Report on

Evaluation of master's degree programme

Petroleum Geosciences Engineering

120 ECTS-credits

Faculty of Science and Technology (TN),

University of Stavanger (UiS)

31.07.2020

Introduction:

National authorities impose the University of Stavanger to keep continuous control over their studies in line with the requirements in the regulations relating to higher education. This implies (i) <u>regulations relating to quality assurance and quality development in higher education</u>, and (ii) <u>regulations regarding supervision of the quality in higher education.</u>

The regulations regarding supervision of the quality in higher education (§4-1(3)) states clearly that the 'supervision' takes place by ''(…) systematic control of all study offerings (…)'' as such that ''(…) that they meet the requirements in regulations for quality assurance and quality development in higher education and tertiary vocational education §§3-1 to 3-4''. Hence, supervision is as such implemented to assure the quality *sensu lato* within the study offerings. This is organised in '' (…) satisfactory routines and procedures for accreditation of study provisions and revision of the accreditation (…)''. This is guaranteed if it can be shown that ''(…)the study-offerings satisfy the criteria for accreditation, and if the results are satisfactory." This evaluation has to be carried out periodically and within this process all peer groups are involved (representatives from industry or society, students and external experts). At UiS, a revision of the programmes' accreditation subject to the regulations regarding supervision in higher education §4-3(3) is based on the periodical evaluations done according to the regulations regarding quality in higher education §2-1(2).

The Dean appoints an expert evaluation committee which reports according to the above mentioned national guidelines but as well as to any other additional requirements made by the university. The report must also point out areas where further development is desirable.

This report has therefore the following content:

1. Composition and mandate of the expert evaluation committee
2. Overview of documentation that must be made available for the work of the committee
3. General overview of the programme
4. Committee assessments regarding the accreditation criteria
5. The committees' overall assessment

6. The assessment by the Dean, advice and action plan

The report with the advice by the Dean and a possible action plan is subsequently sent to the University Director for further handling.

1. Composition and mandate of the expert evaluation committee

Composition of the committee:

- 1-2 academic employees from the students' academic environment

  (Prof. Udo Zimmermann, Dr. Dora Marin)
- 1-2 external academic employees from equivalent or restricted subject area

  Dr. Sergio Longhitano
- 1 external industry representative

  Wim Lekens
- 1-2 students

  Maren Fuglestein
- 1 representative from the administrative staff

  Karina Sanni

Mandate of the committee

- Assess whether the requirements from the regulations for accreditation is met, eventually which areas they do not meet the accreditation criteria
- Assess whether the programme has satisfactory implementation capacity and documented results
- Review and give assessments and recommendations that can be useful for the further development of the programme.

2. Overview of available documentation

- Programme description
- Matrix demonstrating the structure of the programme
- Course descriptions for all courses, including reading lists
- Template for Diploma and Diploma supplement
- Title of all master degree theses written by students and graduated the past three years
- Timetables for all three cohorts for the academic year of 2018-2019
- Overview of the scope of the academic year (student study hours, etc.)
- Academic environment publications registered in Cristin from 2015-2019
- Academic environment other publications, relevant for the programme from 2015-2019

- Overview of the academic environment (as of 31st of December 2019)
- CV for all members of the academic environment
- Student exchange agreements with quality assurance by the academic environment
- Supervised professional training-contracts
- Overview of the current arrangements for cooperation with places of supervised professional training in industry and academics
- Student data and results:

Data	Source
Amount of admission places	Board decision
Application and admissions	Tableau - STAR
Intake Quality	Tableau - STAR
Amount of starting students	Tableau - STAR
Amount of students	Tableau - STAR
Student throughput	Tableau - STAR
Drop-out rate (2015-2018)	Tableau - STAR
Qualifications and student exchange (2016-2019)	Tableau - STAR
Amount of student exchanges (out)	Tableau - STAR
Passed ECTS-credits	Tableau - STAR
Internal mobility	Tableau - STAR
Evaluation data	«Studiebarometeret», internal data
Exam data – 2016-2019 Division of grades Percent of failing students Passed/signed up for exam	DBH

3. General overview of the programme

Norwegian name of the programme Master Geoscience engineering
English name of the programme: Master of Science in Petroleum Geosciences Engineering
Qualification (degree) the programme leads to (in original language) (also title if relevant): Master of Science

X		Campus based programme
	o	Session-based teaching
	o	Decentralised education at other place of study (name place of study)
	o	Online-programme
	o	Online programme with physical sessions
	o	Joint-degree

X		Full-time study
	o	Part-time study

4. Committee's assessment regarding the accreditation criteria

The programme must be reviewed according to the accreditation criteria given in the regulations for supervision by NOKUT and the department's regulations regarding quality of education

Requirements for the programme

4.1 Information about the programme must be correct, show its contents, structure and progression, as well as possibilities for student exchange.

Information in this sense includes the contents of the programme description and associated information about the programme

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Committee assessment:

There is a mistake in the document file called "Studieplan og emner'' within the description for Master i Geoscience engineering 2019". The course GEO600 shall be called 'Seismic Interpretation', not 'Seismic Inversion' as it is currently written. There is also some differences between the pdf and the webpage (uis.no): In the pdf there are two courses, GEO550 'Sequence Stratigraphy' and GEO640 'Depositional systems', whereas in the webpage the course GEO550 is called 'Sequence stratigraphy and sedimentology', and there is not a course called GEO640 'Depositional systems'. The course GEO540 is called '3D structural and geological modelling' in the pdf file and in the webpage is called '3D Geomodelling'. In the elective courses in the second semester, there is a course called GEO650 'Advanced Fieldwork Methodology for Petroleum Geologist' in the pdf file, but this course is not listed in the webpage. All these are relicts of the recent changes of some courses

The rest of the information regarding the content, structure, progression and student exchange opportunities is correct and clearly presented in the study plan in the pdf file and in the webpage. This information is consistent with the study plan and course combination 2019-2021.

Committee recommendations:

Update both UiS official webpage in English and Norwegian or/and the pdf document, using the same names and generally updating of teaching staff per course.

4.2 The learning outcomes for the programme must be described to comply with the national qualification framework for lifelong learning, and the programme must have a suiting name.

The learning outcomes must be described as what a candidate should have achieved after completing the programme. Learning outcomes for programmes of professional study, for example programmes with national curriculum frameworks, needs to fulfil the requirements to both the professional study programme as well as the national qualification framework for lifelong learning.

Committee assessment:
The program name and learning outcomes are suitable and properly described and are in line with the NQF (Norwegian Qualifications Framework for Lifelong Learning) as the qualification has been described in terms of 'learning outcomes' in regard of 'knowledge', 'skills' and 'general competence'. The learning outcomes reflect the content of the study and fulfil the requirements to NQF and a professional study programme. It is clear stated and well organised what the candidate should accomplish during and at the end of the studies.
Committee recommendations:
To adapt learning outcomes if course content may change in order to up-date some courses for novel and new developments in their fields, in terms of new methodologies, technologies and knowledge.

4.3 The programme must be academically updated, and clearly be relevant for further studies and/or employment

The programme must be updated within new and relevant research as well as professional-, employment- and/or societal life in general. Regarding the relevance for employers, use agreements and contracts with relevant companies, and other interactions with the industry and society in the account for relevance in employment life. It is expected that the institutions already assessed the foundation for recruitment based on expected demand/need, as well as combined capacity associated to the same or similar programme at own and other institutions.

Committee assessment:
The program is academically up to date. Several subjects teach state-of-the-art developments in science *sensu lato*. The subjects are relevant for further studies or employment, which is clearly reflected in the uptake of MSc students in level 8 of the academic framework or that most of the students are adsorbed by job markets. In many of the program courses, relevant software is used, students are introduced to basic and advanced analytical techniques and data, which are also used in

the industry. There are different consortiums with industry in place, therefore, we understand the challenges for the future generation. Simultaneously, there are several state-of-the-art laboratory agreements on international level gaining a top education in this field to guarantee knowledge transfer to Norway. This is reflected in several alumni working in academic institutions including UiS. The program is highly regarded in the industry and students are finding relevant employment despite difficult times in the industry.

Committee recommendations:

The level of activity in terms of the application of the knowledge to academics and industry is high and **it is recommended that UiS assists in maintaining this level with support** for software update, modernisation of laboratories and financial support for international stays for analytical work as well as the presentation of data within theses.

4.4 The scope of the programme must be 1500-1800 hours per year to be considered as full-time studies.

The scope of the work is an estimate of how much time the typical student will use to complete the different academic activities required to meet the learning outcomes. The calculation must include self-study, exam preparation and organised learning activities. What kind of learning activities that are included in each programme varies, but some examples can be lectures, seminars, lab-work, guidance, and supervised professional training. How much self-study there is, varies with the profile of the programme. A balance between self-study and organised learning activities must be ensured, to make it possible for the students to achieve the learning outcomes in nominal time.

Committee assessment:

The program fulfils the number of hours to be considered as a full-time study. The students have a well-balanced amount of guided learning activities (e.g. lectures, discussion sessions, laboratories, fieldwork) and self-study activities (e.g. projects, reports, presentations) and evaluate the program as very positive. Based on further data like course evaluations etc. we can state that several students even study more than the assigned hours of 1800.

Committee recommendations:

Student evaluation shows that the balance is well thought and well received. It may be considered that UiS need to assist here more in terms of necessary help in regard of more student assistants to release the academic environment from teaching load as this type of teaching is by far more intensive than 'classic' structures with 'frontal lectures and one exam'. Moreover, UiS should assist when aiming

to maintain this level of education, which we strongly recommend, within the new challenges of 'blended education'. Nevertheless, the students like teachers appreciate the way the learning structure is organised, see the benefits in evaluations both during the studies and in when starting to work, as expressed in evaluations. The students from IER receive job offers and are highly regarded in industry and academia level.

4.5 The content, structure and infrastructure must be customised to the learning outcomes for the programme.

The learning outcomes for the programme is achieved through the courses. One course is the smallest credit-awarding unit. The contents and the structure of the programme must show how all the courses, together with the progression from semester to semester, leads up to the learning outcomes for the programme. The programme must have sufficient access to suited locations, equipment, library services, administrative and technical services, sufficient and suited IT-resources, online support, suited learning platform etc. that will support the students' learning and learning environment and the academic staff in teaching and research and/or artistic development work and academic development work.

Committee assessment:

The principle of the free election is generally very positive. But there is a concern with only having elective courses. It is possible that students do not take relevant courses, because they think, those are more demanding. However, some of the courses should be mandatory since in the learning outcomes (skills) says that: 'The candidate will be able to evaluate and solve problems on hydrocarbon exploration and production, from a regional to reservoir scale' and 'The candidate will be able to optimise results by using state-of-the-art technology in hydrocarbon exploration and production (...)'. Some courses seem to deepen knowledge in a specific field while others introduce in really new areas. It is not visible if there is a clear guideline for students of what shall be selected in terms of complying with the NQF guidelines. It seems an informal information process.

The infrastructure for all courses is given and well established, as the outcomes on different levels (e.g. student evaluation, publications, level of MSc theses) show. It is an industry expectation that the students are qualified and take relevant foundational courses despite their difficulty.

Committee recommendations:

The study plan shall be based on few but mandatory courses followed by several specialisation courses (see below) if study-learning outcomes do not change and for a deepening in a field of this large study area. A suggested path should be clearly indicated in the webpage. Selection of mandatory

courses shall be tailored to the experiences in the recent years and maybe 5 study points courses shall be considered to widen the field within the mandatory courses merges into a 10 study points course covering a specific area. Most probably a similar approach should be applied to the electives. The courses should follow a logical order. As they appear now in the webpage, the students are able to select them whenever they want to. It shall be considered as it makes more sense to introduce course which build the ground for analytical or technical expertise and enable then applied courses.

Maintaining the good to very good infrastructure for the courses shall be of highest interest for UiS considering the evaluation of the course by students and supported by stronger financial help.

4.6 Forms of teaching, -learning and –assessment must be customised the learning outcomes for the programme. The programme must facilitate students taking an active role in the learning-process.

The different methods of work must be adapted to the programme's contents and structure. It is presupposed that the methods of teaching, -learning and –assessments are suited for a digitalised society. The methods of teaching and learning must be built in such a way that the students achieve the learning outcomes described for the programme. Forms of assessment must be suited to measure whether the student has achieved the learning outcomes. How the academic environment enables for the students to take an active part will be dependent on the profile of the programme, and is also related to secure and maintain a good learning environment

Committee assessment:

Students are engaged in the learning process. The methods of teaching are adapted for a digitalised society. An evidence of these, is that during the Corona times the master students managed to finish their course projects from home, using remote connection to the university software and having digital contact with the course teachers. Moreover, several courses are already introducing 'blended education' and use digital media. This goes in-line with the content of the courses using sophisticated software and introducing to outstanding analytical techniques coupled then with state-of-the-art digital applications. However, it is all too obvious that a number of courses within this MSc program are in need of physical presence (e.g. excursion, practical work) which cannot and should not be replaced by digital courses. Most of the courses employed a portfolio education and if they have still a final exam, this examination is levelled by semester-accompanying evaluation. Portfolio-based evaluation can ideally match learning outcomes if not *vice versa*, as such that learning outcomes by NQF is tailored for portfolio evaluation. In this case, the study program is best practice.

Committee recommendations:

Continue to strengthen the necessary and productive types of digital teaching and the necessary skills. The latter expects the evaluation committee from UiS. Again, the high level of organization and complexity of the teaching structure – for the best of the candidate – requires permanent and sufficient financial support by UiS. It is possible to evaluate this aspect via the available documents. The committee proposes to add documentation such as quality control, interviewing students and academic environment. This report needs to be taken seriously by UiS. We propose this strongly as it is visible from the available documents that the MSc program is a success; hence UiS shall invest in maintaining this asset by supporting the program with financial help and in increasing the level of the analytical facilities in this key area.

4.7 The programme must have a relevant relation to research and/or artistic development work and academic cooperation.

The academic environment must show adequate relevant connection between FoU (research and development)/KU (artistic development)-establishment and the programme and how the students are introduced to FoU/KU during their studies. The academic environment must ensure the connection through their own research results, but also by using other research results in the education.

Committee assessment:

The most prominent outcome of this strongly existent relation is the involvement of MSc students in peer reviewed international publications over the years. MSc students are also involved in mobility and several students do their thesis in collaboration with industry, participate in industry consortia or in the NIOR centre. A high number of MSc continue on to a PhD.

So, the program has a relevant connection to research and academic cooperation.

Committee recommendations:

The strong relation between FoU and the program shall be maintained. However, UiS needs to be a main support driver and a stable sustainable source of funding. Funding cannot solely be achieved from the NRF as in other countries (e.g. Germany via DFG, the NRF equivalent), UiS/TN needs to establish a fund to support those appreciated activities. This is also a key first step to nurture first class MSc students into publications at PhD level and have serious candidates for EU funding. The committee feels that this is a necessary strategy nowadays and needs to be acknowledge by UiS. Otherwise, students will have a significant disadvantage in comparison to those at other universities. Providing opportunities is one major strategic point in the modern world.

4.8 The programme must have arrangements for internationalisation customised for the level, scope and individuality of the programme.

The requirement entails that the programme is put in an international context, and that the students in this way are exposed to a diversity of perspectives. Students on different levels in the programme will experience the international dimension differently, it will also vary from subject area to subject area. In this case, the programme is the centre of the internationalisation, and the arrangements can expand across many activities, such as use of international literature, international guest lecturers, foreign exchange students coming to the university, or student's participation at international conferences or workshops, etc.

Committee assessment:

The program has several arrangements in place. For example, last year IER had international guest lecturers and foreign exchange students are common participants in the courses. Students usually participate in international conferences (e.g. EAGE annual meeting, IOR annual meeting). Students also participate in international competitions such as the AAPG Imperial Barrel Award Program (where they have been in the top positions for the European chapter) and in the Laurie Dake Challenge. In several occasions students have opportunities to enrol fieldwork in other countries, carry out their laboratory work not only in other countries but at Centres of Excellence of highest worldwide recognition (e.g. Helmholtz Centres in Germany, Luxembourg Centre of Science and Technology or Institute of Studying the Interior of the Earth in Japan, etc.). Internationalisation is of utmost importance in modern geosciences because of the variety of costly applications and the study program plus the accompanying thesis projects give credit to this and actively encourages candidates to use those chances. (see attachment). From an industry perspective an international mindset, cross culture collaboration and diversity are key success criteria to solve tomorrow's business challenges.

Committee recommendations:

Encourage UiS to support internationalisation activities in a wider and structured manner, increasing the economic support for IER and the level and equipment of the analytical facilities. The interest of the students exist, as does the excellent network of the academic environment, to guarantee the continued participation in these international activities.

4.9 Programmes leading to a degree must have arrangements for international student exchange. Contents of the exchange must be academically relevant.

This requirement entails that the institution must ensure that students at all programmes leading to a degree, can be offered a student exchange stay through updated and binding contract, and that the relevance of the exchange-stay is ensured through the programmes' academic environment. The arrangements must be visible and predictable for the students, so that they better the students' possibilities and motivation for student exchange in the programme. There should also be made pre-approved course-lists with descriptions (student-exchange packages) as far as possible.

Committee assessment:
The program has these arrangements for international student exchange. There is a list of recommended universities, where the students can study abroad (Uppsala University, University of Basilicata, University of Bicocca-Milano, The University of Coimbra, Aachen University of Technology, University of Leoben, University of Houston, Colorado School of Mines, California State University, University of Adelaide, etc.). The Faculty of Science and Technology is a member of a Nordic network of technical universities. The study plans and exchange possibilities are well examined and fit in the curriculum perfectly. The level of teaching together with the learning outcomes in the named institutions is on par with NQF and UiS.
Committee recommendations:
Continue expanding the list of recommended universities and maintain support for those activities which would require economic assistance from UiS.

4.10 For programmes with supervised professional training, there must be a contract between the institution and place of professional training.

Contracts with the places of professional training must be in place. The agreements must ensure and regulate the academic completion of the supervised professional training. The contract makes it possible to ensure the quality of the supervised professional training, and to be sure it is of the same quality as the parts of the programme happening at the institution itself.

Committee assessment:
The program does not contain supervised professional training.
Committee recommendations:
N.B.

4.11 The master's degree programme must be defined and limited and have a sufficient academic scope. STF §3-2(1)

The limitations of the master's degree programme must be clear through the descriptions of courses, disciplines, and knowledge areas the programme entails. The profile and possible specialisations of the programme must be described in such a way that the scope of the programme is clear.

Committee assessment:
The program has a clear academic scope, as described in the study plan. At the end of the programme students will be able to analyse existing theories, methods and interpretations within petroleum geosciences, and work independently to solve practical and theoretical problems. Students will be able to independently carry out specialised research or development projects within petroleum geosciences under supervision and in line with current ethical norms of research.
Committee recommendations:
The possible specialisation paths may be expressed more clearly in a document uploaded within the study description and the study program.

4.12 The academic environment associated with the programme must have a size comparable with the amount of students and the programme's individuality, it has to be stable over time when it comes to competency, and its composition must cover the subjects and courses that form the programme.

The academic environment associated with the programme, includes people who directly and regularly contributes to the development, organising, and execution of the programme.

An important assumption for quality in the programme is that the students meet an academic environment which is big and stable enough, and that has competencies within all subjects and courses taught. Expected learning outcomes for the students and the contents of the programme and relevance, should be guiding for the composition of the academic environment. The academic environment is responsible for building a holistic study offering with good coherence, progression and academic diversity.

Committee assessment:
The academic staff expertise is diverse and completely related to the program courses. It is stable in its competency as most of the persons are relatively young. Only 2-3 are within 15 years to retirement. Recent changes could be compensated with younger promising staff and perspective. If the staff structure stays stable a major change will be due in 10 years+. The amount of staff is good for a MSc program but in the context of the duties of the entire institute, more permanent staff is necessary.

Further documents (like publication records, duties on BSc levels, PhD students and project involvement, etc.) show clearly the general overload within the expectations of UiS and the workload in other parts of teaching and research and administration. This is far from ideal. The program consists of several Professor II positions, which are highly appreciated. This leads to permanent and constant and productive contact to industry, one major goal of UiS/TN strategy. Nevertheless, IER should employ more young scientists incorporated into the academic system.

Committee recommendations:

UiS needs to strengthen the opportunity for younger persons in the academic environment to gain similar expertise as the older ones. General overload can quickly be assessed when reviewing all duties of the involved persons, hence more permanent positions need to be developed. Transforming some of the more costly professor II positions into permanent position for young lecturers should be considered, which has a number of advantages. However, this does not imply reducing the involvement of professor II positions nor a reduction in the number of positions as such. We argue for a larger number of young employees to reduce the teaching overload. Keeping in mind that permanent young staff is able to release the existing staff from a number of other duties. A win-win situation. We urge UiS therefore to consider developing permanent positions for young lecturers. Again, the existence of professor II positions is vital for IER since the contact to industry was, is and will be one of the major strengths of IER and TN.

4.13 *Academic environment associated with the programme must have relevant educational academic competency.*

Educational academic competency means University level pedagogy and didactics. Educational academic competency also includes competency to make use of digital technology to promote learning. National regulations for educational basic competencies have minimum requirements for scientific/academic staff, in line with these, UiS has decided it will require 150-200 hours work to develop the desired level of basic competency as a minimum to meet the requirement for educational academic competency.

Committee assessment: The academic staff has the correct pedagogical and didactic competences. During the Corona time, different workshops about digital teaching were taught. The academic staff has taken different pedagogical courses such as: NyTi and UNIPed in the past. Additionally, several offers of further pedagogical and didactic education exist in terms of digital workshops or 3-day courses within Erasmus+.

Committee recommendations:

Continue to strengthen the digital teaching skills, which are very relevant in this moment. However, if UiS wants to implement the number of hours (150-200 hours), an in-kind reduction of on-going activities is necessary to avoid causing a decrease in academic quality. As staff is already overloaded in their work, mainly with research-related activities and to an even higher degree with administrative tasks which have been carried out in the past by other staff, adjustments are paramount in this area. We prefer therefore short digital one-day courses or effective 3-day courses by Erasmus+ which are supported economically by UiS. Those courses can be selected from a large pool of offers so that individual teacher can strengthen specific abilities or be trained in new didactic and pedagogic skills. This seems to us more applicable and preferable over 'general' courses.

4.14   The programme must have a clear academic management with defined responsibility for quality assurance and development of the programme.

The requirement is that the academic management must consist of staff in teaching and research positions and have the formal responsibility for the programme being completed in line with the programme description and that the programme description is developed. The person/people with the academic responsibility must have the competency to drive the quality assurance and – development of the programme.

Committee assessment:

Associate professor Dr. Lisa Jean Watson has been appointed recently as the study program leader. She is participating in teaching and research activities and strongly fulfils the qualifications for the position. The program leader is responsible that the required tasks are fulfilled. Dr. Watson inherited the position from former program leader (Prof. Nestor Cardoza) who guaranteed the fulfilment of these required tasks.

Committee recommendations:

The new program leader shall double-check the program description and the subsequent work tasks and control or oversea the recommended changes. She shall also check, control and remind UiS with regards to the proposed improvements in this evaluation and especially in terms of the support by UiS. The position, however, shall not be suffocated by administrative tasks but enable the development of creative and sustainable strategies. This pro-active task shall generate new MSc organisations which is able to adapt easier to the needs of the students, the possibilities of IER and TN and society and industry needs at large. The program leader shall lead the program towards addressing future challenges. We have full confidence that the new program leader has the ability to

assure the quality of the program, generate new ideas, develop the program and realise this with all involved peer-groups.

> *4.15   At least 50% of the work-years associated with the programme must be done by employees whose main employer is UiS. Of these, there needs to be employees with minimum associate professor-level in the central parts of the programme. In addition, there are the following requirements for the academic environment's competency-level: For programmes on master's degree level, 50% of the academic environment associated with the programme must be employees of at least associate-professor level competency, where at least 10% with professor level competency*

The academic environment associated with the programme, includes people who directly and regularly contributes to the development, organising, and execution of the programme. To have UiS as their main employer, their position has to be at least 50% at the university.

It is therefore only the academic environment associated with the programme (in the form of work years), that falls under this point. Positions from 0,1 work years is included in the calculation.

Committee assessment:
IER has more than 50% of the staff involved at associate professor level and 10% are professors which are involved in the MSc program. There are 10 permanent staff involved of which 4 are on professor level while 6 teachers are not permanently employed. Professor II positions come in addition to that, are highly educated and they bring their experience in industry.
Committee recommendations:
As selection of courses is totally free it may be possible to have a lower % in regard of professor and associate professors then covering the courses selected. Although it is controversial if then the education is hampered; however, according to regulations this shall be avoided. It is obvious from the information given that the teachers do change over the years for a specific topic which also moves slightly the % of associate professors and professors within the programme. The programme and competency level would be strengthened if UiS would increase the number of permanent positions. Information should be updated on the UiS platforms in regard of names and association of the teaching staff.

4.16   The academic environment associated with the programme must do continuous research and/or artistic development work and academic development work and must show documented results at satisfactory quality level and scope for the programmes' contents and level.

The academic environment must be able to show to results of such quality and scope, that it is satisfactory for the programmes' individuality, contents, and level.

A scope in relation to the programmes' level entails that it requires more research activity in relation to a master programme, than for a bachelor programme. NOKUT will on the other hand, during their supervision, require that the activity in an academic environment that has programmes within Ph.D. level must keep "high international quality" at all programme-levels.

Committee assessment:

 The academic staff performs continuous high international quality research, where the main results of the research are published in international peer review journals. The academic staff is highly productive with 76 publications in international peer review journals. Master students are sometimes part of research projects, mainly through their thesis project. 118 MSc thesis were delivered in the period 2014 to 2019. Other characteristics that make the Master in Petroleum Geosciences Engineering to have high international quality are: the updated topics of the courses in program, the language that we use (English), the presence of international exchange students, international events where the master students participate (conferences and competitions), the visit of international guest lecturers, and the different collaborations with industry and universities around the world.

Committee recommendations:

To continue bringing guest lecturers and encouraging students to participate in international events. However, the latter needs to be funded by UiS – the committee seems it as a duty to support those efforts by financial means (with a fund matching program) to maintain the excellent quality the university expects.

4.17   The academic environment associated with programmes leading to a degree, must actively participate in national and international cooperation's and networks that are relevant for the programme.

Cooperation and networks must be relevant for the programme and give the academic environment experiences that can be used in the programme, and that can contribute to the quality of education. This can for example be research cooperation, participation at international conferences, cooperation

about education/teaching quality etc. These networks that the academic environment actively participates in, are the ones that are being assessed. It should also be assessed how the cooperation contributes to the quality in the environments' research and development-activity.

Committee assessment:

The academic staff has a strong international network. This is evident in the program consortia, where there is collaboration with researchers from different universities and research centres in Europe; publications; and participation in international conferences. The master students in the program are also involved in these activities.

A number of MSc theses are as such supervised that the students are encouraged and have to visit international laboratories or have to present their thesis results at international conferences (annual IOR conferences, etc.). The excellent international network is formalised within the education by the support of the supervising professors.

Committee recommendations:

To continue promoting international cooperation, not only in the field of petroleum geoscience. This is, however, currently mostly an initiative of a few teachers and should be encouraged to be expanded with the financial support of UiS. If this is to be part of the teaching strategy not only 'encouragement' is needed, but definite structures shall be built up with a fund matching program as internally arranged. However, this is not enough and needs substantial financial support from UiS. These initiatives are always very positively evaluated in all levels by UiS and it is therefore in the interest of the university and not left in the hands of few active teachers.

4.18   For programmes with mandatory supervised professional training, the academic environment associated with the programme must have relevant and updated knowledge from the professional training-field. The institution must ensure that the supervised professional training-advisors has the relevant competency and experience from the professional training field. STF§2-3(7)

With "supervised professional training-advisors" it is meant people who takes care of and advises the students during their time in supervised professional training.

With "relevant competency" in the second sentence, it is related to relevant academic knowledge and advising competency.

In programmes where supervised professional training is an integrated part, it is assumed that the institution and the academic environment themselves makes sure there is systematic contact with the professional training field, so that the programmes and the academic environments own

professional training experience is updated and following the development of the field. It is important for the quality of the programme that there is a continuous academic interaction between competency people in the professional training field and central competency people with their main employment at the institutions. The academic environment at the institution must have their own knowledge of professional training, to be able to cooperate with the field and integrate / build bridges between theory and practice in the education.

Committee assessment:
The program does do not have a mandatory supervised professional training
Committee recommendations:
No comments

5. The committees' overall assessment:

From our side (still as bullet list):

General:

Well established and thoughtful program with a lot of staff efforts. this seems not sustainable as staff will run out of support and energy as staff works at the edge and is dedicated and a good number of individual initiatives. Therefore, if staff changes and IER will not gain similar dedicated persons the program will suffer.

As the MSc program is very successful and highly rated by students UiS should support financially and increase the level of the analytical facilities the program within these fields substantially:

Internationalisation (financial support for conferences, research travel and data acquirement as the committee sees that here funding is well spent)

Further education of the academic environment in all fields (digitalisation, pedagogic and didactic skills, technical skills also related to laboratories)

It is suggested to be able to plan for marketing strategies to promote the master course, aimed at spreading its formative/professional potentials, its job opportunities (e.g. disclaiming the % of employed students after the first 3/6 months from their graduation). These strategies, for example organised with dedicated pages on the main social networks or with short videos, have a very high attraction among young people, and would increase the number of students potentially enrolled at the first year of the course and coming from different universities or countries.

Content:

A structure with obligatory courses and some elective programs with possible (or not) obligatory courses per sub-program and some electives. This strategy would enable IER in the future much easier (in terms of logistic, organisation and finance) in developing more effectively and quicker a successful sub-program into a free-standing Master. However, we do not see a need in reducing courses but reorganising the structure. The variety is one of the major strengths of the program.

The Master's plan does not foresee any strategy of possible adaptation to the energy transition era that the whole world is preparing to face, with particular reference to Northern Europe. Although one of the goals of the Master course is to ensure its solidity and duration, as stated several times in the program, there is no mention on, eventually, how to adapt/change/modernize this course accordingly. This aspect is one of the objectives that recently many of the energy industries and companies have declared they want to achieve in the next years and, as such, the possibility to lose financial support

from these partners would be very low. To imply changes, obviously, would require the employment of some specialists in the field complementing the expertise which exists.

Academic environment:

We would also propose that UiS invests in some permanent young lecturer positions to cover some of the courses instead of a large number of professor II positions, but we argue strongly for maintaining a certain number of professor II positions because of the obvious benefit for students and the program.