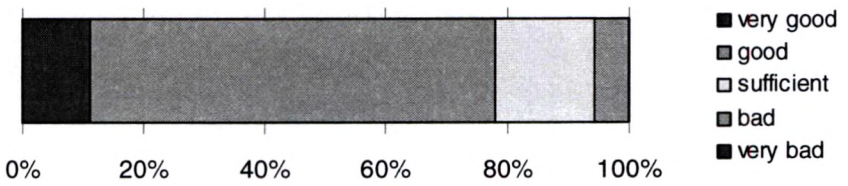
a) What is your opinion on the seminar way of teaching (one lesson equals one morning or afternoon)?



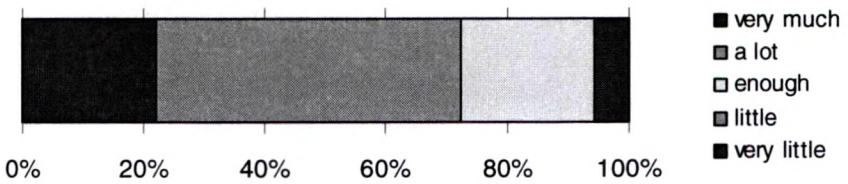
b) How much attention paid to the use of modern techniques while giving the lessons (PC, internet, multimedia, software)?



c) How was the quality of the course material (in terms of being up to date)?



d) How worthwhile is it to attend the lessons given?



Comments

The seminar way of teaching is appreciated by the students; it is a free form and gives a scientific feeling. The courses are actual and up to date and given by leading scientists in their field giving us the opportunity to learn from the best. Power point is a marvel as a teaching tool but is a nightmare as a course book. If you for one reason or another aren't able to attend the lesson you are in trouble due to the fact you can't decipher the power point slides. Also it would be handy to have courses that last for a few years like real books? In this way you can give the students the depth and detail they would like in some courses and still be able to keep the course multidisciplinary and interesting for all the students.

2.6. Evaluation and examination

2.6.1. Organization

Like all programmes of the Faculty of Sciences, examinations are organized in a semester system. There are two examination periods: for the first session in January/February (module 1 – 3) and June/July (module 4 and dissertation). The second session takes place in August/September. In case of failure, examination can only be retaken during this second session. Most of the examinations are concentrated in the first period of the first session. This results in a tight time schedule since originally 9 courses had to be examined in a period of about 4 to 5 weeks. It resulted in a frequency of one examination each 2 to 3 days. Therefore students tend to postpone 2 to 3 of the 9 examinations to the second period of the first session which leads to a better spreading. Concentrating all examinations in the first period also allows to expand the dissertation period and to delay the submission as long as possible. Some lecturers organize additional evaluation by means of individual or group-projects.

The Examination Committee is responsible for the way that examinations and evaluation are organized.

2.6.2. Means of evaluation

There are three major approaches of evaluation :
- examination (written preparation with oral feedback);
- individual and group projects;
- dissertation work.

The examinations aim at evaluating the knowledge of the students in relation to course contents. During evaluation or the examination, attention is paid to integration of knowledge and insights in the tuition subjects. It is necessary that students understand relations and that they make links between different subjects provided by different courses. In general, several (2 or more) questions are asked so that knowledge testing is not concentrated on a restricted part of the course. A set of recent examination questions is given in appendix 5.

By means of the individual or group projects different skills of the students are evaluated. It concerns especially the skills for searching, analyzing, synthesizing and communicating information. This way of evaluation also allows in particular cases a more original and creative input or approach by students.

The evaluation of the dissertation focus on research capacities in terms of critical thinking and problem solving. Being confronted with the main steps in research development (from hypothesis formulation to conclusion drawing), the student can develop and show his or her skills in terms of practical work, interpretation and communication.

2.6.3. Criteria and ways of evaluation

Lecturers communicate in time about the way examinations are taken and organized (also mentioned on the ECTS formats in the course catalogue). There is clear information on the content of the examination matter, the way of interrogation (written, oral, short, extensive,..), the type of examination questions, and the weight of the different parts of the course.

Evaluation of the examinations takes into account the present knowledge, the integration of knowledge and the way that knowledge is communicated.

2.6.4. Criteria and ways of evaluation by the examination committee (deliberation)

The general examination rules are available through the course catalogue. The Examination Committee holds a deliberation which is strictly confidential. After proclamation of the results, students can get feedback on the obtained scores from the individual lecturers, with insight into the evaluation of the separate examination questions.

2.6.5. Transparency of the evaluation

As indicated before, the details on the process of examination is communicated early in the semester and repeated during (one of) the final lecture(s). The way of examination is also indicated on the ECTS fiches in the course catalogue. After the first examination period (January/February) the individual results are made available in a coded manner. In the past this was (on a total of 20) A: 12 or more; B: from 10 to less than 12; C: less than 10. If not deliberated, all examinations with scores coded as B and C had to be redone during the second session.

Since this academic year (2004-2005), the examination rules changed. The new codes are : A: 13 or more; B: from 10 to less than 13; C: from 6 to less than 10; D: less than 6. When not deliberated only examinations with scores coded as C and D have to be redone in a second session. Minimum 'B' is required to pass (and this score is valid in the next 3 academic years as well; in case of partial failure).

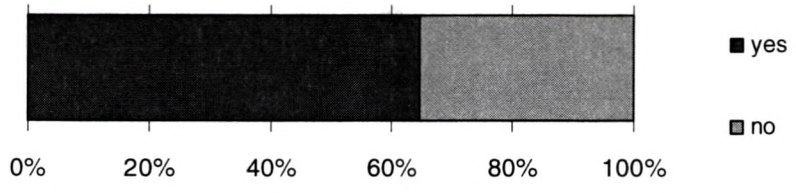
2.6.6. Quality survey on the examination

The quality of the examination is surveyed during the annual lecturers and course evaluations. In this student inquiry, a series of specific questions on the organization of examinations is included as well. It is evident that in case of problems these could be communicated to the coordinator. Until now, not any problem was mentioned by the students.

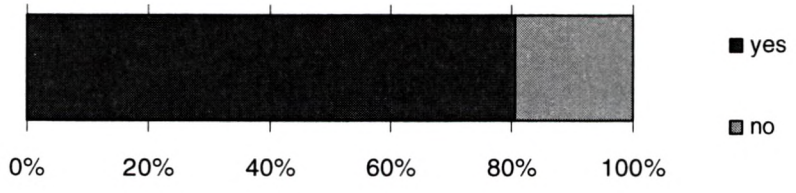
2.6.7. Evaluation by the students

The students (2004-2005) were inquired about the organization of the examinations with the following questions:

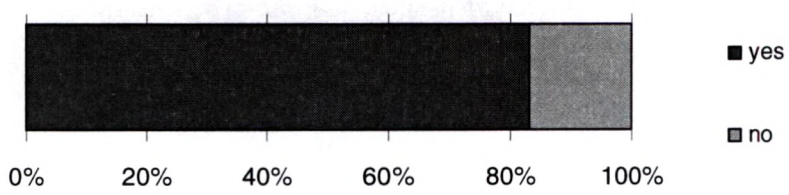
a) Were your knowledge and skills sufficiently and adequately tested during the examinations?



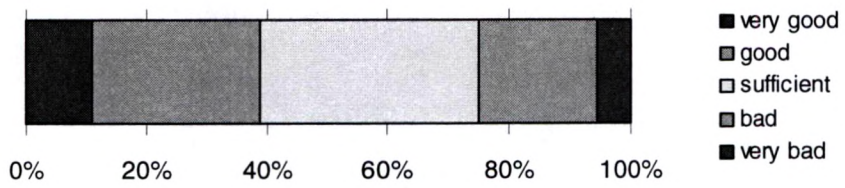
b) On average, was it clear what you had to study and what was expected from you?



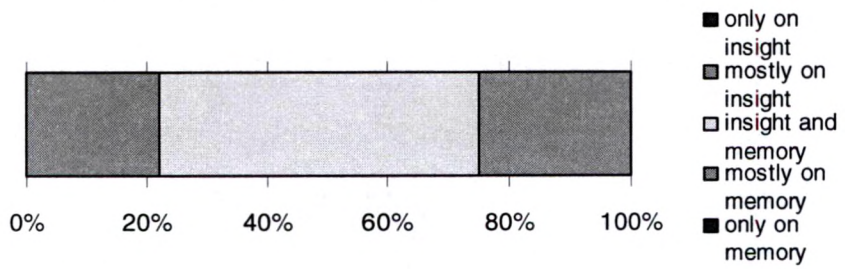
c) Did you get your examination schedule in time?



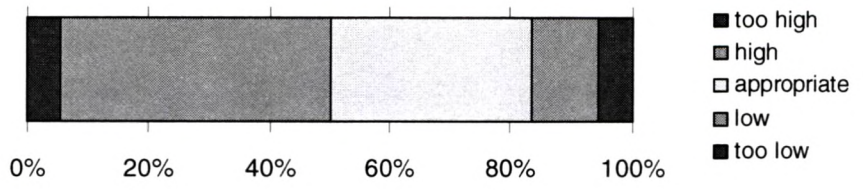
d) How were the examinations scheduled?



e) Which kind of questions was most abundant during the examinations?



f) How was the pressure during the examinations?



The way the examinations were taken was OK but sometimes this also contributed to some misunderstandings. Some people did not write everything down because they thought it was just oral, what was not the case since some professors just corrected the written version during the oral part.

Most students also wanted a better possibility to prove them selves more, some examinations were too easy and too much based on memory.

The examination pressure wasn't too high and the only other objection given was that the examination schedule was available a bit too late, but most of them also understood the difficulties in making such a schedule.

2.7. Master dissertation

2.7.1. Position and weight of the dissertation in the programme

The dissertation work covers about 90 % of the time during the second semester. It counts for 18 of the 60 ECTS points of the MARELAC programme. A list of dissertation subjects (between 30 and 40 per year) is provided to the students half November. Final selections of the topics are made at the end of December, just before the examination period of the first semester. The practical dissertation work starts half of February. Dissertation submission takes place the end of the first week of June. The oral presentation and defense takes place at the end of June.

2.7.2. Content and concept

The dissertation work concerns original scientific research.
It includes the following steps :

- Formulation of research questions (hypothesis);

- Data collection (optional);
- Data processing;
- Interpretation;
- Writing.

Mainly the three last stages are considered as most essential for the MARELAC dissertation. The formulation of an overall research question is often already done by the supervisor, when providing the subject, although a student often has to tune or reformulate the objectives of his or her study.

In many cases, dissertation subjects are formulated in relation to an existing dataset. So the process of data collection is not considered as a necessary part of the dissertation work (since the time for dissertation preparation is very short). In some cases, students have no experience in marine or lacustrine research and they explicitly wish to include field or lab work. However in general, the main focus is on data processing, interpretation and writing. The end product is aimed at a large to medium sized scientific paper already in the format for a peer reviewed scientific journals.

In contrast to dissertations as generated during the actual second cycle MASTER (licentiate) programmes, the MARELAC dissertation is much more focused on specific research questions and aims at communicating the results in a way that it is published in journals with international standards: to the point, restricted in numbers of tables and figures, with clear research questions and specific conclusions. In this way, the MARELAC dissertation is supposed to be shorter in length but more advanced in terms of reporting than the licentiate (second cycle) dissertation.

The provided thesis subjects need to be approved by the Educational Committee before they are distributed among the students.

The main criteria for approval are

- to be in the scope of marine and lacustrine sciences;
- to fit in the provided time frame of about 4 months;
- to have a promoter guaranteeing the general requirements.

In general all subjects are open to all students independent of their academic (bachelor or licentiate) background.

2.7.3. Selection procedure of the dissertation subject

Dissertation subjects are provided by researchers associated with the MARELAC programme. From the start of the programme (October), the

students are informed that they will receive a list of subjects at the end of November. In that way the students have the time to get interest in particular subjects as lectured during the first two months of the programme. In case the students have interest in a very specific subject, he or she can talk with potential promoters to make sure the topic of interest is provided as dissertation subject. If the expertise in particular subjects of interest, is not available within the MARELAC research consortium, the possibility is left open to look for international contacts in order to visit labs from outside the MARELAC programme. In this case a promoter from within the MARELAC programme should take the promotership (and the 'external' scientist is then co-promoter). This procedure ensures a quality control in order to obtain the expected standard of the dissertation as identified within the MARELAC programme. This procedure needs a certain degree of independence and sufficient initiative taken by the student.

2.7.4. Supervision of the dissertation

All the different stages of the dissertation, as indicated in the previous paragraph, are supervised by the researcher who has initially identified and formulated the subject. The supervisor is at least at the level of a PhD student or a post doc researcher. PhD students acting as supervisors are supported by promoters who are always at the post doc or higher academic level. It is the promoter who is the final responsible for the success of the dissertation work. The promoter controls the work load, the availability of all necessary facilities, and the individual input of the student. The supervisor is responsible for the daily guidance and support of the student.

2.7.5. Collaboration between students and researchers

During the dissertation work, students become active members of the research group. They have access to all facilities: laboratories, libraries, internet, .. This ensures maximum integration and allows consultation and discussion with other researchers.

The dissertations are strongly embedded in research projects which meet international standards (EC, European Science Foundation,...). If organized within the time period of the dissertation work, students can participate in workshops and other meetings relating to these larger research projects. Sometimes financial support (by the project) is provided to participate in such events.

2.7.6. Evaluation of the dissertation

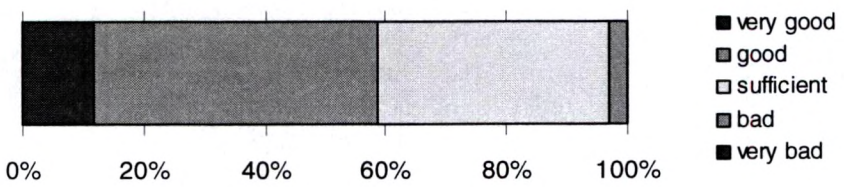
The evaluation of the dissertation takes place at different levels : daily work and end-product.
The daily work is evaluated by the supervisor and to some extent by the promoter; the end-product (dissertation) is evaluated by a reading committee which consists of 3 to 4 members including the supervisor, the promoter, possibly the co-promoter and an external expert from outside the research group. The members of the committee read the dissertation and evaluate both content and format. They write a report of about half a page in which they comment on various aspects. They can identify major flaws, if present, but in general also an appreciation for the work is asked for. The students receive this written report three days before they have to present their results for an audience including the members of the reading committee. It allows them to anticipate on major comments from committee members if present.

All committee members provide a score on 20. The promoter, after consultation of the supervisor, gives an additional score reflecting the daily work. After the presentation of results, the members of the reading committee agree on the final score taking into account the individual appreciation of both the written report and the oral presentation. The main weight is given to the written part of the dissertation.

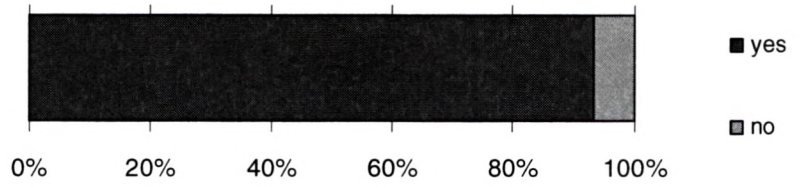
2.7.7. Evaluation by the students

The 2004-2005 students were inquired about the dissertation, although these students still had to start with the work.

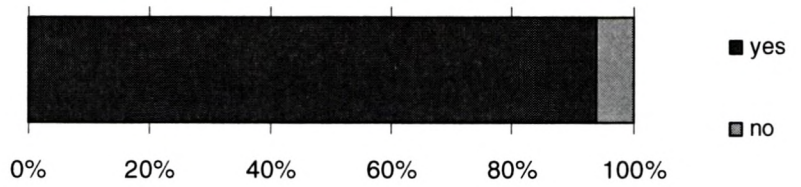
a) How did you like available dissertation subjects (up to date, content, variation)?



b) Did you get enough information in advance about the possible subjects?



c) Will you be assisted during your dissertation work?



Comments

What the dissertation subjects is concerned, there was some request for more subjects. Biology and geology subjects were sufficiently available but other research groups didn't supply enough subjects. Most students thought that they would be assisted enough and eventually liked their subjects.

2.8. Admission requirements

2.8.1. Applied policy

Below we summarize the admission requirements as applied between 2001-2005.

- The holders of a second cycle MASTER (licentiate) degree for
  - Biology
  - Biotechnology
  - Biochemistry

- Geology
- Geography

- If the Faculty of Sciences decides that there is sufficient knowledge based on the submitted CV, the holders of a degree in an academic education of the following disciplines :
  - Science
  - Applied Science
  - Applied biological science
- If the Faculty of Science decides that there is sufficient background based on the submitted CV, the holders of a degree in a non-academic education of the following disciplines :
  - Industrial engineer in architecture
  - Industrial engineer in chemistry
  - Industrial engineer in electromechanics
  - Industrial engineer in environmental sciences
  - Degree in nautical sciences
  - Industrial engineer in informatics
  - Industrial engineer in agriculture and biotechnology

Good knowledge of English is essential, therefore if not Belgian or not native English speaking, a test of English as a Foreign language (TOEFL) is required.

From 2005-2006 new requirements were formulated in relation to the BACHELOR-MASTER implementation :

Holders of a degree of the following diplomas get admission:
1. Directly:
(a) Modified (new) programmes:
- Master of Biology
- Master of Biochemistry and Biotechnology
- Master of Chemistry
- Master of Geology
- Master of Geography
- Master of Geomatics and Surveying
- Master of Bioscience engineering

(b) Programmes as organized in the 'old' structure:
- Licentiate in Biology
- Licentiate in Biotechnology

• Licentiate in Biochemistry
• Licentiate in Chemistry
• Licentiate in Geology
• Licentiate in Geography
• Bio-engineer

2. If the Faculty of Sciences decides that there is sufficient knowledge based on the submitted curriculum, the holders of a degree in an academic education of the following disciplines

(a) Modified (new) programmes :
• Master of Biochemistry
• a diploma of a master programme following on a BACHELOR programme within the area of Engineering or Bioscience Engineering
• Master of Physics and Astronomy
• Master of Informatics
• Master of Chemistry
• Master of Soft Matter
• Master of Mathematics
• Master of Veterinary Medicine
• Master of Biomedical Sciences
• Master of industrial sciences: Biochemical Engineering
• Master of industrial sciences: Chemical Engineering
• Master of industrial sciences: Environmentology
• Master of nautical sciences
• Master of industrial sciences: informatics
• Master of Bioscience Engineering : agriculture
• Master of Bioscience Engineering: horticulture
• Master of Bioscience Engineering: food industry

• A diploma of a master programme with a comparable qualification as those listed in 1 (a) en 2 (a), granted by other institutes than Ghent University.

(b) Programme 'old' structure':
• a diploma of an academic programme at 2nd cycle level in the area of Applied sciences
• a diploma of an academic programme at 2nd cycle level in the area of Applied biological sciences
• Licentiate in physics

- Licentiate in informatics
- Licentiate in chemistry
- Licentiate in mathematics
- Industrial engineer in the chemistry
- Veterinary
- Licentiate of biomedical sciences
- Licentiate in the nautical sciences
- Industrial engineer in informatics
- Industrial engineer in the agriculture and biotechnology

3. Subject to successful accomplishing of a specific or individual preparation programme
(a) modified programmes:
- a diploma listed in sub 2 (a)

(b) programme 'old' structure':
- a diploma listed in sub 2 (b).

When direct admission as based on the previous requirements is not allowed, students first need approval from the Educational Committee and the Faculty of Science. Therefore students have to submit a copy of their diploma, a list of academic courses that were attended in addition to the scores that were achieved and a letter of motivation. Based on their educational curriculum (minimum four years of higher education), the personal motivation and the attended programme, the Educational Committee provides advice to the Faculty of Science, who finally decides. After admission has been confirmed, a student can register at the central administration.

2.8.2. Characteristics of inflow students

The number of incoming students is relatively stable over the last 4 years (since the start of the programme). It varies between 17 and 20 students.

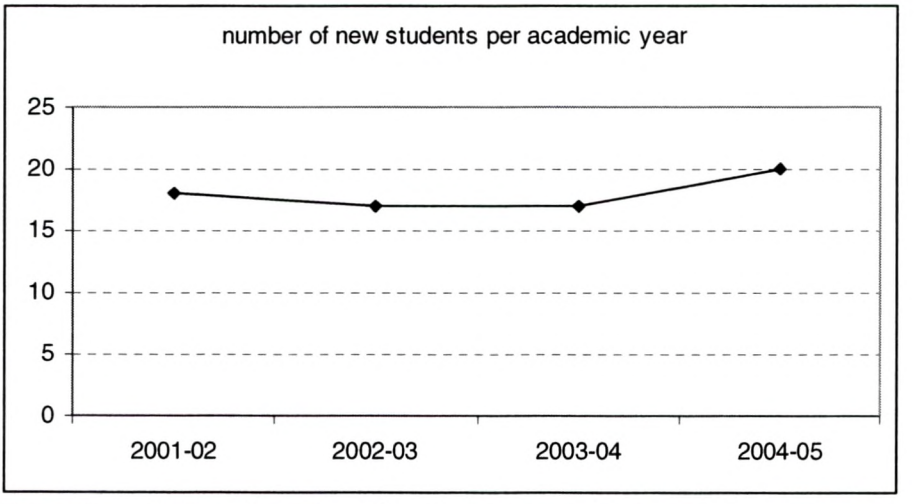


Figure 1: evolution of number of students per academic year

a) Gender

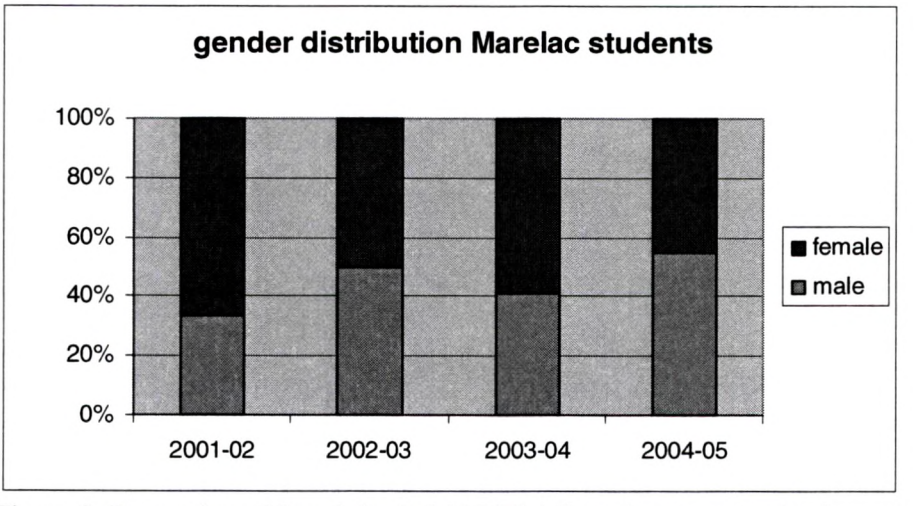


Figure 2: Proportion of female/male MARELAC-students per academic year

In the first year when MARELAC was organized, there was a slightly higher participation by female students. The remaining years the differences are very small (Figure 2).

b) Previous training

The MARELAC programme can be attended (see admission requirements) by persons with different background mainly from different academic or higher education diplomas in the 2nd cycle of the Science programmes.

Figure 3 illustrates the obvious tendency over the years towards a more diverse inflow from outside Ghent University. This tendency might indicate that the Programme gets better known outside UGent. Over the 4 years (total), most students come from Ghent university (48,6 %). The second largest group are the students the from Catholic University of Leuven (KUL 14,9 %) followed by the University of Antwerp (9,5 %). There is an increasing proportion of non UGent students in the last two years (more than 50 % did not follow the second cycle in Ghent University).

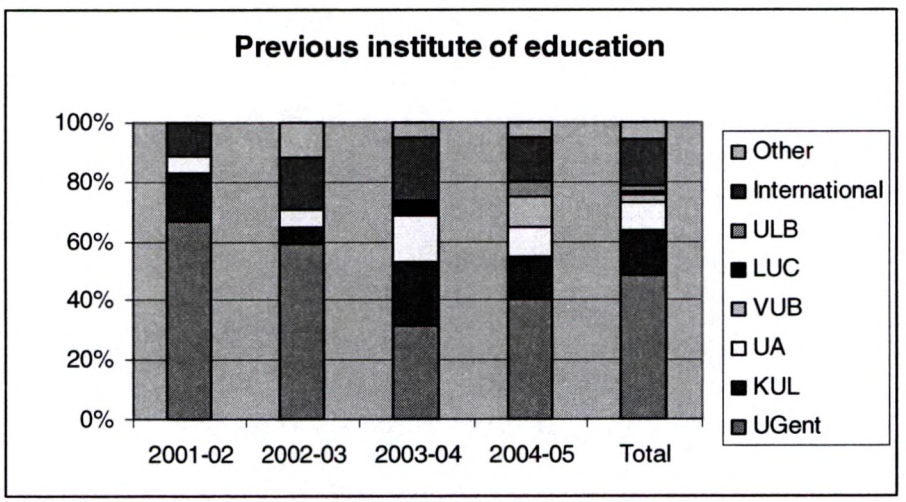


Figure 3: Proportion of students in relation to their previous institute of higher education : UGent: Ghent University, KUL: Catholic University Leuven; UA: University of Antwerp; VUB: Free University of Brussels (Flemish) ; LUC: Limburg University Centre; ULB : Free University Brussels (French)

Over the past 4 years, 52,8 % of the inflow has a degree of Licentiate in Biology (see figure 4). From these, 31.9 % obtained their degree at Ghent University. There is an international inflow of 16,7 %. Their background differs but is related to natural sciences. Of the remaining

part 12,5 % had studied geography, 6,9 % geology, 5,6 % bio-engineer and 4,2 % industrial engineer.

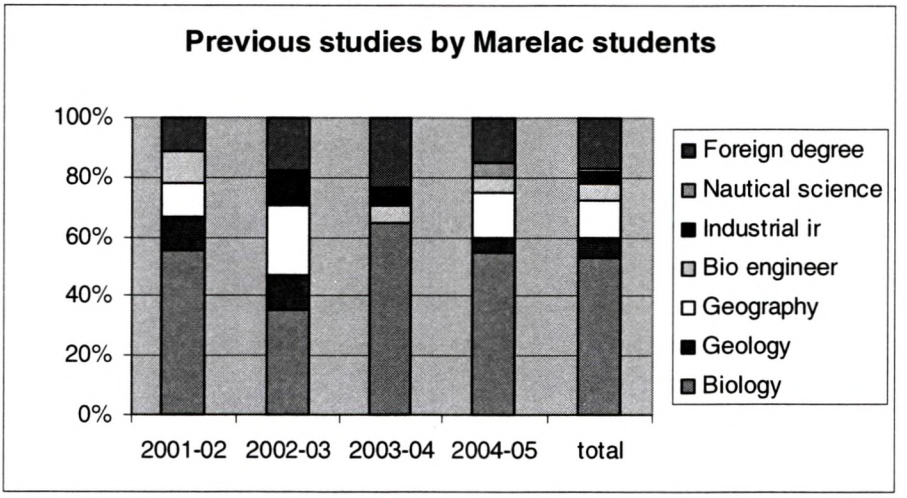


Figure 4: Proportion of MARELAC students in relation to their previous education

c) Age

It is expected that most students start with the subsequent Master programme when they have just finished their 2nd cycle degree. This is also the case since: 35,6 % is only 22 years old when they start with MARELAC.

d) Geographical origin

Most of the students are Belgian (Flemish) (87%). Other nationalities that have attended so far in the MARELAC programme are Spanish (2), Italian (1), Irish (1), Croat (1), Rumanian (1), Dutch (1), Ecuadorian (1), Brazilian (1) and Chilean (1).

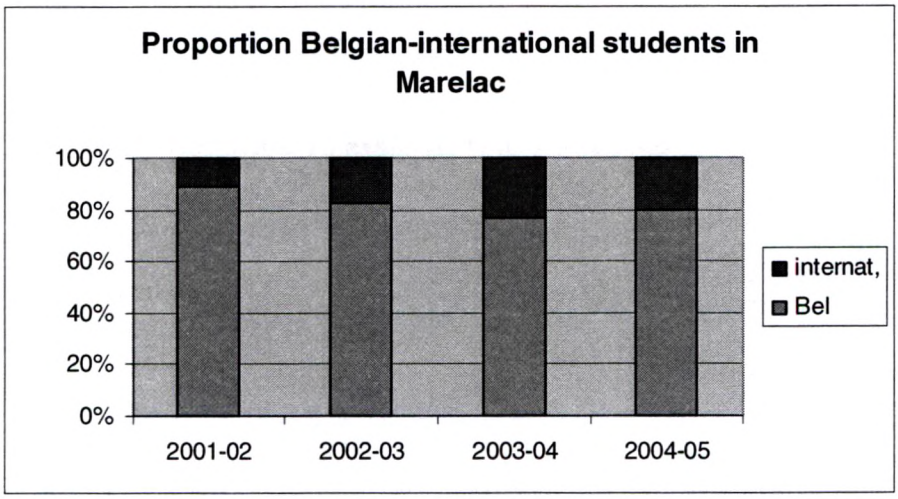


Figure 5: Proportion of Belgian and international students in MARELAC

The Table below gives an overview of the origin (Belgian provinces) of the Belgian students in the MARELAC programme. As comparison the overall first year student population composition at Ghent University is shown (referred to as generation students: students that registered for the first time at UGent between 1993 and 2004.

Province	MARELAC	generation students UGent
Oost-Vlaanderen	30,5 %	57 %
West-Vlaanderen	23,7 %	27 %
Antwerpen	23,7 %	9 %
Vlaams-Brabant	15,3 %	5 %
Limburg	6,8 %	2 %

It is obvious from this table that students from all Flemish provinces are attracted. This programme recruits less regional than the average of all other basic programmes at UGent.

2.8.3. Coherence of the programme with the previous academic training

MARELAC concerns a postgraduate training programme (subsequent Master) and therefore allows inflow from diverse Master (previous

licentiate) programmes. The main income is by graduates in Science or Applied Science (see also admission requirements). These educational programmes give sufficient scientific basic knowledge for attending the MARELAC programme. In general a 4-year programme of higher education prepares sufficiently for this specialization course. Since the MARELAC Course aims at providing a multidisciplinary insight and knowledge in marine and lacustrine systems it does not focus on one discipline. It is possible that depending on its background a student has to put more effort in a particular course but that should be balanced by other course more affiliated with his or her background.

In some cases (see admission requirements) the Educational Committee of MARELAC has to agree if the background, education and motivation of an incoming student fulfill the standards needed for attending MARELAC. In those cases, a candidate submits a copy of its higher education diploma, a list of courses attended and the obtained scores. Also a letter of motivation is requested. The EC checks the background in scientific training especially for Biology and Geology but also Chemistry and Physics. The study results and motivation can help in deciding upon admission in case of doubts.

Students with other nationalities than those having native English knowledge or Belgian do have to perform a TOEFL test which tests for general basic English language knowledge.

2.8.4. Specific activities in function of the previous training

All courses from module 1 are compulsory and aim at providing this specific marine and lacustrine knowledge which is not lectured at any other Master or Licentiate programme from which there is inflow.

The module 2 courses (Marine and Lacustrine Biology and Geology) aim at improving the incoming students their expertise and knowledge in the field of Biology and/or Geology. These are basic courses and therefore are not attended by respectively graduates in Biology and Geology.

So far not any preparatory course was offered.

2.8.5. Flexible learning routes

Students can attend the MARELAC course on a part-time base. However no special provision is organized for working students. In the past working students have attended on a part time base.

2.8.6. Policy towards earlier achieved competences and qualifications

A student can request exemption for a particular course based on its previous education. In that case he or she provides the course content and possibly course notes to the lecturer who can agree with the request. This confirmation has to be approved by the Educational Committee.

Chapter 3 Personnel

3.1. Quality of the personnel

Since the MARELAC programme is not associated with a particular department, the staff comes from different departments within the Faculty of Science, Bio-engineering Science, Applied science and Law. The text below mainly refers to the policy in relation to personnel as applied at Ghent University in general and at the Faculty of Science in particular, where most of the MARELAC associated research groups belong to. In total 6 lecturers associated with the MARELAC programme are no personnel of Ghent University They are associated on a part time base (10%) as visiting professors with the Biology department.

3.1.1. Appointments

The Board of Directors of Ghent University annually fixes the division of the available academic staff between the faculties, taking into account the staff policy plans of the faculties. The staff policy plan of the faculty of sciences is formulated by the heads of the departments (and therefore with participation of the department councils) and is approved by the Faculty Board.

In this way, it is fixed on a yearly basis which percentage of the total wage budget of the university is available for staff of the faculty of sciences. This is expressed in "points". If the current staff formation appears to be higher than allowed, the faculty has to turn in on its staff progressively in the following years. Because of the decreasing number of students in sciences, the faculty has been turning in points since a number of years. Each faculty can decide rather freely on the application of the granted staff points, as far as this fits within the submitted policy and agrees with the decretal and institutional regulations concerning the maximum number of professors that can be appointed in the faculty within each degree.

Each year, the amount of academic staff as well as the functioning resources are divided between the 14 departments by the Faculty board. This division occurs on the basis of a formula which takes into account education load (lessons (hours and "weighed" numbers of students), practical work sessions, excursions and field work projects, number of master dissertations) for 85% and research (number of doctorates) for 15%.

The Faculty of Sciences does not prefer to work with the key of the university for the division of the points, but works with full time equivalent

entities (FTE). The degrees of the staff members play no role in this division scheme. The departments are granted a number of FTEs and the proportion of professors and assistants can be determined by the departments, nevertheless a 50/50 proportion is strived for (visiting professors are not taken into account).

Within the departments the educational tasks are divided on the basis of competence, experience and work load of the staff members. The assignments are presented to the educational board and are ratified by the Faculty Board.

If the required expertise required for lecturing a particular course is not present at the own University, specialists from outside can be invited by the Educational Committee to apply for a visiting professorship. First the Educational Committee informs with the different Faculties to ensure that the specific expertise is not present at UGent. If the result of this inquiry is negative, external experts are invited to submit their CV. First the department has to agree based on the CV and consequently the decision has to be approved by the Faculty Board and the directorate. Visiting professorships need to be reconsidered by the Educational Committee and Faculty Board each 3 to 5 years.

3.1.2. Impact of qualities at appointment and promotion, evaluation and follow up of the staff

For the appointment of professors, the educational and research needs of the department are taken into account. Also factors as continuation of a specific discipline versus strengthening of a research group are considered. This policy is decided upon by the department council, is discussed on a meeting of the heads of the departments and is ratified by the faculty council.

Job openings are published in the Belgian Bulletin of Acts, Orders and Decrees. At first, the applications are evaluated on file with respect to admissibility, scientific competence and education experience. The most suitable candidates (sometimes all -) are invited for an interview and/or giving a lesson for an ad hoc commission. During the interview candidates are also asked for their vision concerning education and research.

The promotion policy uses the performances in the scientific area (international publications, citations, participation to congresses, stays in foreign institutions...) and the educational area as well as criteria on so-called external and internal service. Not only the scope of the educational performances is important, but especially the quality of it, which should become clear from education evaluations. The evaluation file is part of the

promotion file. For further information on the education evaluation we refer to chapter 5.1.

Assistants involved in the education have generally not enjoyed any formal educational training, although some of them were trained during AILO (academic initial secondary teacher training) and doctor-assistants can follow also the instructor training. At their appointment however didactic and communicative skills are always taken into account. The fact that they have fulfilled already executive functions (e.g. in associations) is also evaluated as positive. At the education evaluation also the supervision by assistants at practical classes is mentioned. The outcome of the evaluation can be a point of interest at the possible lengthening of a mandate of an assisting staff member, with appointments of 2+2+2 years for the assistants and 3+3 years for the doctor-assistants. At the appointment (and promotion) of the administrative and technical staff the technical and communicative skills are evaluated.

3.1.3. Policy concerning the commitment of the staff for education activities

The theoretical lessons are looked after by the responsible teachers who are professors or doctor-assistants (according to the current regulations a doctorate is the only legal requirement to gain responsibility for a course).

For the organisation and the supervision of the practical exercises, excursions and field work projects is mainly counted on assistants, supported by professors. In a lot of cases all scientific staff, and not only university staff, is involved in the organisation of the education, at least to the extent the contracts allows this. This involvement is necessary to avoid an overload of assistants, so that they have sufficient time to conduct scientific research and to conclude their doctorate research within the set period. The dissertations are generally supervised by post-doctoral researchers or assistants with at least 2 years research experience, and professors.

3.1.4. Obstructing factors for the implementation of a good personnel policy

No real obstructions are observed.

3.1.5. Professionalisation

Most lecturers have had no formal educational training, although many have a diploma of teacher for the higher secondary education, now AILO. For some years the university has organised an instructor training that can be

followed on a voluntary basis. This training is especially focused on different ways of teaching. Also a training dealing with more general but related subjects such as presentation techniques, time management and job evaluation conversations is offered. Such trainings reinforce the expertise of the staff.

3.1.6. Expertise of the staff

Expertise of the staff is insured by a striving to select teachers who are able to add contents from their research experience (to see chapter 3.2.) to their courses. Since 1993, but more structured since 1997, the educational capacities and performances of professors as well as the supervision at practical classes and to a lesser extent the examinations are evaluated by a student consultation (education evaluation) organised by the quality centre for education. The targeting of assistants at their educational and supervisory tasks mainly take place under the form of informal conversations with the responsible professor. Since the MARELAC programme is a specialized programme at an advanced level, the associated research groups and staff are particularly dedicated to marine and lacustrine research.

3.1.7. Involvement of teaching staff

There is a strong involvement of the staff from the research groups in the Faculty of Science associated with the MARELAC programme. Mainly the marine and lacustrine oriented research groups within the departments of Biology and Geology have a strong involvement in the programme through field excursions and training at sea, and through dissertation work, since most of the students become embedded in these research groups through their research projects. Also more and more MARELAC Alumni started a PhD study in one of the affiliated research groups.

At the level of teaching the involvement of the staff is mainly restricted to the assigned MARELAC lecturers with the exception of the module 4 courses where also post-doc researchers from the different research groups are invited to present their work and expertise in particular systems.

3.1.8. Technical, administrative and organisational expertise of the staff members

In general, the satisfaction concerning the commitment of the administrative and technical staff members is large. Staff members regularly get additional training, e.g. they follow courses on new administrative tools (SAP-system)

organised by the central administration of Ghent University or learn new laboratory techniques.

3.1.9. Introduction and mentoring of new staff members

There are no formal procedures for the introduction and mentoring of new staff members. Because they are almost exclusively recruited from the academic environment, they rarely experience adaptation problems. Collegial conversations and department council meetings help with the integration of newcomers.

3.1.10. Mentoring of assisting staff on their educational task

Assisting staff is informed at their recruitment concerning the tasks to fulfil. Generally they "inherit" information cords of their predecessors. This information is customised to new priorities. Not only assisting staff, but also project employees and post-docs take up some of the typical assistant tasks as e.g. introduction lessons for practical courses, excursions and field work projects. This is meant to ensure that assistants would have sufficient time for their doctorate research.

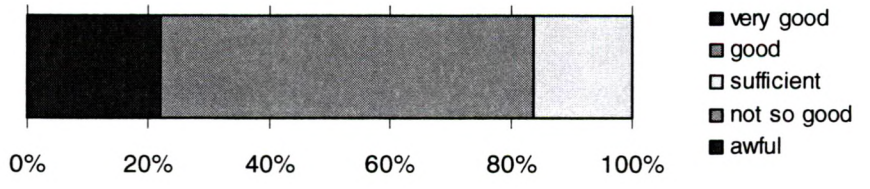
3.1.11. Equal opportunity policy

At appointments or promotions all candidates get equal chances. The selection happens on the basis of the merits of the candidate. Earlier this year a workgroup "UGender" was established for the targeting and support for an adapted equal opportunity policy in the different faculties of the university.

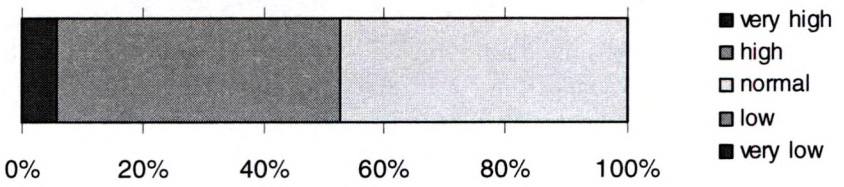
3.1.12. Evaluation by the students

The students (2004-2005) were inquired about the educational personnel.

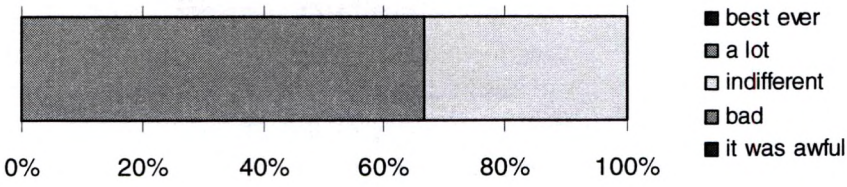
a) How was the motivation of the educational personnel?



b) How was the effort they showed?



c) Did you like the way they gave the courses (guidance given and commitment to help you out after the lesson)?



Comments

Most of the students were very happy with the educational personnel. Most of the teachers and the assistants were very eager to help out and were very motivated.

3.2. Professional/academic orientation

3.2.1. Research expertise

Experience as a researcher is the main criterion for an appointment as a professor. This is also taken into account for evaluations and promotions. In recent years, the importance of the research component has still increased. Probably, this is due to the fact that the financing of the universities in Flanders is related to research achievements, counted by the number of doctorates and the number of (a1) publications of the last 10 years as incorporated in the "Web of Knowledge".

Most lecturers involved in the MARELAC programme come from internationally renowned research units in the field of Marine and Lacustrine

Systems/Science, often with a leading position in their discipline at European and even global scales. Their research is at high international standards as illustrated by their research output (see appendix 14).

3.2.2. Range of research specializations

In order to illustrate the strength of the MARELAC programme by bringing together this international multidisciplinary expertise in the field of marine and lacustrine sciences we provide a short description of the research activities and output of the different research groups in appendix 13. Many research groups associated with the MARELAC programme take lead positions on an international level in their field of expertise. Also the list of publications (Appendix 14) illustrates the range of specializations involved in the MARELAC programme.

3.2.3. International contacts personnel relevant for the educational programme

Since all research groups associated with the MARELAC programme work in an international context, there is a strong feedback from ongoing international research initiatives towards the educational programme. This feedback is situated at three main levels :

- Through their (inter-)national contacts MARELAC lecturers are providing latest information in their field of research during the specialized courses.

- Invitation of (inter-)national experts to present seminars in the module 4 courses (see further for details).

- Dissertation subjects are mainly framed within international research projects. MARELAC students are brought in contact with international scientists through
  - collaboration in the field of research;
  - the external reviewer in the reading commission of their dissertation
  - participation to workshops related to their dissertation work (Atlantic Coral Ecosystem Studies, EC project workshop Erlangen,....);
  - participation in international sampling campaigns (Indonesia, University of Nairobi and Kenyan Marine Fisheries and Research Institute, Training Through Research (TTR) – Unesco

multidisciplinary sampling Campaigns with RS Prof. Logatchev, CADIPOR- RS Belgica campaign Gulf of Cadiz);

- long term visits to international laboratories and research groups in function of their dissertation work (University of New Brunswick, Dalhousie University, ...).

In appendix 17 a list of international partners associated with each research group and with a direct link to the MARELAC programme is provided.

3.3. Staff quantity

3.3.1. Staff extent

In chapter 3.2.2. and appendix 13 an overview is given of the size of research groups associated with the MARELAC programme.

MARELAC lecturers have different status at the university. Most MARELAC lecturers belong to the permanent Academic staff (13 ZAP), two lecturers are post-doc researcher (contract basis or FWO (Research Foundation-Flanders), while 6 lecturers do not belong to the university staff. They are officially associated to Ghent University as visiting professors and appointed for 3 or 5 years. Post-docs also contribute to the MARELAC programme.

For dissertation work the MARELAC students are integrated in research groups where they are supervised by post-doc researchers and/or PhD students. Since most of the affiliated research groups are relatively extensive, there is sufficient support for the MARELAC programme in terms of dissertation supervision and practical guidance.

3.3.2. Extent of the staff in relation to the number of students

The numbers of students varies between 16 and 20 per academic year while in total 13 research groups (20 lecturers) are involved in the educational programme. Each research group consists of sufficient permanent academic staff, research assistants, PhD students, post-doc researchers and technical/administrative personnel to guarantee the quality of the educational programme.

3.3.3. Ratio between the different staff categories

The number of university staff members is relatively small in all categories compared with the large number of project personnel involved in each of the

research groups. The educational programme is largely supported by the strong project funding of each of the research groups.

3.3.4. Age structure

The teaching staff is well represented by different age categories. Also the other permanent staff members in the technical and administrative category are represented by most age categories.

3.3.5. Participation of the different personnel categories in education and research

The lecturing in the MARELAC programme is mainly taking care of by the tenured academic staff, visiting professors and post-docs. All other personnel (technical and administrative staff) is mainly involved through dissertation works. They support the students in the lab or supervise their research projects.

For the field work, PhD students and assistant personnel are involved, but since this practical aspect is restricted in the 1-year programme, the work load is also here restricted.

Chapter 4 Facilities

4.1. Material facilities

4.1.1. Housing

Most of the research groups (Phycology, Marine Biology, Renard Centre for Marine Geology , Protistology and Aquatic Ecology) involved with the MARELAC programme are housed on the Sterre Campus in the building S8. The campus can easily be reached by car and by public transport. More than 50 % of the courses takes place at the Sterre Campus (building S8). Other locations are situated (on biking distance) in the Universiteitsstraat, Plateaustraat, Technologiepark Zwijnaarde and Ledeganckstraat. These locations are all within a radius of less than 5 km. They are easily reachable by public transport or by bicycle.

4.1.2. Lecture rooms

All lecture rooms are sufficiently accommodated (beamer, overhead projector, black board) according to their purpose.

4.1.3. Libraries

There is no separated MARELAC library; the libraries of the research groups involved in the programme are fully available for the students. In addition to that there are several central library services.

- Central library at Rozier

The central library of the University has a large collection on a wide range of topics. The library hours are Monday-Friday from 8 till 17 o' clock.

- Faculty library at Campus Sterre, S2, 3th floor

The budget for this library comes from the central library, the faculty library committee advises the faculty how this budget should be divided amongst the different disciplines in the Faculty of Sciences. The library hours are Monday-Friday 8.30-12 and 13.30-16.30. This library has a spacious reading room.

- Research group libraries

Due to the diversity of the courses taken by MARELAC students, they generally consult the libraries of a number of research groups. There they

find more specialized reading material. There are about 5 libraries spread over various research groups containing information on marine and lacustrine topics. The students can obtain material from these libraries, but they cannot be used as study room.

Catalogues
The website of the university gives access to the ISI Web of Knowledge, where Web of Science and Current Contents can be consulted. There is also an electronic application that can be used to locate any book or journal present in one of the libraries of the University. All catalogues can be consulted on-line and a system has been set up so that materials can be requested on-line and can be picked up in a library of choice.

Web of Science, Medline, Current Contents, Pubmed and ELIN are about the most popular e-sources. They are accessible for computers within the UGent network. All students enrolled at the University get an electronic account and can dial in to the UGent network. In several student homes, the rooms have computers that have direct access to the UGent network.

The number of specialized marine and lacustrine journals that is accessible through the UGent library is restricted. The offer has increased recently but still remains relatively low.

4.1.4. Computer facilities

The Faculty of Sciences has 3 computer rooms that are freely accessible for students if no lessons are going on in the room at that moment:

- Sterre Campus: Alan Turing room: 27 PC's
- Sterre Campus: Konrad Zuse room: 33 PC's
- Campus Ledeganck, Ada Lovelace room: 28 PC's.

The main computer class of Ghent University (DICT) is located on the Sterre Campus and has 36 PC's and 26 X-terminals available for students. The limitation here is that the access to the PC rooms is limited at night and closes from 9 pm onwards.

4.1.5. Student and personnel facilities

- There are seven University restaurants, offering four daily menus (one is vegetarian), sandwiches and snacks.

- The University has six student homes, with a total capacity of 1514 rooms, 191 studio's and 100 flats. Generally, there are common kitchens and shower facilities, maintained by university personnel.
- The social service of the University helps students to conduct their studies in optimal material and psycho-social circumstances. They offer information and advice concerning the social status, formalities, financial plans, psycho-social problems, etc. There are also 2 student doctors that can be consulted daily from 9-12.30 and 13.30-19 (on Friday till 17) or upon appointment.
- The Ghent University Language Centre offers various types of courses for students and staff who want to learn French, English, German, Italian, Spanish, Portuguese. They also offer Dutch courses for speakers of other languages.
- The university has sport accommodations available for its students and staff. Various indoor and outdoor disciplines are offered. There is also a swimming pool.

There is no meeting room for MARELAC students. The Sterre campus in general lacks student meeting rooms which is very inconvenient during longer breaks. Both a multimedia room giving access to internet facilities, as well as a social meeting room would definitely increase the student accommodation to a large extent. MARELAC students often have to make individual and group projects where central accommodation lacks for this purpose at the moment.

4.1.6. Access to locations

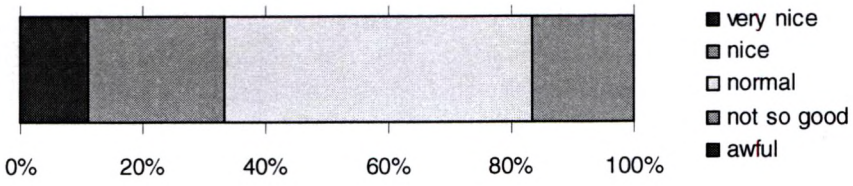
All locations are easy accessible by public transport.

4.1.7. Financial means

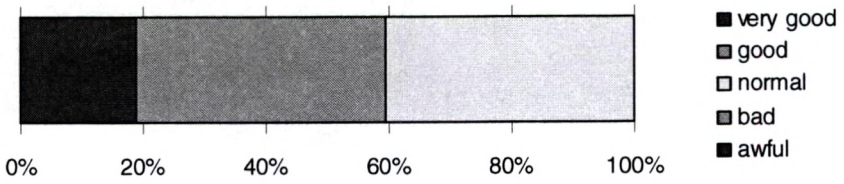
Recently some structural investments were done by the University to improve the PC facilities (new PC room in Ledeganck). This PC room is managed by an extra personnel member.

4.1.8. Evaluation by the students

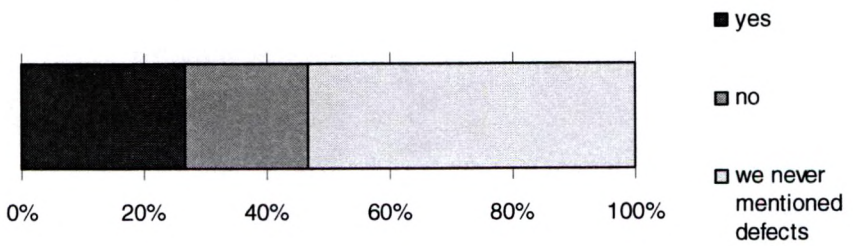
a) How are the available facilities (PC, libraries, software, and manuals)?



b) How did you like the classrooms and their equipment?



c) Is there enough attention for the improvement of the infrastructure?



Comments

The only complaints here were about the availability of computers: these were mostly old computers and only three were available for most of the MARELAC students and the dissertation students from the Marine Biology section.*

** Comment from the course coordinator: The students refer here to the PC room of the Marine Biology section which is not intend for the whole MARELAC group. However students are allowed to check their Email there in between two courses.*

4.2. Study guidance

The Office for Study and Career Advice is the central information centre concerning study programmes and grants. They give information, advice and guidance concerning the different aspect in a student's career and distribute brochures, organise information sessions, etc.

As the advanced studies are more internationally oriented, they are also advertised through the International Relations Office of the Faculty of Sciences through e.g. regular mailings to the international partners.

There is also a website dedicated to the programme that is frequently visited and that serves as an excellent source of information towards incoming students. In addition to this, the goals and contents of the programme can be found in the electronic course catalogue available on the web.

All faculties of Ghent University have appointed a curriculum mentor/tutor. All students from the faculty can contact this person with questions concerning study choice, study methods and study progress. This mentor/tutor mainly focuses his/her attention to first year students, who are regularly contacted, although students from any year are welcome.

It is the faculty's intent that students contact the professors and teaching assistants spontaneously if they encounter problems with contents or understanding of the course. The electronic platform MINERVA includes a forum where students and professors can easily exchange questions and information concerning the courses. There is also one person, who is appointed as tutor for the specific programme. This person is also regarded as counsellor during the examination periods.

Students can also contact the Office for Study and Career Advice for student guidance in its broadest context (personality, social problems, health problems), either in individual or in group sessions. The International Relations Office (IRO) offers guidance on general issues for students coming from abroad.

Complaints about education or examinations are dealt with by the faculty ombudsservice. This is a neutral organisation consisting of 4 professors acting as mediator between the student and the professor.

4.2.1. Information for incoming students

Information for new students is provided in different ways:

1. Ghent university organizes each year a information session for graduates who want to attend a specialization programme. MARELAC representatives attend this session in order to inform interested people on the different aspects of the programme.
2. The MARELAC website (http://www.marelac.ugent.be) gives information on the programme, the lecturers, the involved research groups and the admission requirements. It also gives the coordinates of the MARELAC coordinator if more information is needed.
3. Through e-mail, phone or personal visits, the coordinator provides specific information if requested.
4. An info session on the MARELAC programme is organized at the end of the academic year addressing all graduates in science or related programmes.

4.2.2. Inflow support

New students are informed on the content of the programme, the time schedule and the study load through the coordinator. Also Alumni still working at the university are involved in informing new students about their experiences on the programme. The coordinator organizes the first day of the academic year an info session on the practicalities of the programme. At that moment students are clearly informed about the role of the coordinator to advice and support students where necessary.

4.2.3. Information, study guidance and advice during the programme

The coordinator as well as most lecturers of the programme can be visited through the academic year with specific questions and requests concerning the programme.

4.2.4. Usability of the study guide and communication of objectives and regulations

The goals and contents of the programme, the admission requirements, the programme tables and some general information as the education and examination regulation are published in the electronic study guide. This study guide can be consulted on the website of the university (http://aivwww.ugent.be/Studentenadministratie/Studiegids/2004/). A CD-Rom version is available upon request, and the faculty of sciences also publishes part of this in formation in its study guide book, which also includes lesson schedules with an indication of the room where the lesson takes place.

4.2.5. Mentoring during examinations

After 12 weeks of lessons, a study and examination period starts. Also during this period the students can appeal to the professors and assistants for extra explanation. Nowadays most of the students use e-mail to forward their questions to the professor. In some cases a forum (Minerva) is used, so that students also can interact with each other on the questions.

4.2.6. Counceling flexible learning route

Students who want to register with a personally adapted programme, should contact the examination board for the outline and approval of this programme.

4.2.7. Psychosocial guidance or guidance of students with a handicap

As mentioned under 4.2.3 students can turn to the Office for Study and Career Advice for personal guidance, also concerning personal problems which are not study-related. Students with a physical handicap or a chronic disease get help at the guidance service for students with a handicap. Efforts are spent to prevent that the handicap would predominate the competences of the student and causes a failure of the student in his/her studies.

4.2.8. Ombudsfunction

The coordinator functions as the ombudsman (tutor) as well. Individual as well as group requests or problems are handled by the coordinator.

4.2.9. Organisation and coaching during international exchanges

Coaching of foreign exchange students at UGent

This paragraph refers to foreign Socrates exchange students. The regular foreign students have access to the same facilities but are in general guided by the course coordinator.

At the central International Relations Office (IRO) foreign exchange students can count on the following services:

- Every interested student receives an information package (by mail and e-mail), with information on admission procedure, language preparation, visa, insurances, housing, Welcome Day, city of Ghent, Erasmus Student Network (ESN) and the Exchange Student Guide. All this information can also be obtained from the website.
- Students can reserve a room in one of the student residences though the IRO. If needed they can also get help in finding a room on the private market.
- Students get help in the application procedure for their visa.
- The IRO brings the students in contact with their promoter and the Commission for International Relations of the Faculty.
- Twice a year the IRO organises a 'Welcome Day'. On this day, students get all information about the services of Ghent University, the city and the student life in Ghent.
- Foreign students have the same facilities as regular students (restaurants, library, computer rooms, sports, medical and psychological coaching, renting bicycles...).
- Coaching in finding a student job.
- Free course of Dutch.
- Students with social and other problems can go to the 'Foreign Students Adviser' who helps them to find a solution.
- ESN is an international student organisation with a section in Ghent. She tries to integrate the foreign students in Ghent and organises all kinds of social, cultural, ... activities. ESN also collaborates at the 'Welcome Day'.

The Faculty Commission for International Relations (FCI) offers extra services:

- Information about academic matters is given by the international relations officer of the faculty, the member of the FCI for the discipline or the promoter himself. The promoter offers support when there are problems with the educational programme. The international relations officer takes care of the daily support, collects and controls mobility (application forms and learning agreements), and sends the results of examinations (transcript of records) to the home country.
- Information on the Faculty is mostly given by the international relations officer.

Coaching of UGent-students going abroad.

So far, there were no outgoing students in the framework of Socrates in the Marine and Lacustrine Sciences. If there would be an interest next year, students would have to follow the procedures as for the other disciplines in the Faculty of Sciences. They would be guided through the whole process by several departments.

Chapter 5 Internal quality control

5.1. Evaluation Results

5.1.1. Internal quality control - student appraisals of the educational system

At the Ghent University the solicitation of student appraisals of the educational system is an important element within the institutionally structured implementation of internal quality care and control. Several aspects of the organisation of the educational system and the teaching are evaluated on their efficiency and effectiveness. The primary goal of the evaluation is to provide possible functional adjustments. Hence, the evaluation aims to deliver actual feedback, not only to the professors, but also to the Educational Committees and to the Quality Centre for Education of the Faculty (hereafter QCE). As a follow up of the evaluations, the Educational Committees can initiate or propose specific measures. The university's Regulations on Education and Examinations (hereafter REE) stipulate that every professor with a teaching duty has to be evaluated at least once in three years.

The educational system is evaluated by means of an electronic questionnaire, developed and maintained by the QCE and approved by the Faculty Board. By means of this system, the students can communicate their experience and appreciation and can in addition suggest improvements. The questionnaire focuses around important aspects of the education, such as e.g. the teaching system, teaching methods, examination, etc., all to be subject to the judgement of the students. The questionnaire has evolved from a very general version used by all Faculties of the university to a version which is specifically tailored to the needs of the Faculty of Sciences. For the complementary studies and advanced studies, as well as for the subsequent master's programmes, the questionnaires are presented to the students near the completion of their programme.

The evaluation is organised by the QCE and is the institutional part in the quality control process on faculty level. Through the questionnaires, the QCE, the Educational Committee and the departments gather information on the educational process. In addition to this evaluation, the teaching professors are encouraged to organise their own feedback moment at the end

of their course, in order to be able to implement modifications on a very short term, or ask for very specific information. This is the informal part of the evaluation: this information is only available to the teaching professor.

The process of the evaluation can be outlined as follows:

- As the questionnaire is implemented electronically, the students gain authorised and protected access to a webpage where a personalised questionnaire is presented that includes each course in their curriculum. An important remark in this context is that the students participate completely voluntarily. The questionnaire consists of a number of very specific (so-called "closed") questions that try to measure the appreciation of the education at several levels. In addition, it is also possible at any time to enter free comments.
- When the period for filling in the questionnaires is over, the teaching professors get access to the results for their courses. The professors are invited to file a reaction to the Director of Education (hereafter DE) on this if they wish to do so.
- An evaluation committee (consisting of the DE, a staff member of the Logistic Department for Teaching Affairs (hereafter LDT), the chair of the Educational Committee, a teaching assistant and a student) analyses the results and writes for each course and for each professor a preliminary synthesis report and a preliminary score. The report can also contain questions for the Educational Committee.
- The preliminary synthesis report and score are communicated to the professor and to the EB. The professor is again invited to comment on these, if he/she so wishes, but at that time is asked to address them to the Educational Committee. It is the task of the Educational Committee to check the preliminary scores, to discuss the questions of the evaluation committee and to advise on the preliminary synthesis report and score.
- Based on the preliminary synthesis reports and scores, on the comments of the professors and the advice of the Educational Committee, the final synthesis reports and scores are formulated by the QCE. These are the institutionally organised records of the evaluation on Faculty level. This is communicated to the professors, the Educational Committees and the presidents of the departments. The final reports are also consulted by the Dean of the Faculty of Sciences and the faculty committee that prepare the files used for the appointment and/or promotion of the professors.

As for the follow up of the evaluations, this is in the first instance the responsibility of the Educational Committees. This follow up is the answer to the incentive for quality improvement originating from the point of view of the student population. The Educational Committee is asked to report to the QCE on its follow up actions.

5.1.2. Non-personal results

The evaluation of the educational system contains questions on several aspects and levels

- a global opinion on the course:
  - theory
  - exercises (if applicable)
  - practical work (if applicable)
  - course material
  - evaluations
- a global opinion on the professor
- a global opinion on the programme
- a global opinion on the student appraisal system (i.e. the evaluation tool).

The students give an overall judgment for an item by selecting one of the 'smileys':

 (very good) means: In general I am very positive about it.

 (good) means : In general I am positive about it. Small remarks that I may have are details that do not change my overall positive opinion.

 (OK) means: I am neutral: no negative feelings, but no enthusiasm either. Just OK.

 (weak) means: In general I am rather negative or negative about it. I will clarify my opinion on the page with the questions.

 (very weak): In general I am negative or very negative about it. I will clarify my opinion on the page with the questions.

When a negative appreciation is given, it is mandatory to fill in a more detailed questionnaire. When the overall appreciation is positive, this detailed questionnaire can be freely completed.

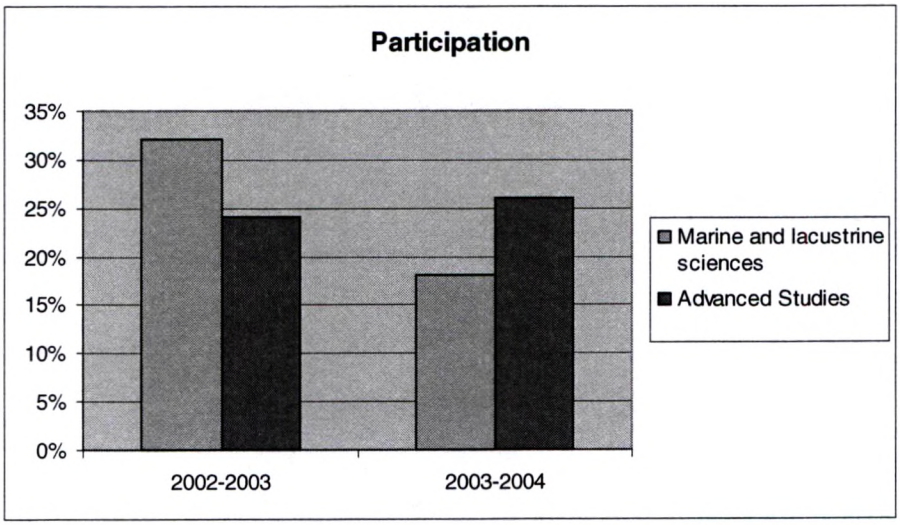
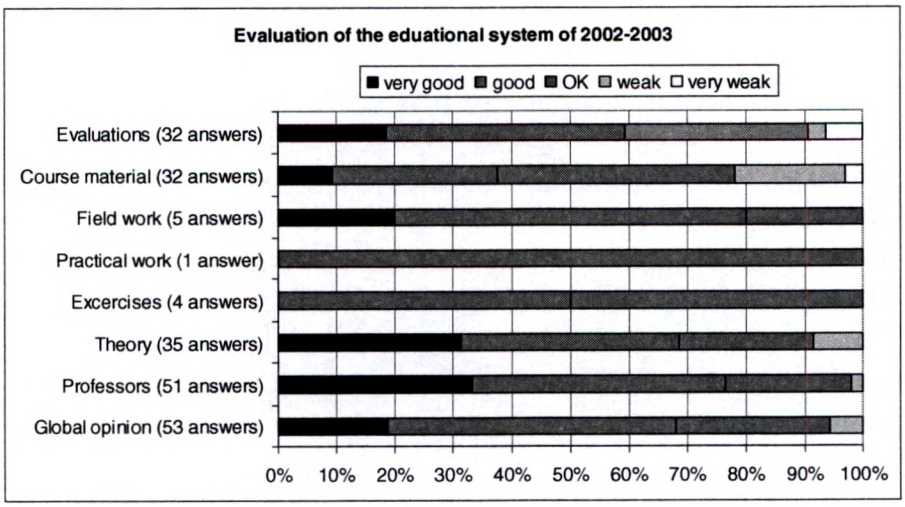
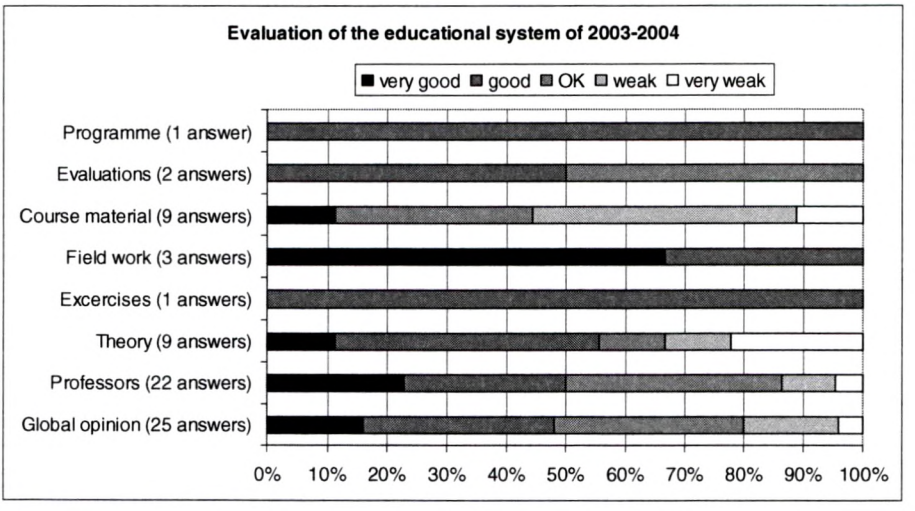


Figure 6: Student participation to programme evaluations for MARELAC compared to other advanced studies at the Faculty of Sciences

The results of the evaluations are summarised in the following figures.





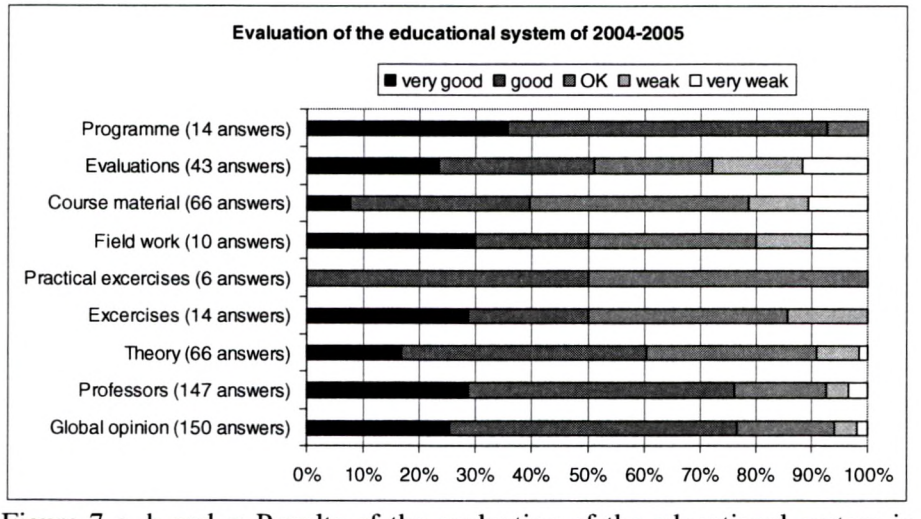
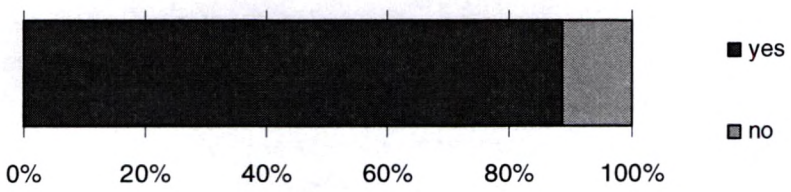


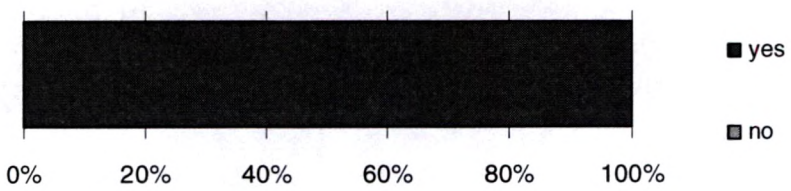
Figure 7 a, b and c: Results of the evaluation of the educational system in MARELAC for different academic years. The horizontal bars have to be read from left to right in decreasing order of appreciation

In the students inquiry of this academic year (2004-2005) also some specific questions on quality control were formulated :

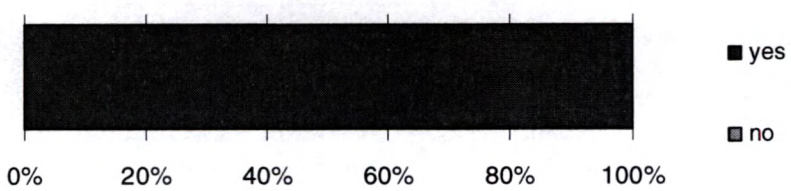
a) Is there enough involvement of the students when it comes to quality control?



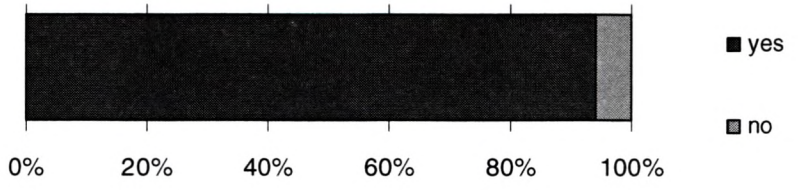
b) Do you think the teachers take your opinion in consideration?



c) Do you think that students can play a role in the development of the programme through the educational committee?



d) Do the teachers listen enough to foreign students and do these students have an input?



Comments

The way the student committee has been formed is very good, each student representing every university and or faculty was asked to join. The few matters that have been discussed in the committee have been instated within a month or two. This was above expectation to all.

5.2. Measures for improvement

5.2.1. Measures for improvement of the education

Since MARELAC is only organized since 4 years, this visitation (2005) is the first overall evaluation of the programme. The first year (2001) an informal inquiry was organized among the students about the general philosophy and overall organization of the programme. Some remarks were made which were dealt with in the Educational Committee. In general however the programme met the expectations by the students.

Because of the strong representation of the students in the Educational committee (6 of the 18 members), any problem or inconveniency in relation to the programme is dealt with in a relatively short time.

The annual lecturer evaluations are the main (anonymous) source of information concerning the quality of the educational programme. The results of this evaluation are discussed in the Educational Committee in order to remediate if necessary. In general the participation is low so that the final report of these inquiries only provides trends, not statistically supported. So far not any serious problem came out. The main remarks from both informal inquiries and official evaluations were about overlap between some of the courses. The first year there was a problem with the strong

mathematical approach in the partim Physical Oceanography. The problem was solved for the next academic year.

5.2.2. History and remediation of the programme

Since this is the first visitation this aspect is not discussed.

5.3. Involvement of personnel, students Alumni and the labor market

5.3.1. Councils and committees involved in quality care

The Faculty Board ("*Faculteitsraad*") is headed by the Dean and consists of 72 professors (tenured academic staff), 8 teaching assistants (assisting academic staff), 8 administrative and technical staff members and 16 students. This council is responsible for the education policy and the education quality care. Concerning these issues, the Faculty Board is advised by the Quality Centre for Education ("*Kwaliteitscel Onderwijs, KCO*").

The Director of Education, a professor, is the president and representative spokesman of the QCE. His task is to coordinate the educational processes within the faculty in consultation with the Dean's office. As president of the QCE, he determines the agenda of the QCE meetings. He is the executive of the decisions made by the QCE, hereby assisted by the staff member of the Logistic Department for Teaching Affairs at the Faculty of Sciences. His appointment is for 2 years, but renewable. The Director of Education is also a member of the University Education Board.

The Faculty of Sciences has four ombudspersons (professors). There is also a curriculum mentor ("*studietrajectbegeleider*") who can be consulted by all students from the faculty.

The quality control of the teaching processes in the Faculty of Sciences is a concern of the 11 Educational Committees. Each of these committees has 18 members: 9 professors, 3 teaching assistants and 6 students. All teaching activities in the Faculty of Sciences are implemented by the departments within their particular field of study and expertise. The professors are appointed as teacher for a specific course by the Faculty, on the basis of a proposition of the educational committee. The professor is in charge not only of the lecturing, but also of guiding the study processes and the organisation of examinations.

The administration of the curricula of the students is in hands of the Faculty Student Administration (FSA). All necessary data are stored in a

central database that serves as source of data for administrative applications. International student exchange programmes are taken care of by the International Relations Office (IRO) of the Faculty.

The Examination Committees perform the deliberations of the students. The Faculty Doctoral Committee supervises the courses that are offered within the framework of the doctoral study programme and approves and valorises the curricula of the students.

5.3.2. Functioning of councils and committees and interplay with the University educational policy

The Educational Committees are in charge of the study programmes. They are fairly autonomous with regard to contents, organisation and quality care of their programmes. They determine the different courses in the programmes and their contents, the study time needed and the credits awarded for the courses. The records of the Educational Committees meetings are a communication tool between the Educational Committees and the Faculty Board and QCE. For specific matters, like e.g. programme modifications, they are technically supported by the Logistic Department for Teaching Affairs. All teaching programmes have to be approved by the Faculty Board.

The QCE aims to supervise the logistic support to the Educational Committees provided by the Logistic Department for Teaching Affairs. Furthermore, it functions as a guard of quality care in education and as an inspirer of educational reform. The Director of Education is the president of the QCE and is appointed for a period of 2 years. For the Faculty of Sciences the Director of Education has his seat in the University Education Board. The Director of Education and his administrative team are daily quality caretakers of the education in the faculty. This team comprises the Logistic Department for Teaching Affairs at the Faculty of Sciences.

On the meetings of the QCE, all academic educational programmes in the faculty are represented, and various topics are discussed and critically reflected on: quality of the programmes, instruction methods, guiding of study processes, delivery of content for information brochures, quality of infrastructure, processing and follow-up of student evaluation of the education, follow-up and support for the visitations.

The QCE bureaus handle specific or technical topics in preparation for meetings with the complete QCE. The QCE bureaus are composed of expertise members of the QCE, the Director of Education and the staff member of the Logistic Department for Teaching Affairs.

The University educational policy is outlined by the University Education Board. This Board, supported by a secretariat, realises one of the goals of Ghent University: delivery of high-quality academic education. This Board functions as an advisory body towards the Board of Directors and/or the Executive Committee. The secretariat of the University Education Board supports the implementation and follow up of various methods of internal and external quality care.

Several tools are developed for guaranteeing a continuous optimizing of the educational efforts:

- Set up of a relevant database with informatics tools
- Follow up of the teaching and examination regulation
- Design of a system for registration of study progress and curriculum development
- Installing a mentor system
- Proposing methods for curriculum development
- Developing tools for the teaching evaluation
- Teachers training
- Developing tools for internal and external quality care, etc

The University Education Board is presided by the rector or the vice-rector. A permanent communication between the University Education Board and the Faculties is assured through the presence of a Faculty representative in the Board. Academic staff members, assisting academic staff members and students take part in this council, as well as a number of advising members from e.g. the student administration and the technical staff.

On the level of the central administration, the Department of Educational Affairs includes the Office for Study and Career Advice, the Office for Student Administration and Study Programmes, the Office for International Relations, the Office for Educational Support, and the Office for Educational Quality Control. The latter is responsible for internal quality control, especially student appraisals of the educational system as well as for external quality control, especially visitation committees. It also houses the secretarial office for the University Education Board, the advisory organ for the academic Management in respect of Educational Affairs and the institutional ombudsservice for Ghent University.

5.3.3. Student involvement in appraisals of the educational system and programme modifications

Appraisals of the educational system are organised by means of electronic questionnaires to be filled in by the students. This direct involvement is extended to the QCE in which a number of students take part. Students also participate in the Educational Committees as well as in the other councils (Faculty Board, University Education Board, ...).

5.3.4. Contact between the programme organization and Alumni

There is not any formal contact between the organization of the programme and MARELAC Alumni. Therefore feed back and contacts are mainly informal. Many Alumni are associated as PhD students with several of the research groups involved in the MARELAC programme. Two Alumni were involved in the realization of the self-evaluation report.

5.3.5. Alumni involvement in appraisals of the educational system and programme modifications

Except of the official participation of Alumni in the realization of the self-evaluation report not formal feedback has been organized.

Chapter 6 Results

6.1. Realized level

6.1.1. The extent to which the objectives were attained

The extent to which the objectives of the MARELAC programme were attained is partly reflected in the employment of the Alumni. Indeed 42 % of all Alumni (that returned the inquiry , see also further) prepare a doctoral dissertation. Only 17 % is unemployed. The largest part (71%) has a marine related job. Since the objectives were focused on three general aspects (multidisciplinary scientist, policy supporting and advising, education and information providing) in relation to marine and lacustrine systems, the MARELAC Alumni are expected to have experienced their MARELAC programme as added value in their current function which is in general the case (79%). The detailed results of the Alumni inquiry are discussed below.

6.1.2. Quality of the master dissertation

The master dissertation is evaluated by a reading commission consisting of 3 to 4 commissioners. The commission includes the promoter and co-promoter, and at least one external expert in the field of research who has no immediate association with the research group or the performed study. The master dissertation is evaluated based on its scientific value for its correctness, originality, depth and profundity, decision process and reference list. Furthermore the dissertation form is evaluated, referring to the lay out, the language and the quality of figures and tables. Additionally the daily work is quoted by the promoter as well as the oral presentation and defense.

Some master dissertations have effectively led to a peer reviewed paper (or the results are integrated in papers with a broader scope). A list of published or submitted papers is provided as appendix 15.

6.1.3. Outcomes in the field of internationalisation

Within the term 'internationalisation' one can make the difference between educational activities (for example mobility of students and teachers, intensive courses, curricular development, etc...) and research activities. Both are often linked.

Appendix 16 gives an overview of the international contacts within the Socrates/Erasmus programme. Next to these 'structured' activities there

are also individual initiatives of the lecturers. These often do not bring student mobility but do have an input in the education.

In this paragraph we will focus on the educational activities (especially the structured co-operation). So far we have not had any outgoing students. The last years we do have some incoming students within the Socrates/Erasmus programme. In 04-05 there are 4 incoming students, the years before there were no real MARELAC-students, but some foreign biology students also follow some separate MARELAC-courses.

Table 4: In and outgoing SOCRATES/ERASMUS students per Academic year for the total University, the Science Faculty (WE) and the MARELAC programme

Incoming students			
Number of students	UGent	WE	MARELAC
2002-2003	491	53	0
2003-2004	533	54	0
2004-2005	560	83	**4**
Outgoing students			
Number of students	UGent	WE	MARELAC
2002-2003	449	17	0
2003-2004	409	14	0
2004-2005	449	13	0

The four incoming students in 04-05 come from Spain (1), Poland (1) and Portugal (2).
Next to these Socrates/Erasmus students, there has been a few incoming students through other programmes, for example EU-Canada and VLIR-IUC Ecuador.

No scholarships are provided, resulting in a relatively low participation of international students (16.7 % over 4 years). Nevertheless,

each year many request for subscription are submitted, which are not always finalized because of financial reasons.

2001-2002 : 1 Croatian, 1 Dutch /16 Flemish
2002-2003 : 1 Spanish, 1 Ecuadorian, 1 Rumanian/ 14 Flemish
2003-2004 : 1 Brazilian, 1 Spanish/ 15 Flemish
2004-2005 : 1 Chilean, 1 Irish, 1 Italian, 1 Spanish/ 16 Flemish

Students are stimulated to attend part of their MARELAC programme abroad, given the framework of Socrates, although so far not any students has made use of this Socrates opportunity. It is mainly the fact that no specific research topics or courses are provided abroad that prevent students from traveling. One student spend the second semester in a research group in Portugal.. One student has made her dissertation in collaboration with a Dutch company, close to the Belgian border. Three students have made their dissertation at the Netherlands Institute of ecological research (NIOO) where four MARELAC lecturers are permanent members of the staff (visiting professors). In 2003-2004 four scholarships were provided to travel to Canada in the framework of a EU-Canada student exchange programme. The 4 students traveled to New Brunswick and Guelph to make a research project there. So far two students traveled for field work in relation to their dissertation work respectively to Kenya and Indonesia. Each time the dissertation was framed within ongoing research projects respectively at UGent and the VUB. As an exceptional case, a student traveled on his own expenses and initiative to Australia to collect data, to complete a dissertation in collaboration with a local environmental company. The possibility to travel (on own expenses and initiative) are definitely stimulated and supported by the MARELAC educational committee. If required, contacts are made by the coordinator. This is communicated to the students at the beginning of the academic year. So, in total, 12 students since the start of the MARELAC programme have done part of their study (mainly dissertation preparation) outside the Ghent University.

Four lecturers come from the Netherlands Institute for Ecology (NIOO - Yerseke). In the framework of the fourth module experts in particular fields of expertise are invited each year. Visitors were Prof. dr. Mike Elliot (University of Hull), dr. Emil Olafsson (University of Stockholm), dr. Lara Aroyo (University of Stockholm), dr. Kostas Kiriakoulakis (University of Liverpool), dr. Antje Boetius (Max Planck

Institute), dr. Andy Gooday (Southampton Oceanographic Centre), dr. J.P. Ducrotoy (Scarborough), dr. Michel Trauth (University of Potsdam).

6.1.4. Preparation of the graduates for the labor market

The MARELAC programme does not offer a profession orientated educational training. It has general objectives in order to strengthen the capacity of scientists in function of their knowledge and expertise on marine and lacustrine systems.

Since two years Prof.dr. Jan Mees from the VLIZ organizes an info session in which an overview is given of all marine and lacustrine related research groups, institutes, administrations, private companies in Belgium, in addition to some European and global initiatives.

This and the following chapters are based on the results of a inquiry performed among all MARELAC Alumni (2001-2002, 2002-2003, 2003-2004). Exactly 50 % of all Alumni completed the inquiry.

The following figure gives an overview of the courses that are mentioned as useful for actual/recent job. The times a course has been mentioned is summed.

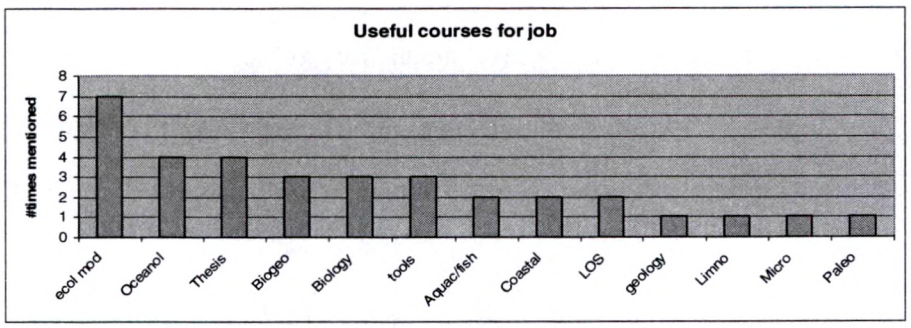


Figure 8: Usefulness of the courses for the labor market

The identified gaps are summarized as follows:

Gap	Times mentioned
More practical (cooperation industry) - too academic	5
GIS	4
Advanced biology/geology courses (for biologists/geologists resp.)	3
Lack of lacustrine aspect	3
Statistics	3
More technological tools	3
Poor course material	1
More Oceanography, biogeochemistry	1
More management/pollution aspects	1

67 % of the Alumni believe that the MARELAC training helped for the current/last function. How the MARELAC course helped for the job is shown in detail below It is obvious that mainly the general scientific insight obtained through MARELAC has helped in performing their function.

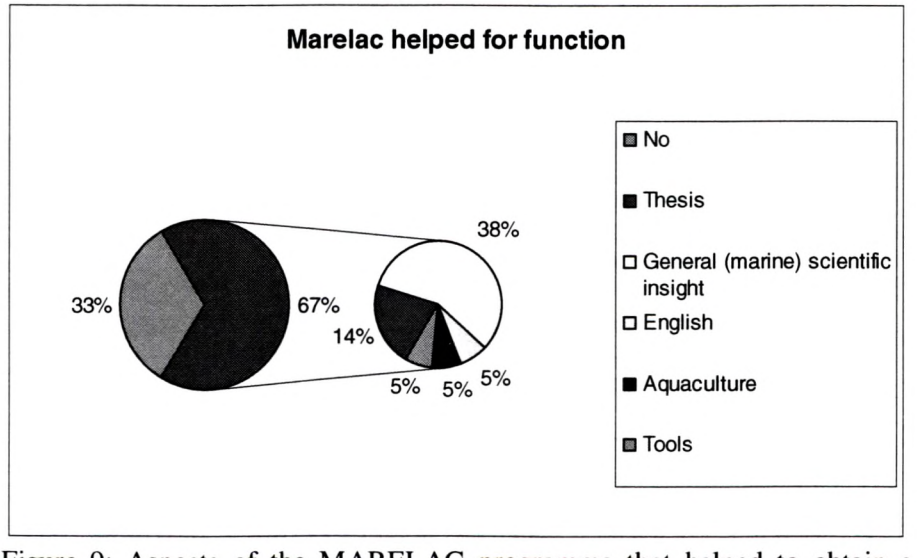


Figure 9: Aspects of the MARELAC programme that helped to obtain a function on the labor market

6.1.5. Employment profile of the Alumni

From the 50 % of the Alumni that have completed the inquiry, 17% has not had a job since finishing MARELAC, while 38% has had or has currently a job and about 41% is preparing a doctoral dissertation. About 4 % did not

specify. Most of these PhD students perform research in the field of marine biology/ecology. The distribution is given in the figure below.

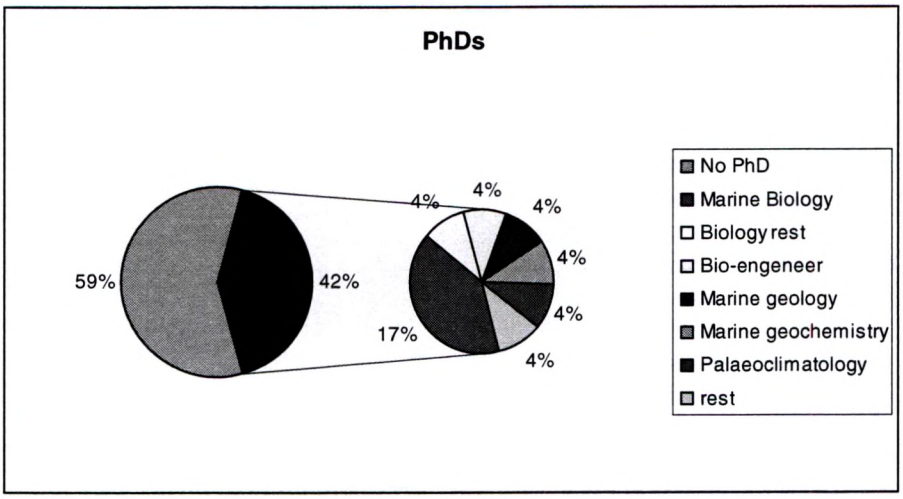


Figure 10: Proportion of Alumni that started a PhD in different fields

Most of the PhD topics are marine related (see below)

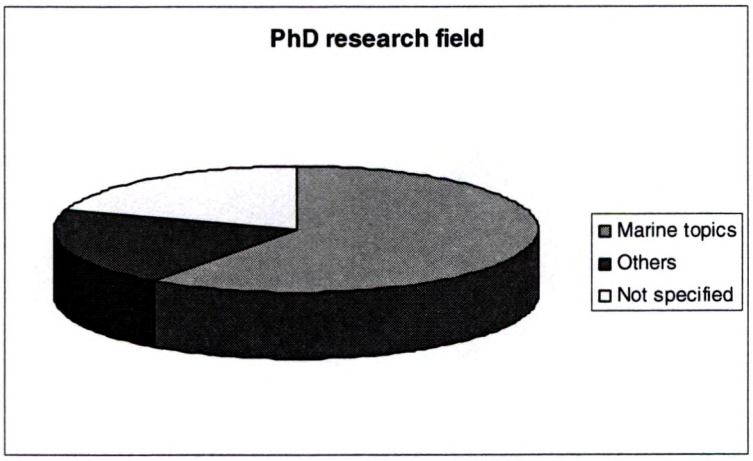


Figure 11: Proportion of PhD research by MARELAC Alumni that is marine related

None of the 17% of the Alumni who did not have a job until now have done more studies, and they all actively searched for a job. The job searching time of the people that have (had) a job is indicated in the following figure. In this

analysis also the time before starting PhD research is included. Almost ¾ of all employed Alumni found a job within 3 months.

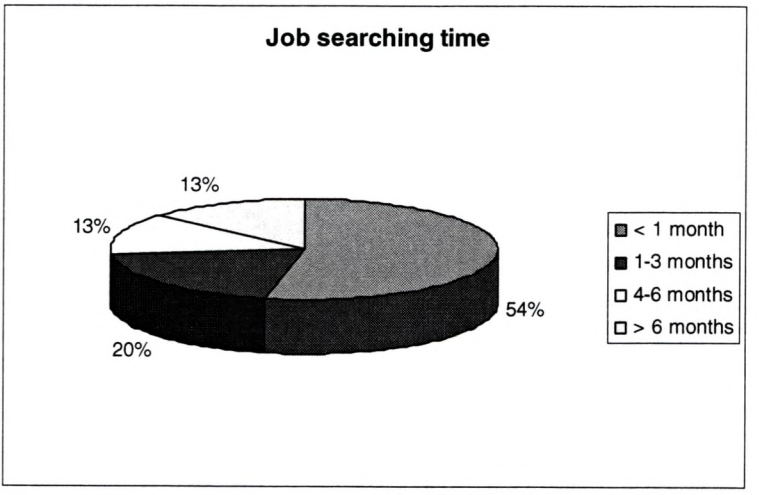


Figure 12: Time that was needed by Alumni to find a job after finishing the MARELAC programme

Most of the employed Alumni did not change job. The frequency of job change is visualized in this figure.

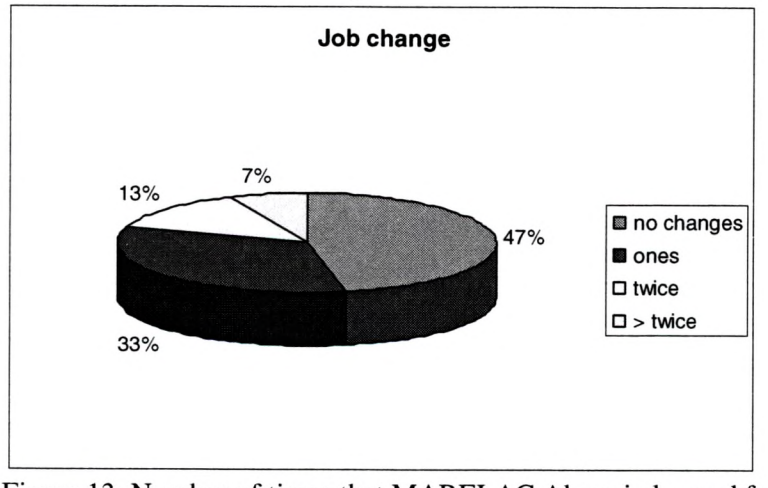


Figure 13: Number of times that MARELAC Alumni changed from job

Half of the Alumni experienced strong competition from people with different diplomas during job applications. Bio-engineers are the strongest competitors.

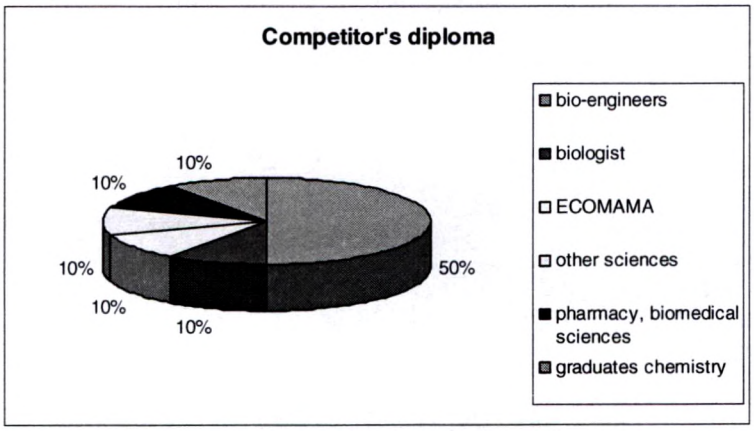


Figure 14: Competences with which strong competition was experienced

Most of the Alumni do not think that a doctoral diploma could have been an advantage during job application (58%):

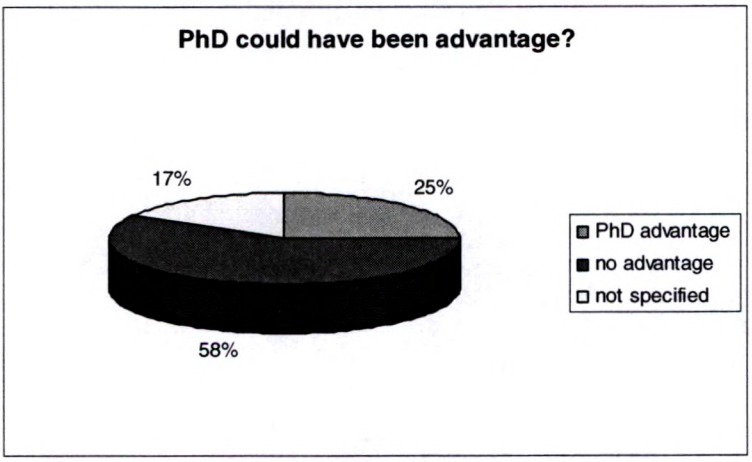


Figure 15: Proportion of MARELAC Alumni that believes that a PhD diploma does not give advantage on the labour market

6.1.6. Fields of employment

The major part found a job related to marine and/or lacustrine environments as indicated in the following figure.

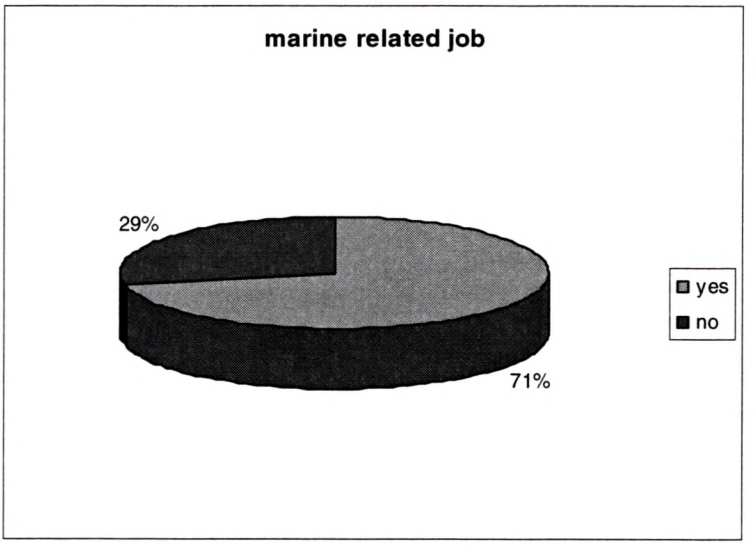


Figure 16: Proportion of Alumni with marine related job

The MARELAC Alumni seem to work in a lot of different sectors. Academic research scores the highest. The relative importance for each sector is given in the figure below.

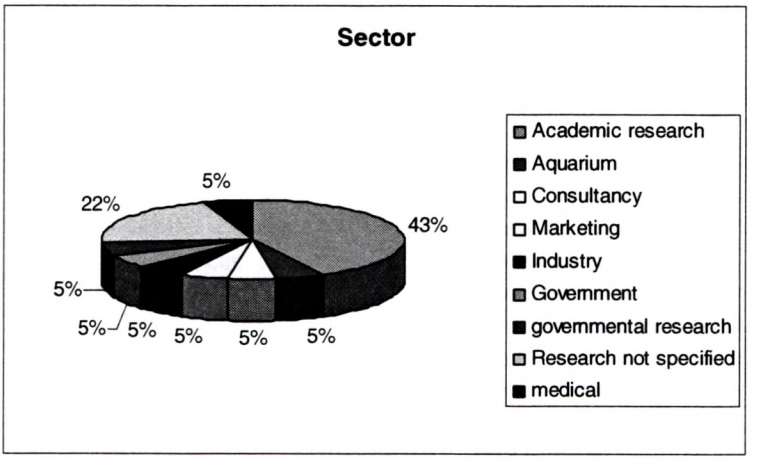


Figure 17: Proportion of sectors in which MARELAC Alumni found a job

The size of the institutes the Alumni have a function is also shown below. It is rather difficult to interpret these results, because of the large numbers of

PhD students (e.g. Ghent University vs. Laboratory). Because we do not know at which universities the PhD students perform their research, we could not interpret the data correctly.

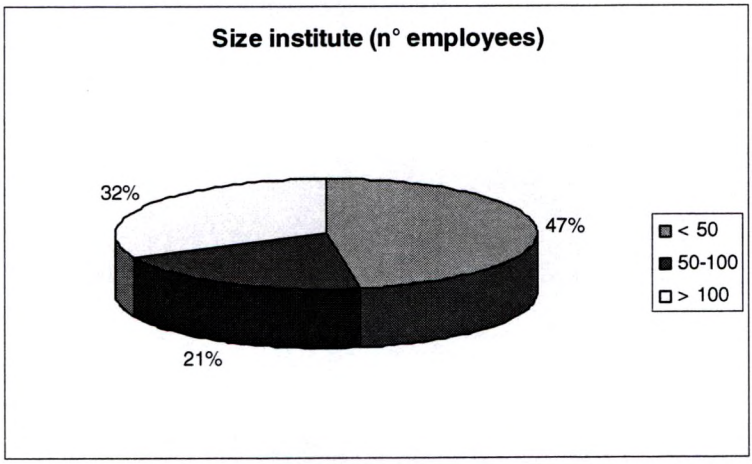


Figure 18: Proportion of the size of institutes that MARELAC Alumni work

The statute the different Alumni have at their current/last job is shown below.

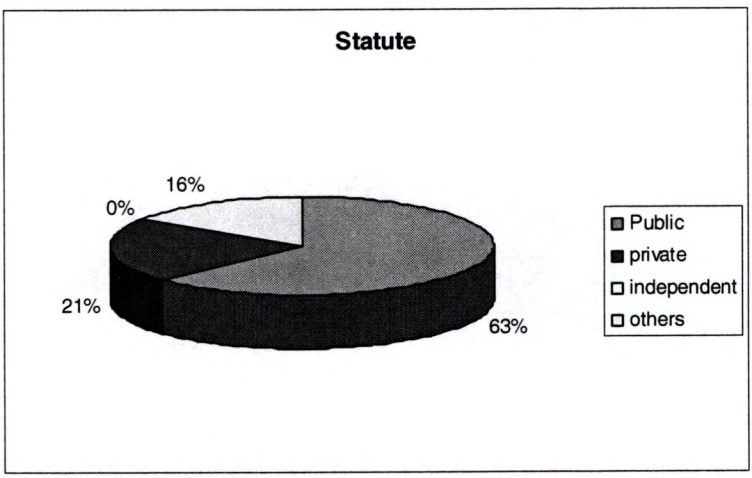


Figure 19: The different statute in which MARELAC Alumni work

6.1.7. Satisfaction of the Alumni in relation to their employment

The inquiry did not include a direct question on the satisfaction of the Alumni in relation to their actual position. We have only an indication of their satisfaction through the relation between their actual job and their education. 65 % has a job in relation to their education.

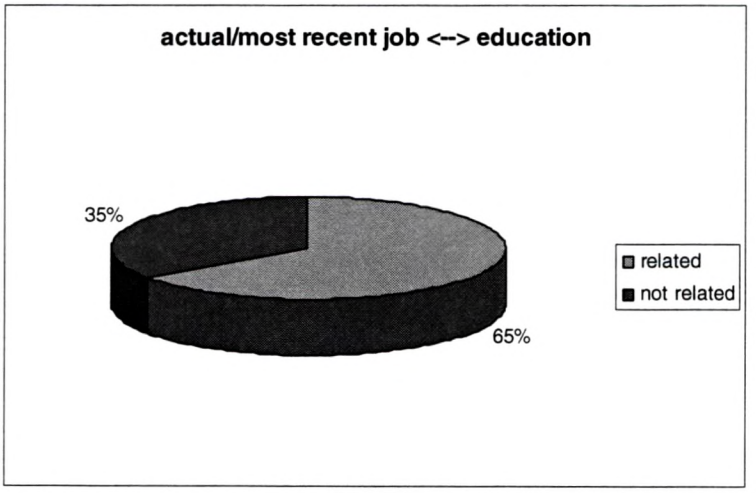


Figure 20: Relation of actual job and the MARELAC education

6.1.8. Satisfaction of the Alumni on their education

71% of the Alumni mentioned an increase in general scientific insight and even more (92%) say that the MARELAC training gave them a more profound scientific base and insight on marine and lacustrine sciences specifically.

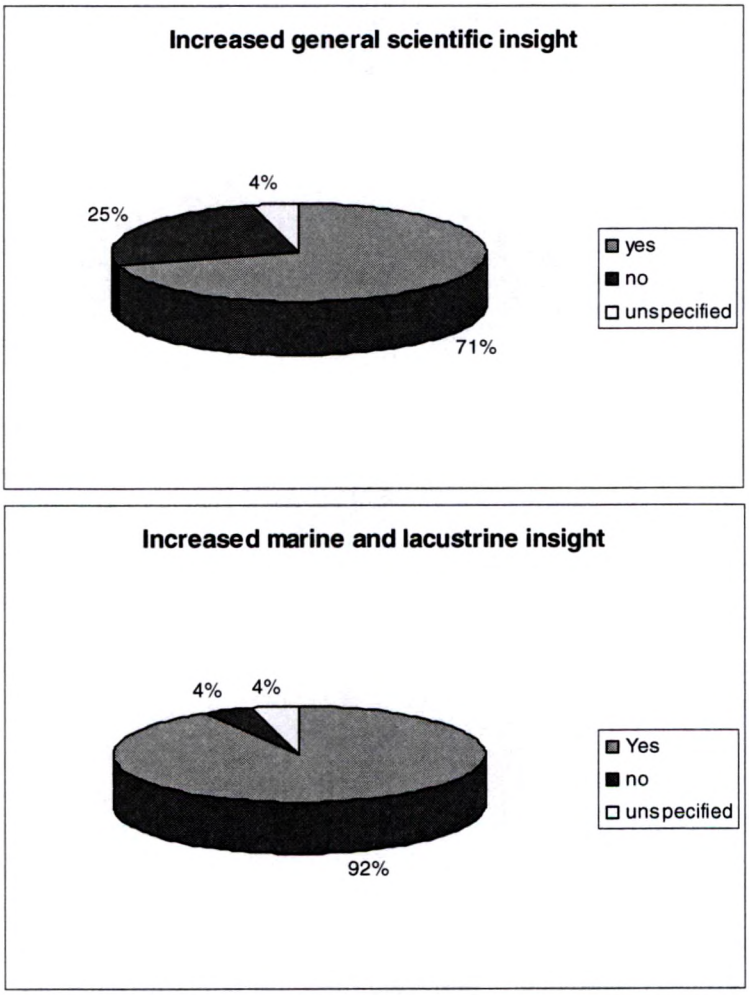


Figure 21 a and b: Increased insight in respectively general scientific aspects and marine and lacustrine related insights through MARELAC

MARELAC was an added value in finding a job for 79% of the Alumni.

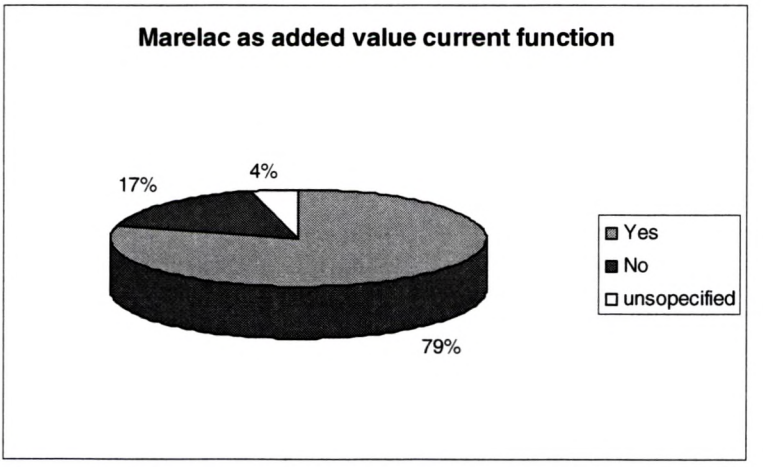


Figure 22: Proportion of Alumni that experienced MARELAC as an added value in finding a job

More than half of the Alumni are in favour of more practical work. The field in which they prefer more practical work varies as indicated below.

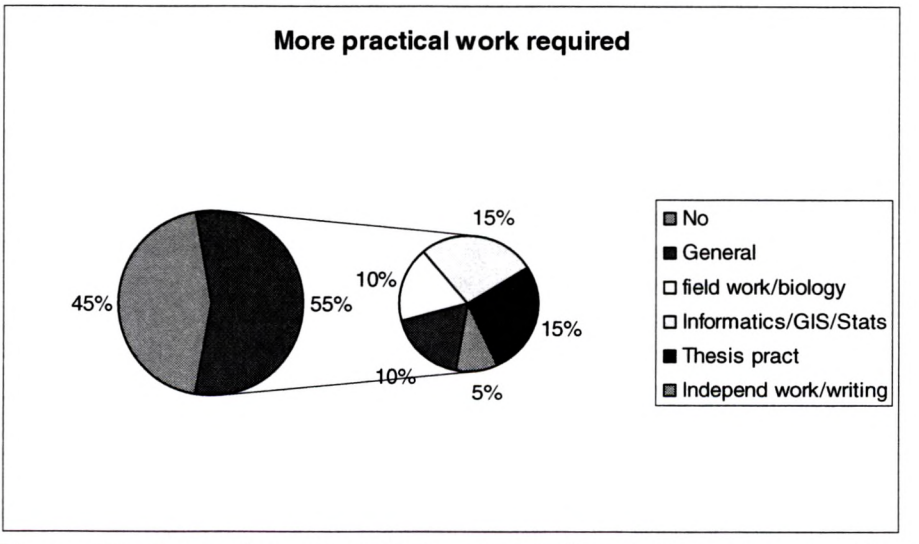


Figure 23: Proportion of students that believed that more practical experience was needed

64 % of the Alumni had a correct idea of the course before they started. The reason that 36% was informed badly is visualized in the figure below. 8% of the Alumni that says to be informed badly are students of the very first MARELAC year (2001-2002).

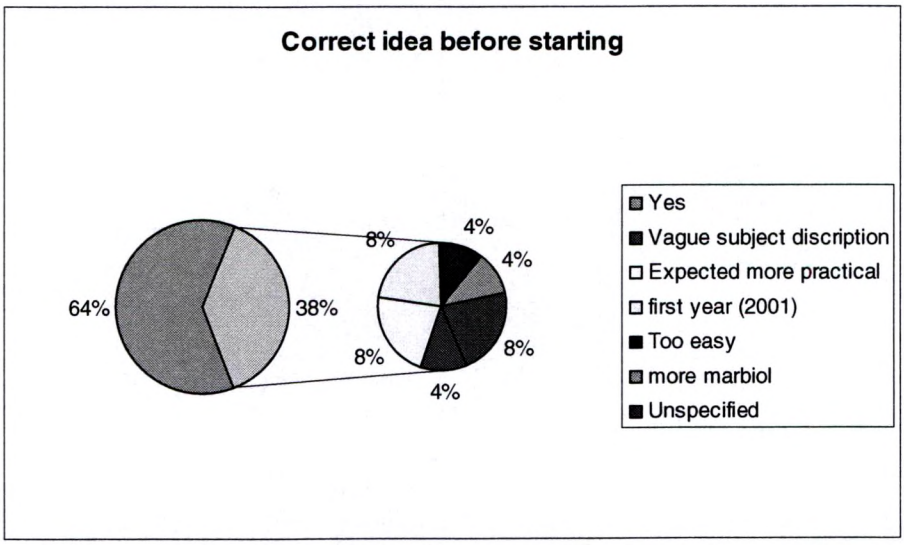


Figure 24: Proportion of students that had a correct idea of MARELAC before starting

6.2. Educational efficiency

Master of marine and lacustrine sciences is an advanced programme. Therefore a considerably high proportion of succesfull students is expected. This is also the case : Most studenst finished the programme with succes in the first year and even in the first session. Only occasionally a student did not accomplish his/her degree because he/she discontinued the study. This was due to different reasons, but mainly because he or she found a job (2 students). Some students (about 3) just registered pro forma at the MARELAC course to stay registered as UGent student. The average proportion of succesfull students is 90,2 % for the previous three academic years.

The table as required by VLIR (tabel 6.3. in appendix) shows all main and additional subscriptions as took place before the 1st of february since the academic year 2001-02.

CONCLUSION

The strong points of MARELAC are :

Programme :

- A sound and academic multidisciplinary (!) MASTER programme reflecting the fundamental understandings of marine and lacustrine systems (delineated by physical borders, not by disciplines);
- the fundamental training in marine and lacustrine sciences, and especially the combination of both sciences, which is unique in Europe;
- the cross pollination between bio- and geosciences is especially productive in field oriented dissertation work and in the courses of module 4 of the programme (coastal systems, extreme environments, lacustrine systems and margins);
- training at sea is organized, in addition to a field trip.

International dimension :

- Lecturers are from different universities, research institutions and countries although with a very strong contribution of lecturers from Ghent University;
- students originate from different universities and countries.

Educational staff and Research orientation :

- The academic teaching staff has a very high scientific qualification;
- the educational programme is strongly embedded in international research projects;
- during the dissertation work, there is a very strong integration of the students within the research group activities;
- the dissertation is written in the format of a scientific paper;
- several dissertations have been published or submitted to peer-reviewed journals;
- students are trained towards Ph.D. research (and obtain with success individual Ph.D. scholarships).

Infrastructure and logistics :

- The study cost at Ghent university is low (compared with other European universities);
- student facilities in Ghent are very well organized (housing, restaurants, ...);
- very well coordinated course with excellent communication between students and teaching staff.

Participation of the students :

- Very strong involvement of the students in the evaluation of the course contents and the organization of the course programme.

Employment :

- Next to Ph.D. training programmes, MARELAC Masters have a high employment in education related functions as well.

The most relevant opportunities towards improvement and remediation are:

Programme :

- There is not enough time for sound practical training and hands on experience (actual limitation of the MASTER programme is 60 ECTS);
- in the beginning of the academic year, special courses should be organized in order to bring students with different background to the same level (now there is only a catch up for geology and/or biology).

Participation of the students:

- Interactive way of teaching shall be enhanced.

Central Administration and international dimension :

- Many of the official documents only exist in Dutch (e.g. examination regulation).

Scholarships :

- Although the study costs are low in Ghent, there is no special funding for even a few student scholarships (MARELAC students mainly have

private funding, rarely through ERASMUS-SOCRATES or other funding agencies).

Logistics and infrastructure :

- Need for PC-multimedia room in order to prepare individual and group projects;
- need for a social meeting room for students in the Sterre campus.

Policies on the medium term (2007-2008 onwards) for the organization of the MARELAC MASTER programme of 120 ECTS

Within the framework of the Bologna Declaration and the Flemish Decree organizing the Bachelor-Master programmes at an European level, the Educational committee of MARELAC has considered the pros and cons of a 1-year postgraduate course (Master after Master) compared with a 2-year Master programme (Master after Bachelor). The Faculty of Science of the Ghent University has always been in favor of a 2-years Master programme (following a Bachelor programme of 180 ECTS) for all its disciplines.

After a discussion of more than 3 years, the Flemish government has decided recently (May 2005) that master programmes in science comprise 120 ECTS (from the academic year 2007 – 2008 onwards).

The MARELAC educational committee strongly supports this reorganization and will present a MARELAC programme as a 2-year, interdisciplinary Master programme with emphasis on the following strong characteristics : the multidisciplinary nature of the courses will be more consolidated in the first year by a number of compulsory general courses on different marine and lacustrine disciplines, while in the second year a specialization (majors) in biosciences or geosciences will allow students to get an advanced training in one of these disciplines.

A two-year programme will permit a remediation of the comments given above (such as shortage of practical training, shortage of basic courses in GIS, statistics, more time for dissertation work, development of scientific writing, ...).

Additionally, a 2-year programme will have the advantage that students can be recruited from a larger pool of Bachelors, both at the national and international level. However, the educational background of the

students will be more diverse and less mature (only 3 years of bachelor training).

A third specialization (next to bio- and geosciences) will include the training for teaching in secondary schools and high schools. The format for the teacher's training is still a matter of debate, also at the level of the ministry of education.

The 2-year MARELAC MASTER programme will be based on different modules (provisionally grouped in 7 blocs), each with a specific orientation:

1. Basic scientific knowledge relevant for understanding the Marine and Lacustrine Systems
2. Environmental Impact assessment with emphasis on legislation and management
3. Training activities with emphasis on development of individual skills
4. Majors (specialization) in bio- or geosciences
5. Field work
6. Internships (contact with the employers)
7. Dissertation work (training in research skills).

1. Basic scientific knowledge relevant for understanding the Marine and Lacustrine Systems will be provided in the disciplines of Limnology, Oceanography, Marine and Lacustrine Biogeochemistry, Biology, Geology, Microbiology and Paleo-sciences with emphasis on characteristics, processes and interactions in the bio- and geosphere that drive marine and lacustrine systems in general and in specific environments.

2. Environmental Impact assessment with emphasis on legislation and management will be the subject for the socio-economical and policy approach of the MARELAC programme. Masters will be prepared for policy support, management or consultancy functions.

3. Training activities with emphasis on development of individual skills are considered as an essential and very important part of the programme. Courses include e.g. GIS, remote sensing, bio/geostatistics, ecological modeling, data management, molecular techniques; ...

4. Majors (specialization) in bio- or geosciences : a number of optional courses will be provided which will allow students to get advanced training in biologically or geologically orientated disciplines or, alternatively, they can opt for a combination of courses from both majors. Courses include for example aquatic ecology, eco-toxicology, biodiversity, foodweb ecology, fisheries, aquaculture, ... (an alternative major will be organized for teachers for secondary schools and high schools).

5. Field work : Considerable time will be dedicated to field work at sea and in coastal and lacustrine environments in order to get acquainted with observational tools and study methods and to get practical experience with the nature and function of marine and lacustrine ecosystems.

6. Internships (contact with the employers) : without being a profession oriented programme, acquaintance with marine and lacustrine professional activities can be obtained through short stays at relevant institutes, administrations, private companies and others.

7. Dissertation work (training in research skills) : allows integration in a research group and get trained as a researcher (including writing and submitting a scientific paper).

Linkup programmes with other related MASTER programmes (Biology, Geology,...) will be investigated as well.