

Accreditation Report

Natural Sciences

Faculty of Science
University of Iceland

Expert Committee

May 22nd, 2007

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1. Introduction

1.1 The Expert Committee

Professor Friedrich Seifert, Professor Emeritus of Geochemistry and Geophysics, University of Bayreuth, Germany, **Chairman**.

Professor Rolf Hernberg, Professor of Physics, Tampere University of Technology, Finland.

Professor Paul Engel, Professor of Biochemistry, University College Dublin, Ireland.

Dr. Anna Kristín Daníelsdóttir, Senior Advisor, Division of Research and Innovation, The Icelandic Centre for Research – RANNIS, Reykjavik, Iceland, **Liaison Officer**.

1.2 Terms of Reference

The Expert Committee was appointed to carry out a review of the University of Iceland, Faculty of Science according to Article 3 of Higher Education Act, No. 63/2006, No. 1067/2006 with the following instruction:

“The committee of experts shall provide the Minister of Education, Science and Culture with a report that outlines the results of the evaluation of items a to i, paragraph 3, article 2 of the Rules*, based on the application and information provided by Higher Education Institutions in Iceland (HEIs) in accordance with article 2, in addition to evaluation of the following factors:

- a. Expertise and competence in a particular field of study and the subdivisions therein. With a view to the quality of teaching and research and the appropriate facilities the dissemination of knowledge and in service to society.
- b. The cooperation and support of the university towards the field of research, teaching staff and experts in any particular field. The appropriate measures for the education and training of its students.
- c. Special attention to fields of research and any subdivisions therein. Cooperation between undergraduate and graduate studies and any other appropriate expertise.
- d. The status of fields of study subdivisions therein on a national and international comparison with view to i.e. cooperation with other HEIs and other institutions/organisations nationally and internationally in that particular field of expertise.

The committee shall provide a detailed, objective and supported evaluation.

Should the conclusions of the committee be not to recommend accreditation then it shall provide a detailed report of any failure on the part of the HEI to fulfill the regulations according to article 2 or any recommendations for reparations that the HEI must undertake before accreditation for that particular field of study is awarded. In receipt of such report, the Minister of Education, Science and Culture will afford the HEI a specific extension to make any amendments needed. The amendments will be evaluated by the expert committee in question, who will provide the Minister of Education, Science and Culture with a report detailing the aptness of the amendments. Final decision regarding accreditation will be announced to the HEI.”

*Items a to i referred to above are *a. Objectives and Roles; b. Administration and Organisation; c. Organisation of teaching and research; d. Personnel qualifications requirements; e. Admission requirements and student rights and obligations; f. Teacher and student facilities and services; g. Internal quality system; h. Description of study according to learning outcomes; i. Finances.*

1.3 Working Method

The three foreign members of the Expert Committee (EC) received the UI accreditation application in advance of arrival in Iceland, circulated electronically by Dr. Anna-Kristin Daníelsdóttir (AKD), the Icelandic member of the group. These were supported by a large volume of detailed documentation in the form of appendices, also mostly received in advance of the visit. These included information from a relatively recent internal quality assurance exercise with a report from an international Peer Review Group (PRG). EC members therefore had the opportunity to form some preliminary impressions of important issues in advance.

The EC met initially in the evening on March 19th 2007, all meeting for the first time. This allowed the committee members to get to know one another in an informal setting and learn more of individual members’ background experience. AKD explained her own role, providing local support and contextual information but maintaining strict neutrality in terms of the expression of opinions and influencing decisions.

The entire following working day and the latter part of the evening was spent in preparatory discussions of the materials provided and issues arising, also identifying some apparent gaps or uncertainties. In relation to these, AKD made the necessary local contacts to supply missing information. Discussions were held during the day in a meeting room at RANNIS, offering the possibility to spread out the relevant documentation for easy access and reference. In the evening the foreign committee members continued discussions at the hotel, where a small meeting room was also available. The discussions highlighted a number of general issues and some well-defined and more specific matters to raise with the institution.

March 21 in the daytime was spent in a site visit to another university, but the evening offered several hours for final discussion of the UI application. March 22 was devoted to the UI site visit, beginning in the morning with a meeting and detailed discussion session with the Dean, Prof. Hörður Filippusson, Vice-dean, Prof. Þóra Ellen Þórhallsdóttir, Vice-Dean and Jón Guðmar Jónsson, Chief Administrator of the Faculty of Science, accompanied by about 20 Heads of Department and other representatives of the academic staff of the Faculty. Many questions were raised on both sides in a frank and free-ranging meeting. A meeting of about 40 minutes followed with the University Rector, Prof. Kristín Ingólfssdóttir and Þórður Kristinsson, Educational Director of the UI, in which overall policy matters affecting the UI and the Faculty of Science were discussed.

Lunch at the Radisson Hotel offered a further opportunity for less formal discussion with Faculty members. This was followed by a half-hour meeting with the three Faculty Officers named earlier, permitting amongst other things a frank discussion of the issues of staff appraisal interviews, which had emerged as a source of discontent in the PRG report. The Dean then delivered EC members to different destinations and guides so that FS could assess Geology, Geography and Food Science, RH likewise for Physics and Mathematics, and PCE for Biology and Chemistry. AKD accompanied PCE on the Biology and Chemistry tour. These tours allowed an inspection of teaching and research labs, lecture rooms, offices and working areas and also more detailed discussion of specific issues pertaining to individual subject areas.

After a coffee break the reunited EC met with a group of 20 students from all stages of undergraduate and post-graduate study and all the Faculty disciplines and again had a very full and frank discussion. Finally there was another, round-up meeting with the Dean and Heads of Department, but this was kept very brief as the EC felt that all necessary issues had already been thoroughly addressed during the day.

During the evening and the following day the EC compared impressions and drew preliminary conclusions and planned the writing of the report. The main parts of the report were drafted before the EC members' departure on March 25 and were further edited and refined by circulation between the EC members over the next month before sending a draft of the factual part of the report to UI for checking and comment. Following receipt of these comments the report was finalized for submission to the Ministry of Education.

1.4 Short evaluation of the work process

From the EC's point of view the process was very efficiently organized and ran smoothly. The size and balance of the team allowed it work together very well. It was extremely helpful to have an Icelandic neutral member in the EC group to explain local nuances and put everything in an appropriate context. We would pay particular tribute to Dr. Anna Kristín Daníelsdóttir's patience, consideration and unfailing helpfulness, which made this not only an easy but a pleasant task. Another feature, which was more accidental than planned but was nevertheless a big help, was the fact that a preceding quality assurance has been carried out within UI. Such an exercise not only draws an HEIs attention to things that need to be put right ahead of an accreditation, but also similarly draws the ECs attention to the same issues, enabling them to ensure that the

necessary remedial steps have been taken. We would suggest that in preparation for renewal of accreditation in a few years' time a similar sequence of events might usefully be built into the procedures. For an international panel it is very important to have materials available in English. In the present case some materials were only available in Icelandic until the time of the actual site visit, and this is a situation to avoid in future.

2. Roles and Objectives

The application sets out clearly the role of the University of Iceland, specifically defined in law by Act 41/1999, to produce graduates able to pursue independent scientific projects and serve in Icelandic society, to provide continuing education, to communicate knowledge to the public and to serve the nation 'through the strength of its knowledge'. In pursuit of these objectives, the university has debated and produced its own 5-year development plan and agreed an ambitious set of targets with the Icelandic Government. These are formalised and to be realised through an agreement with the Ministry of Science, Education and Culture of January 2007, which provides new funding for an expansion of research activity and post-graduate education.

Conclusion

Roles and Objectives have been put forward in accordance with article 2 of Laws on HEIs No. 63/2006.

3. Administration and Organisation

The UI application sets out clearly the role of the Rector, the University Council and the University General Forum which appear to be in line with the requirements of articles 15 and 16 of the Act. At the level of the Faculty we met the Dean and the Vice-dean, elected positions, and also met the new Dean-elect. It was clear that this structure is democratically organised, and that the officers so chosen command the respect and trust of their colleagues. We noted that the term of office of the Dean has been extended from 2 to 3 years and that indeed the present Dean has served two terms. This period of continuity seems likely to improve efficiency, especially in a time of change.

Conclusion

Administration and organization have been put forward in accordance with the requirements of articles 15 and 16 of the law on HEIs No. 63/2006.

4. Organization of teaching and research

The study programmes proposed for accreditation are listed in Part 8 of the application.

On the BS level, the programmes cover the necessary broad range of general education in most of the sciences. The programmes of BS in physics and in technical physics (applied physics, hitech physics) are nearly identical and we strongly suggest that the Department of Physics considers merging them. Most study programmes involve a number of disciplines within the faculty (p.37, App.A), but no mandatory classes in physics or mathematics are required for the biology, geography and tourism studies. Inclusions of these fields would appear to deserve serious consideration. -

With respect to the fields, the Masters programmes are mostly a continuation of this broad approach. As the Faculty of Sciences wants to increase the proportion of postgraduate students both from within Iceland and also from abroad, the national and international attractiveness of the Master's and Ph.D. programmes is of prime importance. Presently, a large fraction of the Masters courses are offered in Icelandic, and changing these to English (or offering international Master courses) would both benefit the students for their future careers and increase the international visibility of these programmes. The programme in Geology (60 ECTS-units studies additional to a BS degree) already fulfils these criteria and is very successful.

Teaching is described as being mostly traditional, and as noted by the PRG, little use is made of other aspects of teaching and learning (group study, discussion classes, essay writing and independent studies). There seem to be few classes on general skills such as scientific writing, data mining of scientific literature, presentation techniques. As these required skills are similar for different disciplines, synergies might be achieved by offering joint courses for all programmes.

The course offerings at postgraduate level are presently limited, and Master students often attend classes abroad during their studies. While this exchange is viewed by the EC as being stimulating for the students, the Faculty might also consider shifting some more advanced courses from the BS level to the Masters levels which would not increase the teaching load of the tutors nor significantly the cost (see comments by PRG).

With respect to the Ph.D. level, most of the students indicated in the interview that they would intend to continue with a Ph.D. programme, but the vast majority of them would plan to go abroad. This is welcomed by the EC, but UI will have to work hard to

compensate for this brain drain by attracting an equivalent number of qualified Ph.D. students from abroad, even for the modest fraction of ca. one third foreign Ph.D. students envisaged (Application, p.14) and with a view to the planned expansion of the total number by a factor of three to a level of 15 – 20 Ph.D.'s in FS. In view of the expanding resources, the EC sees this number as a minimum requirement.

The postgraduate programmes could be made more attractive and visible to the outside world by concentrating on fields of particular strength of Icelandic science, including aspects of the region. Cases in point would be geological processes at spreading centres, thermophilic and psychrophilic bacteria and their use in biotechnology and food processing, marine ecology of arctic regions etc. By defining such topics, FS will have a good chance of attracting additional funding and publicity for these programmes by establishing e.g. Marie Curie Training sites as offered by the European Union.

Research is driven by faculty members guiding postgraduate students, and a number of faculty members are particularly active in this field, including most of the recently appointed staff. To increase the international visibility and reputation of UI as a research institution, research and its publication in major international journals has to be fostered even further. A suitable tool for this will be collaboration in joint projects with universities or research organizations from abroad, which will also help the needed exchange of postgraduate students. A reward system for achievements in publication is in place, but the weight of the publication should be better accounted for.

A major obstacle to growth in excellent research is the high teaching load of the faculty, amounting to ca. 50% of the staff's working hours. The EC supports the concept of a more flexible distribution of the total teaching load, giving staff members who are particularly active in research a better opportunity to pursue their studies successfully.

An appropriate protocol for all issues in accordance with the 3rd paragraph article 2 of law on HEIs has been implemented by UI.

Conclusion

The EC supports accreditation of all programs defined in Part 8 of UI's application.

Recommendations

- Consider a merger of the present BS programmes in physics and in technical physics
- Consider inclusion of mathematics and physics courses for the degree programmes in biology, geography and tourism studies
- Consider shifting the most advanced classes from the present BS level to the Masters level

- Focus the postgraduate programmes on fields of particular strength of Icelandic science
- Develop international Master and Ph.D. programmes and training sites
- Attract more high-level outside-funded guest professors to further strengthen teaching at postgraduate level and for international collaboration

5. Personnel qualification requirements

FS fulfils or even exceeds the minimum requirements of personnel qualification as defined by articles 17 and 18 of the law on HEIs and the obligations therein. Besides formal qualifications (degrees obtained), quality indicators are taken into account for research results (novelty, productivity, quality of publications), qualification for instruction, and administrative experience. The new rules recently (17th February 2007) approved by University Council for hiring create, in essence, “tenure track” positions, with temporary hiring at first and permanent employment only later after a positive assessment at the end of a probationary period of four years.

Conclusion

The HEI is in compliance with and fulfils the requirements of personnel qualification as defined by articles 17 and 18 of the law on HEIs and any obligations therein.

Recommendation

- Positions for academic employees of the University should always be advertised both nationally and internationally.

6. Admission requirements and student rights and obligations

The admission of students to Higher Education Institutions is regulated by Article 19, Higher Education Institution Act (63/2006) and further developed in the University of Iceland Act (41/1999). It is stipulated that students must have completed matriculation examination from an upper secondary school or equivalent final examination. It is also allowed by the law to impose more stringent and limiting admission criteria wherever this is found necessary in order to make sure that the admitted students possess sufficient qualifications for their studies. It is also possible to require student applicants to pass entrance examinations. Chapter IV of the Rules for the University of Iceland regulates these matters in more detail. Regulations with detailed admission requirements for each Faculty of the UI were adopted by the University Council in 2005 (573/2005). The

minimum requirements for admission of students to the FS (other than Geography, Travel and Tourism) are 21 credits of mathematics and 30 credits in science, including at least 6 credits in physics, 6 in chemistry and 6 in biology. The Faculty further requires a minimum level of progress during the first study year, sanctioned by re-registration in cases of non-compliance.

The number of admitted students at the FS has grown by 23 % during the five last academic years up to 2004-2005 having reached 1096 in 2005. The number of BS degrees almost doubled between 1995 and 2005, being at a level of about 140 in 2005. The considerable difference between the number of admitted and graduated students exemplifies the substantial extent of student dropout. The dropout problem is being seriously discussed at present by the FS. At least partially, it is a question of statistics, because a considerable number of formally admitted students do not even start studies in the FS. But, even when these dropouts are excluded, the dropout level is still reported to be about 50 %. In discussing the question with representatives of the Faculty, the EC got the impression that it is felt that a more restrictive admission policy should be adopted in order to exclude insufficiently qualified students. It was also mentioned that the standards of science education may vary in different secondary schools throughout the country, and that the formal requirements of science study followed at present may not therefore result in optimal student selection.

The admission process is of utmost importance for the Faculty, in view of the very ambitious strategy to substantially increase the quantity of post-graduate study. It is also economically important, since a high dropout level will result in inefficient use of resources.

The students' rights in the case of complaints and appeals are regulated by Article 49 of the UI rules. This article complies with Article 20 of the HEI Act (6/2006), as required by the accreditation criteria.

The EC had a very active meeting with 20 students representing all departments of the FS and different levels of study. The discussion showed that the students have a high level of confidence in the academic process in the FS. In particular, they expressed high appreciation of the accessibility of teachers and the quick responses received from teachers to students' queries.

Conclusions

The EC finds that the student admission requirements in the FS are based on article 19 (law on HEIs). The requirements at FS are more stringent than the minimum requirements of the law, reflecting the need of the Faculty to ensure a sufficiently high level of qualification.

The regulations of the University on the rights and obligations of students are in compliance with article 20 of the law on HEIs.

Recommendations

The EC recommends that the University take rapid measures to improve the system of generating student statistics, in particular with a view to obtaining a reliable description of the actual state of the apparent dropout problem. It should be established to what extent the apparent dropout problem is real, and to what extent it is attributable to statistical artifacts. To the extent that it reflects the true state of affairs, it is recommended that the UI carefully analyse whether this is attributable to too liberal admission criteria, resulting in the admission of students with insufficient qualification for study at the FS, and, if necessary, reform the student admission policy.

7. Facilities for Teachers and Students and Services Provided

The EC was given the opportunity to see facilities for both teaching and research in most relevant subject areas and to discuss in detail with both staff and students (separately) the efficiency of the system in practice. We are satisfied overall that the facilities allow the University of Iceland (UI) to achieve its roles and objectives and that the institution is producing graduates at bachelors, masters and now doctoral level who are up to a creditable international standard. It was also clear, however, that there are a number of sources of strain in the system that could well become critical in the coming years if they are not recognised and addressed. This is particularly true in view of the recent 5-year contract which sets some very ambitious targets for the UI.

Teaching laboratories. The teaching laboratories of the Faculty are in buildings of differing age, some 30-40 years old and some extremely modern, but they are in general spacious and well laid out. There is, however, a shortage of equipment for teaching classes, and staff is only able to run classes at an appropriate standard by borrowing from research laboratories. Chemistry students, for instance, complained of inadequate and old equipment. Borrowing may work in the short term, and students praised the flexibility and resourcefulness of their teachers. In the longer term, however, it represents a major inefficiency (for both teaching and research) that must be addressed. Staff also expressed anxiety over the inadequate funds available to cover the running costs for modern practical work. In Food and Nutrition students and staff complained of the inefficiency of having their activities scattered over four separate sites.

Lecture rooms and study areas for students. These appear to be very satisfactory.

Research laboratories. These were again variable in quality depending on the age of the building but overall of an adequate standard, and in the case of Askja very impressive. Most areas also had a range of sophisticated instrumentation, some of it very recently purchased. There are, however, problems in relation to space. Expanding research activity and increasing amounts of large equipment are, in some areas, leaving rather limited amounts of working bench space. Staff members are solving this problem in some cases by exporting their research students to collaborating laboratories both in Iceland and abroad. As UI intends to treble its Ph.D. output, this problem must be recognised and

catered for. The EC learnt that new buildings are planned that should remedy the situation.

Staff offices. Academic staff members have pleasant and uncrowded working space.

Library and computing facilities. Access to information appears to be good for both staff and students and we met no complaints. Students were complimentary about the efficiency of the library in obtaining material not immediately available in Iceland.

Technical support. The EC was very surprised to discover the minimal provision of technical support. Even in a teaching-only institution one would expect several technicians to support the practical component of teaching in a laboratory-based subject, and, as the focus shifts towards a higher percentage of advanced postgraduate work, the need for technical staff to keep key equipment and services running efficiently becomes even more apparent. This urgently needs to be recognised in the 5-year plan.

Administrative support. Inadequate administrative support is a frequent complaint in universities, since it means, in effect, that very highly qualified scientists are being used as secretaries for a large portion of their time. This problem appears to be particularly acute in UI's FS. The university has set itself very ambitious research targets, with increased international collaboration, including exchange of Professors and graduate students. Such activities both demand and generate considerable amounts of clerical work, and it is not realistic to believe that these objectives of the 5-year plan can be achieved without the necessary support. Each Department should have at least one secretarial/administrative assistant.

Conclusions

The working conditions for teachers and students and associated support structures are overall adequate to qualify for accreditation of the listed courses.

Recommendations

- A substantial investment needs to be made in equipment for undergraduate teaching laboratories
- Realistic budgets need to be provided for the consumable costs of running modern teaching classes in such areas as molecular genetics
- Care needs to be taken in the relative timing of new building and expansion in Ph.D. numbers. If expansion occurs in advance of the required space, there may be a significant decline in quality
- There must be an expansion in the permanent technical manpower to support both teaching and core research facilities
- More secretarial support in Departments is urgently needed to free up academic scientists for scientific tasks.

8. Internal quality system

The rules of UI have stipulations (Art. 13 and 24) for regular assessment of the faculties' activities. The formal responsibility for quality assurance is with the Rector. The Quality Assurance Committee is responsible for ensuring that the quality assurance stipulations are implemented in practice. The quality assurance policies are co-ordinated by a quality manager. The responsibility for quality assurance at each level (Faculty, Department) is with the respective Head.

The **Course Evaluation (CE)** performed by the students is perceived as a key element in the quality assurance (QA) of the study process. The results of the survey are reviewed by the Dean, the Department Heads and one student representative of each Department. The individual teacher gets the results for his/her own courses. The right for the student representative to share the survey results was only recently implemented at the FS, although it is stipulated in the University rules, which were adopted in year 2000.

A number of concerns regarding the functioning of the CE have been raised. At the FS the rate of participation, as reported by the PRG, is around 50 %. It was reported by the PRG that although a great number of information was gathered through the CE system, there is room for improvement in the actual exploitation of the data as a basis for reforms of the study process. The observations of the PRG regarding a low interest on the students' side in participation in the CE were confirmed by the student representatives met by the EC (see part 6.). The student representatives pointed out, for example, that

- the questionnaires are very long, they contain the same standard questions for each course, and not all the questions are formulated in a meaningful way,
- the timing of the CE is poor, because it takes place when the students are very occupied with preparing for their exams,
- the confidence is low among the students in the actual effects of the CE outcome in solving existing problems of the study process.

On the other hand, the students were pleased that a student representative of each department now can share the results of the CE, because in that way the student body can base their proposals and demands towards the Faculty leadership on true facts. The EC was also informed that work is under way to reform the CE questionnaires. The students also pointed out that some teachers are very slow in publishing the results of exams and that the student body had taken action to publish the names of such teachers.

Although the students mentioned examples where teachers had been unwilling to co-operate in changing practices of which students had complained, for instance in regard to exams, they gave a unanimously positive appraisal of the accessibility of the teachers to personal consultation and of the quick response to students' messages (see also part 6.)

Following the UI quality assurance policy, the Dean is expected to organise annually **staff development interviews (SDI)**. Owing to the large number of faculty members, the SDI's have been delegated to Department heads. In the FS self evaluation report the SDI's were described as useful and were positively met by faculty and staff. On the other

hand, comments by the FS leadership expressed some doubts about the efficiency of the SDI's, although it was perceived that faculty and staff were in general pleased to have this formal channel for discussing personal career aspects or experienced problems with their Heads of Department. It was also said that the SDI should be performed not by the Dean or Department Head, but by persons who have received special training for this. The EC feels, in general, that efficient implementation of the strategic plan for 2006-2011 calls for strengthened and improved leadership at the Faculty and Department level. In this regard, it would seem counterproductive to move a tool like the SDI out of the hands of the leaders of the Faculty. Instead, whenever felt necessary, the Faculty and Department leadership should be trained to conduct the SDI and to make the process more efficient. In regard to the QA of the study process, alongside the SDI, the existing good tradition of collective discussion at UI should be utilised to hold regular meetings of the Faculty to monitor the study process and its quality issues.

In its application the FS reports on a strategy of the UI of improving the ratio of permanent instructors to students from 1:21 to 1:17 by 2011. It is an important quality goal to improve this ratio, particularly in view of the present high average teaching load on the FS. It should also be clear, however, that to monitor the development of this indicator there is a need for unambiguous and temporally comparable statistics on the number of students. This indicator can clearly be improved, not only through hiring more teachers, but also by alleviating the student dropout problem, which was considered in more detail in part 6.

Doctoral studies form a central part of the strategic plan of the UI. The agreement with the Ministry of Science, Education and Culture calls for quintupling the present annual number of doctoral degrees until the year 2011. At present, the FS is a leading educator of doctors at UI with an annual output of about 15 degrees per year. According to the Dean, the Faculty envisages a moderate growth of its doctoral output to reach the level of 15-20 annually until 2011.

In 2004, the UI adopted a detailed policy concerning standards and requirements for quality of doctoral programs. The policy defines the *general*, *academic* and *practical* standards and requirements to be applied to high quality doctoral studies. The general requirements set the formal framework for the administration of Ph.D. studies at UI. The academic requirements define in detail the experience and scientific merits which a supervisor of Ph.D. research is required to have at UI. The practical standards define the material prerequisites for high quality Ph.D. research education. The policy also defines in detail the procedures for follow-up on its implementation.

The EC finds the policy of UI on standards and requirements for quality of doctoral programs to be an impressive and efficient tool for follow-up of the ambitious goals of Ph.D. education, provided that it is followed in detail.

Conclusions

A Course Evaluation system exists at the UI and evaluation surveys are regularly performed. Deficiencies of the system have been identified and reforms are under way, which are expected to make the system more efficient and credible as a tool for maintaining and improving the quality of the teaching process.

A system of staff development interviews is operative at the Faculty of Science.

The policy on standards and requirements for quality of doctoral programs is an efficient tool for follow-up of the ambitious goals of Ph.D. education. It is important for the FS to make sure that the follow-up mechanisms inherent in this policy document are fully implemented in the FS.

In general, the elements of the quality assurance system, required by the rules, exist and the quality assurance system is well structured. At the same time it is important to realise that the actual efficiency of the quality assurance system is closely linked with the level of leadership at the Faculty. It is important that the terms of the Dean and the Department heads have been made longer, thus providing for more continuity in conducting the work of the Faculty.

Recommendations

- The leadership of the Faculty should be brought to a more professional level through training of the Faculty leaders.

9. Description of study according to learning outcomes

In Appendix G of the UI application each of the Degree courses of the Faculty of Science is listed. These are in the subjects of Physics, Technical Physics, Geophysics, Mathematics, Chemistry, Biochemistry, Geology, Food Science, Human Nutrition, Biology, Environment and Resources, Geography, and Tourism Studies and are variously at B.S., M.S., M. Paed. and Ph.D. level. The description of learning outcomes, from course elements listed in detail elsewhere in the submission, follows precisely the wording of the Act No. 63/2006.

Conclusion

Details of the core elements of learning outcomes, degrees and any sub divisions therein are included according to Chapter II in the law on HEIs No. 63/2006.

10. Finances

Total income of UI has nearly doubled in the years 2000 to 2006, both with respect to government budget and other income, but FS (and other faculties) has run into a deficit nevertheless. In the present situation, the departments of FS complain of being severely underfinanced with respect to

- Administrative and technical positions,
- Teaching equipment,
- Operation and maintenance funds,
- Building funds,

And, as described in previous sections, the EC agrees that these complaints are justified, and that they represent a severe obstacle to progressing to higher quality in teaching and research with an international profile. Also, the existence of a sound infrastructure would help in attracting funds from international agencies.

The new contract between UI and the ministry will boost the income of UI considerably for the next five-year period. While these funds will be essential to realize the strategy of UI to achieve their goals, long term commitments will have to be made on the side of UI in order to boost research, and the EC has been assured that it is planned to have a follow-up contract in due course.

Allocation of these additional funds to the faculty and the department level will be on the basis of the number of students completing degrees, research points and matching funds for grants and special income. If FS is able to achieve the ambitious goals of increasing the number of postgraduate studies, some of the problems mentioned above might be alleviated. Funds from the EU (e.g. Marie Curie Training Sites) can help to reduce the strain on departmental budgets. They also contribute substantially to operational cost, on top of funding salaries and travel cost for postgraduate and postdoctoral students in priority fields of research.

As far as overhead money can be collected (in general 20% additional cost in EU projects. mostly 10% for selling research services), this money has gone to the UI research fund. With the planned internationalization of research at UI these funds will become more important for generating income for the infrastructure. Mechanisms should be found by which the departments generating this income (and paying part of the cost of the infrastructure) benefit directly from this overhead.

Conclusion

The outlined financial conditions of operation guarantee the fulfillment of all basic financial obligations.

Recommendations

- FS should use at least part of the additional income generated through the contract by increased student numbers to improve administrative and technical support, teaching equipment, and operation and maintenance funds in the departments.
- Maintenance and operation funds could be further strengthened by additional income from overhead and funds associated with teaching-oriented grants to the departments (e.g. training sites).

11. Summary of Findings and Recommendations

The main findings of the EC are summarized here as conclusions and recommendations to the Ministry of Education, Science and Culture, UI authorities and to FS. More detailed summaries of the EC conclusions and recommendations are to be found at the end of each chapter of the report.

The EC recommends unanimously the unconditional accreditation of Natural Sciences at the University of Iceland in accordance with The Higher Education Act no. 63/2006 and The Rules of Accreditation of Higher Education Institutions no. 1067/200.

The format of the procedure for accreditation was found to be fair, transparent and demanding, and it is fully in line with the Bologna process. The earlier (2006) self-evaluation report by FS and the report of the external peer review group (PRG) on it were helpful also for EC.

The Faculty's strategic plan for the years 2006 – 2011 defines ambitious goals in teaching and research, and the recent contract between the Ministry and UI forms a necessary basis to achieve its role and objectives with an increased focus on postgraduate studies and internationalization. A number of recommendations by EC to UI and FS are given below which might be helpful in this context. For the continuity of high quality teaching and research a follow-up contract after the year 2011 will be essential.

Recommendation to the Ministry of Education, Science and Culture

For future accreditation procedures it is recommended that sufficient time is made available to FS to incorporate the results of a future self-evaluation into the application for accreditation.

Recommendations to the University of Iceland

Improve the system of generating student statistics with respect to the apparent dropout problem. In close cooperation with the departments, the further career of former students should also be analyzed.

Recommendations to the Faculty of Science

- Further strengthen the BS programs by streamlining, merging the physics programs, and by shifting some courses from the BS level to the MSc level.
- Focus postgraduate programs by international Masters and Ph.D. programs (exclusively in English) in fields of particular strength of Icelandic science, and establish international training sites.
- Budgets for investment in equipment for teaching laboratories and for consumable costs of running teaching classes need to be increased.
- For teaching, administration and core research facilities an expansion of technical manpower and secretarial support at the Department level is urgently needed.

Signatures of the Accreditation Expert Committee of Higher Education Institutions in the field of Natural Science in Iceland 2007:

Date

Prof. Friedrich Seifert
Bayreuth Universität, Germany.
Chairman

Prof. Rolf Hernberg
Tampere University of Technology, Finland.

Prof. Paul C. Engel
University College Dublin, Ireland.

Appendix A1

Agenda for the Expert Committee site visit to the University of Iceland (UI) in Reykjavík, Iceland.

Thursday 22nd March 2007

Expert Committee:

Prof. Friedrich Seifert, Bayreuth University, Germany (Chairman).

Prof. Rolf Hernberg, Tampere University of Technology, Finland.

Prof. Paul C. Engel, University College Dublin, Ireland.

Liaison officer:

Dr. Anna Kristín Daníelsdóttir, RANNIS, Iceland.

09:15 – 09:20

Meeting with the Dean, Vice-Dean and Faculty Administrative Officer of Faculty of Science.

Tæknigarður UI, Reykjavík.

Present: Hörður Filippusson Dean and Professor of Biochemistry, Þóra Ellen Þórhallsdóttir Vice-Dean and Professor of Biology and Jón Guðmar Jónsson, Faculty Administrative Officer.

09:15 – 10:50

Meeting with representatives of Departments of Mathematics, Physics, Chemistry, Biology, Geosciences, Food Science and Human Nutrition.

Tæknigarður UI, Reykjavík

Present: Hörður Filippusson Dean and Professor of Biochemistry, Þóra Ellen Þórhallsdóttir Vice-Dean and Professor of Biology and Jón Guðmar Jónsson, Faculty Administrative Officer, Inga Þórsdóttir Professor and Head of Department of Food Science and Human Nutrition, Lárus Thorlacius Professor and vice-Head of Department of Physics and elected Dean from 1.7.2007, Guðni Ágúst Alfredsson Professor and Head of Department of Biology, Sigurður Snorrason, Professor of Biology and Head of Department of Biology Institute, Viðar Guðmundsson, Professor of Physics, Ragnar Sigurðsson Professor of Mathematics, Ingibjörg Jónsdóttir associate Professor of Geology and vice-Head of Department of Geology and Geography, Ágúst Kvaran, Professor and Head of Department of Chemistry, Ingvar Helgi Árnason, Professor of Chemistry, Robert J. Magnus, Professor and Head of Department of Mathematics, Stefán Arnórsson, Professor of Geology, Páll Einarsson, Professor of Geophysics, Einar Guðmundsson, Professor of Astrophysics, Ari Ólafsson, associate Professor of

- Physics, Ragnhildur Einarsdóttir, student representative from the Faculty Council.
- 11:00 – 11:40 **Meeting with the Rector of UI and the Head of Division of Academic Affairs of UI.**
Rector's office, Main building UI, Reykjavík.
- Present:** Kristín Ingólfssdóttir the Rector of UI and Þórður Kristinsson, Head of Division of Academic Affairs of UI.
- 11:45 – 13:00 **Lunch at Skrúður, Radisson SAS Hótel.**
- 13:00 – 13:30 **Meeting with Dean, Vice-Dean and Faculty Administrative Officer of Faculty of Science.**
Tæknigarður UI, Reykjavík .
- Present:** Hörður Filippusson Dean and Professor of Biochemistry, Þóra Ellen Þórhallsdóttir Vice-Dean and Professor of Biology and Jón Guðmar Jónsson Faculty Administrative Officer.
- 13:30 – 15:15 **Discussion of specific aspects of the programmes, site visits, including talk to technical personnel. Expert committee divided into three groups for looking at facilities.**
VR-I Labs UI and Askja UI, Reykjavík.
1. Friedrich Seifert - Depts. in Geosciences, Food Science and Human Nutrition, Askja, The Natural Sciences building.
 2. Rolf Hernberg - Depts. of Mathematics and Physics, VR-I Labs in Physics and Chemistry.
 3. Paul C. Engel - Depts. in Biology, Chemistry, Askja, The Natural Sciences building.
- 15:15 – 15:45 **Coffee - Askja.**
- 15:45 – 17:00 **Meeting with representatives of 20 students, undergraduate and postgraduate students.**
Askja - Earth Science Institute - Meeting room - Second Floor.
- Present:** Ragnhildur Einarsdóttir 1st year Master in Food Science and Human Nutrition, Kári Helgason 3rd year B.Sc. in Physics, Eiríkur Þór Guðmundsson 2nd year B.Sc. in Food Science, Sæmundur Sveinsson 3rd year B.Sc. in Biology, Kristbjörg Sölvadóttir 3rd year B.Sc. in Biology, Hlynur Bárðason 2nd year Master in Biology, Bryndís Marteinsdóttir 2nd year Master in Biology, Berglind Reinarsdóttir, 2nd year B.Sc. in Food Science, Benedikt Ómarsson, 2nd year B.Sc. in Chemistry, Ester Inga

Eyjólfsdóttir 1st year Master in Chemistry, Ragnar Björnsson 1st year Master in Chemistry, Gunnar Þór Magnússon 3rd year B.Sc. in Mathematics, Smári P. McCarthy 2nd year B.Sc. in Mathematics, Olivier Mosdretta 1st year Ph.D. in Mathematics, Ómar Valsson 1st year Master in Physics, Ása Guðrún Kristjánsdóttir 1st year Ph.D. in Nutrition, Benedikt Magnússon 2nd year Master in Mathematics, Sigurður Örn Stefánsson 2nd year Master in Physics, Líney Halla Kristinsdóttir 3rd year B.Sc. in Physics & 2nd year B.Sc. in Mathematics, Inga Júlía Ólafsdóttir 2nd year B.Sc. in Tourism studies.

17:00 – 17:30

Meeting with Dean and Professor of Biochemistry, Vice-Dean, Heads of Department, Students representatives and Faculty Administrative Officer.

Meeting room - Second Floor of Askja - Earth Science Institution.

Present: Hörður Filippusson Dean and Professor in Biochemistry, Þóra Ellen Þórhallsdóttir Vice-Dean and Professor in Biology, Jón Guðmar Jónsson Faculty Administrative Officer, Robert Magnus Head of Department and Professor in Mathematics, Ágúst Kvaran Head of Department and Professor in Chemistry, Guðni Á. Alfreðsson Head of Department and Professor of Biology, Ingibjörg Jónsdóttir Head of Department and assistant Professor in Geosciences, Jón Steinar Garðarsson Mýrdal Student in Physics, Lárus Thorlacius Vice-Head of Department and Professor in Physics, and elected Dean from 1.7.2007, Inga Þórsdóttir Head of Department and Professor in Food Science and Human Nutrition.

17:30 – 19:00

Accreditation Expert Committee Meeting.

Hótel Holt Meeting Room, Bergstaðastræti, Reykjavík.

Present: Prof. Friedrich Seifert, Bayreuth University, Germany (Chairman of Expert Committee), Prof. Rolf Hernberg, Tampere University of Technology, Finland (Member of Expert Committee), Prof. Paul C. Engel, University College Dublin, Ireland (Member of Expert Committee), Dr. Anna Kristín Daníelsdóttir, RANNIS, Iceland (Liaison officer).

Appendix A2

List of documents received

- Higher Education Institution Act No. 63/2006 (Draft translation).
National Qualification Framework for Iceland (Draft translation).
Accreditation of Higher Education Institutions according to Article 3 of Higher Education Act, No. 63/2006, No. 1067/2006 (Draft translation).
- Application for Accreditation of Natural Sciences at the University of Iceland.
Appendix 1: The University of Iceland Act - No. 41/1999.
Appendix 2: Rules for the University of Iceland - No. 458/2000.
Appendix 3: The University of Iceland Research and Education Policy.
Appendix 4: Overview of policies approved by the University General Forum.
Appendix 5: The University of Iceland Policy 2006-2011.
Appendix 6: Contract between the Ministry of Education, Science and Culture and the University of Iceland, January 2007.
Appendix 7: Legal framework of public universities.
Appendix 8: Rules on the composition and procedures of the University General Forum, 5 Nov. 1999, with subsequent amendments.
Appendix 9: University of Iceland Institute of Regional Research Centres.
Appendix 10: Quality criteria and requirements for Doctorate studies.
Appendix 11: Overview of University of Iceland research institutes and affiliated institutions.
Appendix 12: Credit Assessment System for Research.
Appendix 13: Rules on Admission Requirements for the University of Iceland - No. 573/2005.
Appendix 14: On Good Practice in Teaching and Examinations at the University of Iceland.
Appendix 15: The Lisbon Recognition Convention.
Appendix 16: University of Iceland Quality System.
Appendix 17: University of Iceland Financial Statement 2005.
Appendix 18: University of Iceland Rules of Ethics.
Appendix 19: Overview of External Evaluations.
Appendix 20: New rules on the appointment of academic staff (Chapter III of Rules for the University of Iceland, revised), approved by the University Council 15 February 2007, with explanations (informal draft translation).
Appendix 21: Rules on Promotion of Instructors, Specialists and Scholars at the University of Iceland - No. 863/2001.
Appendix 22: Rules on Academic Staff Duties.
Appendix 23: University of Iceland Rules on age and result related transfer of aspects of instructor's work at the age of 55 and 60.
- Appendix A: Faculty of Science self-evaluation report for External Peer Review 2006.
Appendix B: External Peer Review Final Report 2006.

Appendix C: Policy of the Faculty of Science 2006.

Appendix D: Rules on awarding positions at the Faculty of Science.

Appendix E: Rules on Graduate studies at the Faculty of Science.

Appendix F: Rules for the University of Iceland Science Institute.

Appendix G: Rules for the University Institute of Biology.

Other Documents

The University of Iceland Policy on Issues Related to People with a Disability (not translated), see <http://www.hi.is/id/1005376>.

The University of Iceland Policy on International Relations (not translated), see <http://www.hi.is/page/althjodastefna>.

Equal Rights Programme for the University of Iceland 2005-2009, see <http://www.jafnretti.hi.is/page/equalrightsprogramme>.

The University of Iceland Language Policy, (not translated), see <http://www.hi.is/page/malstefna>.

The University of Iceland Policy against Discrimination, see <http://www.jafnretti.hi.is/solofile/1007549>.

The University of Iceland Bibliography, listing works by nearly all instructors, see <http://www.hi.is/page/arbokogritaskra>.

Academic staff of Faculty of Science.

Degree Programmes and Diplomas – Overview for the University of Iceland.

Undergraduate Degree Programmes – Faculty of Science.

Graduate Degree Programmes – Faculty of Science.

Participation in EU Research Programmes.

Master's degree in Environment and Resource.