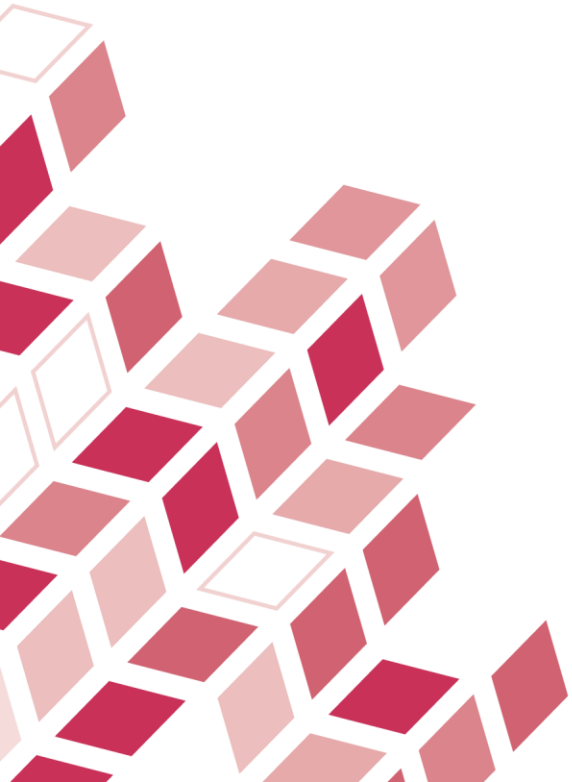
NOKUTs tilsynsrapporter

Ledelse av teknologi og innovasjon – realfaglig retning

Mastergradsstudium ved Høgskolen i Bergen

Mars 2014



NOKUT Nasjonalt organ for kvalitet i utdanningen

Institution:	Bergen University College (Høgskolen i Bergen)
Name of educational provision:	Management of Technology and Innovation – Natural Science track Ledelse av teknologi og innovasjon – realfaglig retning
Degree/Studiepoeng (ECTS):	Master degree, 120 studiepoeng (ECTS)
Date of Decision:	[14.03.2014]
Expert Committee:	Professor Mette Præst Knudsen, Syddansk universitet
	Førsteamanuensis Tim Torvatn, Norges teknisk- og naturvitenskapelige universitet
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NOKUT Nasjonalt organ for kvalitet i utdanningen

Forord

The external quality assurance performed by NOKUT consists of evaluating the institution's quality assurance systems, accreditation of new provisions and revision of accredited provisions. Universities and university colleges have different self-accrediting powers. For an institution without self-accrediting powers to establish a provision in a certain cycle an application must be made to NOKUT.

Hereby NOKUT presents the accreditation report of a master degree programme in Management of Technology and Innovation – Natural Science track (Ledelse av teknologi og innovasjon – realfaglig retning) at Bergen University College (Høgskolen i Bergen).The expert evaluation in this report is part of the accreditation process following Bergen University College's application for accreditation of a master degree programme in Management of Technology and Innovation – Natural Science track submitted before the application deadline on 1 September 2013. This report clearly indicates the extensive evaluation performed to ensure the educational quality of the planned educational provision.

Master degree programme in Management of Technology and Innovation – Natural Science track (Ledelse av teknologi og innovasjon – realfaglig retning) at Bergen University College does not fulfil NOKUT's conditions for accreditation and is not accredited by resolution of 28 February 2014.

Terje Mørland
Director General

Information on accreditation of educational provisions (in Norwegian) at www.nokut.no

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1 Information regarding the applicant institution

Bergen University College does not have power of self-accreditation for educational provisions in the second and third cycle (PhD and master degree) and therefore has to apply NOKUT for accreditation. The following educational provisions at the institution have obtained accreditation from NOKUT (in chronological order by year, names of the educational provisions in Norwegian):

- Mastergradsstudium i samfunnsarbeid, 120 studiepoeng/ECTS (2006)
- Mastergradsstudium i kunnskapsbasert praksis i helsefag, 120 studiepoeng/ECTS (2007)
- Mastergradsstudium i informatikk - programutvikling, 120 studiepoeng/ECTS (2008)
- Mastergradsstudium i klinisk fysioterapi, 120 studiepoeng/ECTS (2008)
- Mastergradsstudium i barne- og ungdomslitteratur, 120 studiepoeng/ECTS (2009)
- Mastergradsstudium i undervisningsvitenskap, 120 studiepoeng/ECTS (2009)
- Mastergradsstudium i klinisk sykepleie, 120 studiepoeng/ECTS (2010)
- Mastergradsstudium i innovasjon og entreprenørskap, 120 studiepoeng/ECTS (2011)
- Mastergradsstudium i samfunnsfagdidaktikk, 120 studiepoeng/ECTS (2012)

Bergen University College has 700 employees and 7000 students. The University College is organised in three faculties; Faculty of Education, Faculty of Engineering and Faculty of Health and Social Sciences.

The planned master degree programme in Management of Technology and Innovation – Natural Science track / Ledelse av teknologi og innovasjon – realfaglig retning is placed under the Faculty of Engineering. The Faculty consists of six departments and one research centre (Centre of Innovation). Bergen University College has an accredited joint master in Innovation and Entrepreneurship (Innovasjon og entreprenørskap, en realfaglig master i teknologiledelse (IET), 120 studiepoeng/ECTS.

2 Description of procedure

NOKUT makes an administrative assessment to ensure that all basic conditions for accreditation are fulfilled as expressed in the Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education.[1]

After the application was approved administratively, NOKUT appointed external experts for the evaluation of the application. The external experts have declared that they are legally competent to perform an independent evaluation, and carry out their assignment in accordance with the mandate for expert assessment passed by NOKUT's board, and in accordance with the requirements for educational quality as determined by the Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education.

Following their assessment, the expert committee shall conclude either with a yes or no as to whether the quality of the educational provision complies with the requirements in the Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education. NOKUT also

[1] http://www.lovdata.no/cgi-wift/ldles?doc=/sf/sf/sf-20110127-0297.html

requests that the expert committee advise on further improvements of the educational provision. All criteria must be satisfactorily met before NOKUT accredits an educational provision.

If the conclusion reached by the expert committee is negative, the report is sent to the applicant institution, which is then given three weeks to comment. Thereafter NOKUT decides whether the comments should be sent to the committee for additional consideration. The committee has been given more time for the final assessment because of the complexity and that they have to evaluate two programmes, and produce two reports. Based on the first report, and the additional assessment, the director general then reaches a final decision about accreditation.

The current report presents the accreditation process chronologically. As described above, the committee is free to change its conclusion on accreditation in the course of the process. The final conclusion is found in part 7.

The committee chose to write their assessment in English. The application and the commentary from Bergen University College however, is in Norwegian.

3 Administrative Assessment

Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education *Forskrift om tilsyn med utdanningskvaliteten i høyere utdanning***.**

§ 7-1: Basic Conditions for accreditation

1. Demands expressed in the Universities and Colleges Act concerning the following arrangements will be assessed:

    a. Internal regulations and governance
    b. Appeals Committee
    c. Learning Environment Committee
    d. Educational Plan
    e. Diplomas and Diploma Supplement
    f. Quality assurance system

NOKUT's assessment

The intention of this article is to make it clear and predictable what regulations in the University and Colleges Act (2002) that NOKUT supervises. Bergen University College offers accredited educational provision. Hence, it is presupposed that the demands expressed in the Universities and Colleges Act are fulfilled. The diploma and Diploma Supplement is commented and evaluated under Part 4. The institution's quality assurance system was evaluated and approved in 2011.

4 Expert Assessment

This chapter is the expert committee's assessment. The term "we" refers to the expert committee as such. The number preceding each heading refers to the corresponding provision in the Quality Assurance Regulation on Higher Education.

Summary

The evaluation committee appreciates Bergen University College's attempt to create an interesting and relevant education focusing on challenges in the global society. However, the ambitions of educating managers of global technology businesses can in our opinion not be realized entirely with the current setup. In the following, the evaluation committee will point to the specific areas for improvement and point to the required areas for improvement.

Specifically, the committee is concerned with three main points, which are further elaborated below:

The concept of "technology".

As the education focuses on managing technology towards supporting technology businesses it is necessary to conceptualize the technology concept. In the recruitment strategy it is pointed out that any engineering education is eligible for this program, however the breadth of the possible engineering programs does not connect well with the focus on technology-based businesses. This disconnection is serious and questions the intentions of the program and the likelihood that these may be realized.

This point for instance relates to the learning outcomes that in some instances (e.g. K1) are formulated in very general terms.

The intention of establishing a cross-disciplinary program.

We very much appreciate this goal, and find that this is very relevant and promising for the businesses where the candidates will work after their studies. Nevertheless, we are concerned about how this is facilitated in the program. We find that such goals must be supported by strong mechanisms to enable the realization of the goal, in particular the staff must "go first". Fundamentally, the master thesis should also enable the students to demonstrate their abilities in working in and managing a cross-disciplinary context.

The staff behind the program has mainly its background in and is active in research stemming from social sciences and business economics. We strongly emphasize that a program with a natural science track must involve a majority of researchers coming from technology and engineering programs rather than social sciences.

In summary, the committee can therefore not recommend that the educational provision of M.Sc. in Management of Technology and Innovation is offered based on the current application. We recommend further that Bergen University College resubmits its application based on the recommended revisions.

4.1 Grunnleggende forutsetninger for akkreditering[2]

7-1 Krav I lov om universiteter og høyskole.

These demands have been evaluated by NOKUT.

7-1 1. Vitnemål og Diploma Supplement

Assessment

The application and the associated information (e.g. appendix 1 and 2) are sufficient given that the changes asked below are implemented in the Diploma Supplement. However, the committee wishes to emphasize the role of the "Vitnemål" and the "Diploma Supplement" as documents also oriented towards employers, and should accordingly serve as information to these. We recommend that these documents are revised accordingly.

Conclusion

YES, the condition is fulfilled.

- Bergen University College is advised to adjust the "Vitnemål" and Diploma Supplement as described in the assessment.

7-1 2. Krav i aktuelle forskrifter og rammeplaner fra Kunnskapsdepartementet skal være oppfylt.

Assessment

The Master in Management of Technology and Innovation – Natural Science track holds a cross-disciplinary approach. The school should more carefully design how the cross-disciplinarity between management and technology is facilitated, but also how they facilitate the integration of students from very diverse backgrounds (see further comments below).

The educational provision is a section (§ 3 Master's program of 120 studiepoeng/ECTS) with admission and recruitment regulations:

- Bachelor (180 studiepoeng/ECTS) with subjects in Natural Sciences of at least 80 studiepoeng/ECTS.
- 3-year Engineering degree or other 3-year integrated degree within Technology and Natural Sciences.
- Other integrated professionally-oriented education of at least 120 studiepoeng/ECTS within Technology and Natural Sciences.

The criterion for admission must be aligned with learning outcome K1 "Ytterligere fordypning i det tekniske fagområdet fra bachelorgraden sin". The courses offered to serve as expansion of existing

[2] The revised regulation is not officially translated into English. The criteria are therefore only in Norwegian in this report.

knowledge from the bachelor degree cannot possibly serve all possible backgrounds suggested by the wide recruitment basis expressed in the recruitment strategy. A question appearing from the program is whether all of the internal departments/organizational units that are given a stake in this program are actually truly involved – or will the students simply be extras in existing classes. Is it perhaps better to restrict the number of departments involved, to allow those who are involved to have more space, and thus more of a stake in the quality of the new program?

Therefore, we recommend that the admission requirement and recruitment should be limited to a number of engineering areas (admission by Bachelor degrees) where the institution can *guarantee* fulfilment of K1. The institution may also consider to offer the program for preferred groups (Masterforskriften §2 and §3). The committee finds this more important than the required average grade as admission criterion.

The formal requirements in the regulation for offering a Master Degree's of 120 studiepoeng/ECTS and admission requirements are fulfilled. Also the master's thesis of 30 studiepoeng/ECTS meets the formal requirements.

Further, we are concerned that the institution does not substantiate how it will arrange for cross-disciplinarity. We find it insufficient to say that this will handle "itself" because the courses are cross-disciplinary. In addition, the institution needs to document how groups are constructed from people with different backgrounds, and how these differences are used in the courses. It is also natural to suggest that all the programs at the institution within this discipline (innovation) are handled together in some cases to further enhance cross-disciplinarity.

Conclusion

Yes, the conditions are met.

- Bergen University College needs to more carefully address the challenges in the regulation of master's degree as mentioned above – concerning admission requirements and in particular with reference to the ambition of cross-disciplinarity.

7-1 3. Rekruttering av studenter til studiet skal være stor nok til at institusjonen kan etablere og opprettholde et tilfredsstillende læringsmiljø og et stabilt studium.

Assessment

The number of students recruited seems low with 15 students being in the lower end of what is necessary for a good learning environment. We recommend that the institution aims higher and recruit minimum 20, to avoid the real number getting below 10. With a small number of students, and the very wide recruitment strategy, we are afraid that it will be difficult to ensure integration across engineering disciplines towards ensuring a positive learning environment. This concern is directly linked to the previous point on the admission criterion in terms of possible engineering programs, where we expressed concerns about the challenges in opening the admission too widely, while simultaneously seeking to establish a strong learning and cross-disciplinary environment.

It is very good to see that the institution thinks in terms of internal recruitment, and as part of this, has adapted electives to fit each of their main engineering programs. As mentioned above, this way of thinking should also be a part of the recruitment policy for external recruitment. However, we find that external recruitment and especially international recruitment could be discussed more explicitly as we find international recruitment a general problem for many programs.

In addition, as mentioned above, the institution should be careful in designing how groups are constructed from people with different backgrounds, and how these differences are used in the courses. In particular, in relation to the potential sparse student basis across different engineering backgrounds, we find the sparseness a challenge for constructing a sufficient learning environment.

Conclusion

YES, the study program fulfils this criterion.

- We recommend Bergen University College to look at the recruitment policy, and we emphasize the need to recruit either from a smaller number of engineering disciplines or to involve the engineering centers more directly in the program execution (and perhaps even development).
- We recommend that Bergen University College further outlines an explicit strategy to organize for cross-disciplinarity focusing on the learning environment from a diversity management perspective.

7-1 4. For studier med praksis skal det foreligge tilfredsstillende avtaler som regulerer vesentlige forhold av betydning for studentene.

Assessment

Practice is mainly organised in the course MOØ224, which has four weeks of practice and three reflection seminars, which should lead up to a report. In the practice period students will also gather data for two other courses. This is a very ambitious setup, and has the potential to become interesting and a relevant experience.

The idea of linking assignments in other courses to data gathering in a company, while the student is there, is promising. However, the practice period seem way too short to be able to achieve these goals. 2x3 weeks with a period in between would have been better, and more time, possibly over two semesters (2nd and 3rd) would have been even better. We suggest that Bergen University College explores the option to extend the number of ECTS points in this course (and correspondingly reduces the ECTS for Gründerskolen). Event better, we imagine that the involved companies are offered that the student(s) write their master thesis in collaboration with the company in question, to both strengthen the expected outcome for the company, but also to benefit from the established relationship with the particular company.

A critical point for execution of this idea is the actual link to the companies. We find that the faculty staff needs to be involved *directly* with the companies and supervise students while in practice. Further, it is of crucial importance to develop a shared understanding with the company managers to

ensure that they are well-acquainted with the scope and focus of what the students are supposed to do for their studies and for the company.

One question is whether Bergen University College can guarantee to provide all students in this program and the planned sister program with sufficient and relevant practice periods in companies. With approximately 30-40 students in the three sister programs (MTI-samf, MTI-real and IET joint degree program), this seems to be a substantial load on nearby companies, which must be handled as early as possible.

We find that the agreement with the Gründerskolen is sufficient although we would prefer that the agreement is directly linked with the program and not the sister program. Admission to the Houston Gründerskole seems to be a potential problem, given that this connection is also used by other programs at Bergen University College and at the University of Oslo. We recommend that Bergen University College builds its own relationships to Houston or alternative other similar environments.

Finally, we recommend that Bergen University College work out a set of guidelines and procedures for how to handle practice work and how to relate to the practice companies both for the university college and for the students. Further, the school should seriously look at possible ways of extending the practice period. 3-4 weeks at the beginning of the semester does not seem sufficient to achieve the expected learning outcomes.

Conclusion

NO, the condition is not fulfilled. Bergen University College is required to ensure that:

- the sketched agreement with Gründerskolen is linked directly to the program and the links with the companies become sufficiently established.
- if the first point is not possible an alternative agreement should be secured with a similar program.
- agreements are made with companies for guaranteeing the practice aspects with the companies for the students and that these agreements clearly regulate and specify expectations and deliverables on both sides.
- Further, we recommend that a guidelines and procedures are developed for how to integrate and handle the practice periods.

4.2 Plan for studiet

7-2 1. Studiet skal ha et dekkende navn.

Assessment

The title of the program emphasizes management of technology and innovation. We find that "innovation" is well-described and supported and hence this part of the name fits well with the program and contents presented. The courses give a broad understanding of issues related to innovation management although some efforts could be made to further substantiate the core of innovation management in e.g. the course MOØ210. For instance, it is hard to see that the innovation management courses are dealing specifically with innovation in technology based firms. Also, any

explicit connection between the electives and the innovation courses is unclear. They are even described as "separate pillars" in the program description.

The technology part does not fit the program in the same way. There is very little space in the program for advancing the students prior knowledge based on earlier specializations (at the entry level) from the bachelor degree (only 15 study points, 2 electives), which may not even specifically link to the overall innovation and technology subjects. Hence, there is a question about the use and adoption of the concepts "technology" and "technology management". Specifically, we are unable to identify the programs definition of "technology", and what it specifically implies for any practices (that the students should/must learn) of technology management. Since technology is part of the name of the program, such a definition and not least explicit understanding is required. Also, and we will come back to this later, it seems as if those professors and associate professor that are involved in the program have very limited technological background and further that the actual engineering research environments only have a loose connection with the program.

Conclusion

No, the name of the program is not appropriate.

- Bergen University College must reconsider and define the fundamental conceptualization of "technology"
- Bergen University College must define how technology is integrated at the course level and specify the links between the innovation and technology courses
- Bergen University College must describe the explicit involvement of the engineering research environments within the school, and link to the competencies of the associated professors.
- While addressing these requirements, we encourage Bergen University College to also consider the points made earlier on cross-disciplinarity.

7-2 2. Studiet skal beskrives gjennom krav til læringsutbytte, jf. Nasjonalt kvalifikasjonsrammeverk for livslang læring. Det skal formuleres ett totalt læringsutbytte for hvert studium, definert i kunnskap, ferdigheter og generell kompetanse.

The learning outcome as described in the program:

Knowledge-based learning outcomes

K1) The candidate has expanded the knowledge of engineering subjects acquired in his/her bachelor's degree
K2) The candidate has acquired advanced knowledge in technology management, innovation and entrepreneurship in relation to the students engineering profile.
K3) The candidate has acquired advanced knowledge on business development, strategy and organization theory, especially about the Nordic model of industrial relations and industrial democracy.
K4) The candidate is able to combine and apply her/his understanding of new technology with her/his insights from management of technology and innovation.

K5) The candidate has gained an up-to-date understanding of the field in regard to the process of assessing the commercial potential of new technology and of bringing new technology to the market and to the public sector.
K6) The candidate has acquired an advanced understanding when it comes to identifying opportunities and challenges associated with the organising and financing of new initiatives such as new business ventures.
K7) The candidate has acquired knowledge on business ethics, ethics for decision-making and corporate social responsibility (CSR).
K8) The candidate has acquired basic knowledge of finance and marketing.

Skill-based learning outcomes

S1) The candidate has acquired advanced analytical skills in technology management and innovation and has expanded the knowledge acquired in his/her bachelor's degree in relation to that.
S2) The candidate has developed the ability to assess the commercial viability of a new technology-based idea. The candidate can use various methods and tools for this purpose.
S3) The candidate has developed the ability to transform research-based ideas into feasibility and business plans. The candidate can use (tacit and explicit) methods and tools for this purpose.
S4) The candidate has developed advanced skills in entrepreneurship, innovation processes for organising production and in presenting new ideas to the private and public sectors.
S5) The candidate has advanced skills in analysing technology management, strategies and change processes.

General competence

The candidates should be able to handle and to analyse a broad spectrum of managerial challenges. In that context, the candidates should be able to include reflections related to ethics and corporate social responsibility. The candidates should also be able to perform extensive, independent, analytical work, and be able to impart and communicate his/her findings.

Assessment

The general remark is that the learning outcomes are very general and broad. In particular, we are challenged by the technology concept and the way that it is described and achieved. Keeping the technology aspects, in general, challenges the ability to understand when they are achieved.

This comment should be viewed in light of K1) *"The candidate has expanded the knowledge of engineering subjects acquired in his/her bachelor's degree"*. The expansion of any knowledge subject is fairly imprecise; hence specification of the exact outcomes is strongly recommended (and preferably linked to the earlier comments on the bachelor intake).

We are further concerned with the level of qualifications as expressed in the learning outcomes. For example, K2, K3, and K6 express the level of knowledge as advanced, but these only express that the students acquire knowledge. We point to the National Qualification Framework, where level 7 also points to the ability to students to apply knowledge obtained on new fields of knowledge and the ability of students to analyse problems. In particular, the last element is crucial in relation to the

master thesis. We do not find that these aspects are sufficiently reflected in the knowledge-based learning outcomes.

Technology management is a reasonable concept when the student has technological courses in addition to the management and economics courses, if the courses are linked to basic premises for technology. Without these courses, most students are unable to make the connection between technology and management required for proper use of the concept.

One example of such attempts at linking the technology and management courses is seen in:

S1) The candidate has acquired advanced analytical skills in technology management and innovation and has expanded the knowledge acquired in his/her bachelor's degree in relation to that.

However, the actual analytical skills that are specific to technology management need to be specified to a more extensive degree.

K5 specifies that: *"The candidate has gained an up-to-date understanding of the field in regard to the process of assessing the commercial potential of new technology and of bringing new technology to the market and to the public sector."*

We agree that this is a crucial point for any company. The current challenge of many companies is exactly to focus on the commercial potential – and to execute the technological development towards the market. The first aspect of the commercial potential is a methodological (also skill-based) component, which is also included in S2. The courses that hold methodological content are MOØ223, but this course focuses on research design aimed for the master thesis, and hence does not support the S2 and K5.

One comment relating to the general competence; we find that the formulation may fit different programs, and even programs that are not related to technology or natural sciences. The formulation mainly specifies; *a broad spectrum of managerial challenges*, whereas there is no mentioning of the technology component. We find that the overall aim and competence of the program is under-developed in its current formulation.

The description of the "*General competence: The candidates should be able to handle and to analyse a broad spectrum of managerial challenges"* also point to the broadness of managerial challenges. We wish to see a stronger focus on particular innovation-related and innovation-driven challenges that more specifically tackle the explicit managerial challenges in technology-based firms.

We find it crucial that the master thesis is better linked to the learning outcomes. Currently, the master thesis is only related to K4 and S1, which we find clearly insufficient. The master thesis should ideally related to all knowledge-based outcomes and clearly also more of the skill-based outcomes.

Conclusion

NO, the learning outcomes are not suited to the content and intentions of the program and do not sufficiently reflects the requirements specified in the National Qualification Framework for the Master level (level 7).

The school must more clearly relate the learning outcomes to the content of the study program. In particular, we emphasize the technology concept as needing more grounding conceptually, in the program description and hence in the description of the learning outcomes. Particularly, we request that:

- Bergen University College adapt the mentioned learning goals and the competence description to emphasize the technology and technology management components.
- Bergen University College change learning outcomes and course contents to reflect all phases of the technology development including commercialization.
- Bergen University College must align the learning outcomes with the requirements of the National Qualification Framework for the Master level (level 7) by stressing the two other components of the students abilities to apply knowledge obtained on new fields of knowledge and the ability of students to analyse problems.
- Bergen University College must reconsider the link between the master thesis and the learning outcomes and ensure a better integration.

7-2 3. Studiets innhold og oppbygning skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

Assessment

In general, the structure of the courses reflects an emphasis on technology and management. If the learning outcomes are changed, the praxis period is re-considered, and a suitable understanding of technology as such is incorporated as suggested above, the structure is suitable for the program.

The committee appreciates the incorporation of practice based elements as described in Practical Innovation Management MOØ224. We find that practice is important for understanding innovation and technology development in businesses.

We further find that the stay at Gründerskolen is another important element. However, this component is giving the students too many ECTS for a limited little theoretical work (too few hours of teaching and work during the stay) as compared to the other elements in the study program. We therefore suggest that these two components are revised to strengthen the practice components in MOØ224 or that the stay at Gründerskolen is altered to contain more student work or alternatively is replaced by a different program with more work (and then the ECTS values are maintained). In brief, we find it necessary to balance the two components with regards to content, ECTS points and expected work effort by the students.

The component of MOØ222 is expected to be given by Rice University (see Diploma Supplement 6.1 and agreement in Appendix 6) and presents the core content of the technology management aspects of the study program. The contents of this item are core for achieving K2 and K3 according to section 2.3.4, but we find that the contents outlined in appendix 6 are poorly aligned with the learning outcomes K2 and K3. Hence, we question whether the study program can really provide the students with the necessary competencies and skills in technology management. We recommend that the Bergen University College develops and offers the course in Bergen and considers the course a core activity requiring strong control by the core faculty members.

Finally, the institution describes the extent of independent work. This section states that there will be training in independent work prior to the master thesis, but we cannot see how this is done, or which course(s) that are expected to support this. Further, the description of the master thesis (page 72 in the report) does not focus on the independent work nor on the cross disciplinary approach of the program.

Conclusion

NO, the structure of the program needs some adjustment to become aligned with the learning outcomes.

- The proposed adjustment of learning outcomes must be undertaken, and the practice-based components are adjusted according to the comments made above.
- Bergen University College must develop the course MOØ222 and aligns the course with the intention described also in K4.

7-2 4. Arbeids- og undervisningsformer skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

Assessment

In regards to the master thesis, we find that the teaching and supervision approach is more standard than what could be expected from a program with this level of ambition. We find that supervision is a crucial element, but as mentioned earlier we would appreciate a coupling with the course MOØ224, preferably also MOØ223 (towards practical commercialization issues), in ensuring a strong practice-oriented component as empirical foundation for the thesis. This coupling would also allow the students to demonstrate a strong ability to integrate and analyse problems (from knowledge-based learning outcomes) with the skills to carry out the actual and required empirical analysis. Hence, knowledge, skills and methodological abilities would more clearly be aligned and integrated.

The study program describes a special focus on cross-disciplinarity and the need to integrate across from engineering (technology) to management. However, the assumption seems to be that bringing these subject fields together in one program will also ensure actual cross-disciplinarity. However, we find that the approaches to facilitate such cross-disciplinarity need to be decided and described. E.g. having two engineering electives does neither bring the content nor the students together with for instance the innovation theory and innovation management subjects (see also K4). Hence, we find that such aims must be facilitated through the teaching pedagogics and course content – like in common projects, seminars, in the field work, or similar measures.

The course MOØ224 may enable such cross-disciplinary work (as described in application on page 34), but it is not demanded from the course description.

We find that the inclusion of Gründerskolen is also an innovative attempt at bringing in new pedagogical methods. We appreciate any attempts at developing further innovative pedagogical methods for the Faculty to demonstrate a strong dedication to also be innovative in the teaching and pedagogical approaches that the students are exposed to. This is however just a suggestion to be considered in the further development of the program.

Conclusion

NO, we find that the Bergen University College needs to investigate and develop the teaching pedagogics for the master thesis in light of the discussion of the previous practice elements and to develop the cross-disciplinary nature of the program.

- Bergen University College must develop appropriate pedagogics for the master thesis to ensure integration of knowledge-based and skill-based outcomes with choice of appropriate methodological approaches.
- Bergen University College must consider how to ensure cross-disciplinarity among the courses to ensure that the students are meeting actual differences in courses, methods and approaches so that they experience the difficulties in cross-disciplinarity work and studies.

7-2 5. Eksamensordninger og andre vurderingsformer skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet for studiet oppnås.

Assessment

Oral and written exams in addition to written reports individually as well as in groups give the staff a sufficient set of evaluation approaches to evaluate the students. Exam forms also seems well suited to the individual character of each course, and at the same time all important forms of evaluation is used at least once in the program as a whole.

In light of the comments made above on the pedagogical approach for the master thesis, we find that the exam form should also be re-considered in light of the changed pedagogical approach in particular if the practice-elements are better integrated in the work.

Conclusion

YES, the exam and evaluation forms are well suited to the learning outcomes of the program, and at the same time harmonize well with the individual character of each course.

- We suggest that the exam form for the master thesis may be adapted according to the adjustments of the learning outcomes.

7-2 6. Studiet skal ha en tydelig faglig relevans for arbeidsliv og/eller videre studier.

Assessment

The program focuses on providing the students with a cross-disciplinary perspective on technology and management. We find that the focus is appropriate and relevant for both existing industrial companies as well as for start-up companies. We find that the examples provided for possible positions are formulated rather broadly. Hence, we encourage Bergen University College to engage with the local businesses, when establishing the collaboration agreements with the businesses for the MOØ224 course, to also discuss in more detail the possible jobs for these students. We find that the program as of yet is focusing intensely on traditional industrial firms (product-based), and we

encourage the school to also emphasize if possible service aspects of the industrial spectrum in Norway.

With regards to the further studies, the relevant ones are at the PhD-level. In the university sector in general, there has been an increasing focus on cross-disciplinary research, but it may be a challenge for the students to identify a relevant research environment that appreciates such a master background. But there is a variety of research groups that are increasingly emphasizing cross-disciplinarity so we do not find the cross-disciplinarity a barrier for further studies.

Conclusion

YES, the criterion is fulfilled.

- Bergen University College is encouraged to investigate in more detail the potential jobs that these students may undertake, and possibly develop additional electives if required by companies or businesses.

7-2 7. Studiet skal ha tilfredsstillende kopling til forskning, faglig og/eller kunstnerisk utviklingsarbeid, tilpasset studiets nivå, omfang og egenart.

Assessment

The research focus of the staff seems to be directed towards innovation management in different forms and across different analytical levels and with staff coming broadly from social sciences.

Hence, with professors and associate professors that are involved in the program that have very limited technological background, we question the focus on technology and the ability of the associated researchers to support these aspects within the program. Most, if not all faculty members, come from a background in economics and/or administration. We have received the CV of the recent hired professor for the program. Her profile strongly supports the innovation management aspects as described in e.g. the courses MOØ210, MOØ216 and MOØ224. On the other hand, as mentioned earlier, we are sceptical about the involvement of the technology side in the program. We find that the social science dimensions and aspects are strongly and convincingly included, but that the technology side is questionable. As mentioned earlier, we encourage that the courses on technology aspects are more clearly integrated into the program. On the staffing side, we encourage, equally important, that these are involved more directly in the planning and execution of the program.

The possible inclusion of students in the ongoing research projects is discussed in this section of the application. We find that this is appropriate leaving the students to choose between a more research-oriented thesis through such inclusion, or alternatively a more practice-oriented approach (as discussed earlier in this report) serving the students different interests.

Conclusion

NO, the criterion is not sufficiently fulfilled.

- The program must more clearly integrate researchers from the technology research areas in the program to ensure that the technology components are strengthened, that the cross-disciplinarity is facilitated, and that the students are involved directly in research programs that are core to the content of their bachelor that they bring into this program.

7-2 8. Studiet skal ha ordninger for studentutveksling og internasjonalisering relevant for studiets nivå, omfang og egenart.

Assessment

The visit to Gründerskolen (MOØ220/221) or the use of the Bergen option (MOØ225/226) is a central part of the second semester. For the reviewers, it seems as if both options; Grunderskolen or the Bergen option, are too light in theoretical knowledge to defend the size of 20 ECTS. In particular, from the agreement provided for Gründerskolen, it seems as if the capacity at Gründerskolen is too low to support all the programs that intend to use Gründerskolen (this point was also raised earlier). Finally, it is not well explained how the students choose between the options, what the minimum number of students to send are, and how these minimum requirements may influence on the learning environment.

Since the Gründerskolen is the main form of exchange with other universities and the Bergen University College cannot support exchange through a variety of relevant exchange agreements. We find that it should be possible for the students to seek other perhaps more research-oriented exchange opportunities through existing programs. Currently, the program is rather "closed" in its approach to exchange options. Perhaps, the current faculty can develop further options for the students through their existing research contacts within ongoing research programs.

A second important component in the program is the practice-based component in MOØ224, where the students are placed in private companies for a shorter period. We find this an interesting component and encourage (as mentioned above) that this is further developed and preferably also is awarded more time and ECTS. The reasons are that it takes time to get into a new working environment especially for an untrained student. Hence to really benefit from the practice-periods in the company, we find that the duration must be increased and the outcomes are specified more clearly by forming specific agreements with the involved companies.

Conclusion

NO, the study program looks as if it may satisfy the criteria, but the assessment committee is in doubt about whether Gründerskolen can actually fulfil the role that is required to award the study points. Also, we lack descriptions and actual agreements as alternatives to Gründerskolen. We also find that the program should be able to offer further opportunities for international exchange also emphasizing the research interests of the students.

- Bergen University College needs to explain what alternatives exist to Gründerskolen, and also needs link to the earlier comment on the re-evaluation of the ECTS credits given to Gründerskolen and the practice-period.

- Bergen University College must develop and document further options for the students to pursue international student exchange evidently linked to the course requirements on the second semester.

7-2 9. Studiet skal ha lokaler, bibliotekstjenester, administrative og tekniske tjenester, IKT-ressurser og arbeidsforhold for studentene, som er tilpasset studiet.

Assessment

According to the provided information, the students will have access to facilities and infrastructure at the main campus of Bergen University College. We find it positive that a student coordinator will be appointed to ensure coordination, supervision etc. We also emphasize the student incubator for the students interested in working with an own company, although such facilities usually require substantial senior involvement, which cannot be seen from the description. For international exchange, the agreement governing Gründerskolen in Houston seems to secure sufficient infrastructure for students staying there. The reviewers assume that Bergen University College will cover this point in similar agreements with other exchange universities.

Conclusion

YES, the students in this study program seem to have access to infrastructure relevant for the study program.

- Bergen University College is encouraged to ensure that infrastructure needs are covered in agreements with future exchange universities.
- Bergen University College is further encouraged to ensure enough resources for those students that may wish to be involved in the student incubator both to ensure study progress and relevant development of the idea.

4.3 Fagmiljø tilknyttet studiet

7-3 1. Fagmiljøets sammensetning, størrelse og samlede kompetanse skal være tilpasset studiet slik det er beskrevet i plan for studiet og samtidig tilstrekkelig for å ivareta den forskning og det faglige eller kunstneriske utviklingsarbeidet som utføres.

Assessment

Bergen University College has recently recruited a professor to handle the program. The committee has subsequent to the reception of the program descriptions obtained the CV of the professor. The professor has a background as PhD in business economics from University of Nordland and a PhD in entrepreneurship from Kiev. The CV supports that the professor research-wise focuses on economic, collaborative, and managerial aspects of innovation and entrepreneurship. However, based on the CV and publication list, it becomes similarly apparent that the professor has no relevant engineering

background that can support the technology aspects of the natural science program. The other associated researchers have similar backgrounds in social sciences. One exception is a civil engineer within energy and environment.

In general, we find that a relative high share of research is oriented towards geography and clustering, whereas we find the share of researchers focusing on firms' product development and innovation activities comparatively limited. With the hire of the new professor this share goes up, but it is still relevant for the program to hire or involve a researcher with a background in e.g. product development techniques and methods towards design and prototyping to enable the full understanding of the fundamental principles of innovation processes.

As mentioned earlier, we would recommend that the researchers in the engineering research environments are more closely integrated in the program. One path for such involvement could be to engage in cross-disciplinary research programs to facilitate also faculty cross-disciplinarity to a higher degree.

Based on the qualifications of the involved faculty members we find that the supervision and teaching competencies for the aspects related to social sciences are sufficient, whereas the involvement of the engineering competencies is less obvious.

Conclusion

NO, we find that the engineering competencies are insufficiently described and involved in the program. Given the information in the application, we cannot assess the quality and involvement of the engineering (i.e. technology) research environments at the school.

- Bergen University College must describe how the technology environments are involved and how cross-faculty interaction is facilitated for the students engagement. If the environments are only involved in the form where students sit in in existing courses, we strongly recommend that further involvement is established and ensured over the duration of the study program. In particular, we find it crucial that the students are involved during their entire program to support their work on engineering-related master thesis projects.

7-3 2. Fagmiljøet skal delta aktivt i nasjonale og internasjonale samarbeid og nettverk relevante for studiet.

Assessment

The faculty has close links to similar programs and research groups at several other universities and university colleges, and in particular the collaboration with Gründerskolen. Further, the researchers are active in a number of international project-based research projects, which may stimulate further collaboration. For each of the three pillars (innovation and entrepreneurship; technology management and organization; and technology subjects) a number of projects with international cooperation aspects are mentioned. E.g. innovation processes in companies and networks, where collaboration is established with the University of Agder and NORUT. As has been mentioned several times, the less obvious integration of the engineering environments also plays out in relationship to these

environments further involvement and specification of their involvement. We find that this specification required above, will also lead to a further specification on the relevance and inclusion of the research network.

Conclusion

YES, the faculty has sufficient links to national and international research groups to be able to fulfill this criterion.

- We further refer to the previous points on integration of the engineering research environments to substantiate their involvement and hence the involvement of their networks.

7-3 3. Minst 50 prosent av årsverkene knyttet til studiet skal utgjøres av tilsatte i hovedstilling ved institusjonen. Av disse skal det være personer med minst førstestillingskompetanse i de sentrale delene av studiet.

For de ulike sykler gjelder i tillegg:

a. For første syklus skal minst 20 prosent av det samlede fagmiljøet være ansatte med førstestillingskompetanse

b. For andre syklus skal minst 10 prosent av det samlede fagmiljøet være professorer eller dosenter og ytterligere 40 prosent være ansatte med førstestillingskompetanse.

Assessment

The faculty is of sufficient capacity, and has the required quality in the crucial fields of innovation and entrepreneurship. Though more of the staff should have engineering background, the criteria that at least one of the academic staff has at least "førstestillingskompetanse" in the core part of the program is fulfilled. At least 50 per cent of the academic FTEs (full-time equivalent) allotted to the provision are members of the institution's own academic staff. According to table 3a (MTI subjects), 29 per cent of the relevant discipline community are full professors/dosent, and 93 per cent are associate professors (førstestillingskompetanse).

Conclusion

YES, the faculty fulfils this criterion.

7-3 4. Fagmiljøet skal drive aktiv forskning, faglig- og/eller kunstnerisk utviklingsarbeid.

For de ulike sykler gjelder i tillegg:

a. For første syklus skal fagmiljøet ha dokumenterte resultater på et nivå som er tilfredsstillende for studiets innhold og nivå.

b. For andre syklus skal fagmiljøet ha dokumenterte resultater på høyt nivå.

The faculty has been successful in acquiring research grants for their key areas, and also has been able to publish recently in scientific journals. The application demonstrates (table 15) that the staff has published a number of articles on level 2, however we find that there is a substantial focus on geography of innovation and less on innovation management and innovation processes. We encourage the researchers (along with the previous comment on program subjects) to also pursue research (or hire in) on innovation processes. For the technology subjects we notice one substantial publication in Science. Three further publications around one of the researchers show a more sparse publication pattern on the technology subjects. We find that the specification required above on the integration of the engineering research will also lead to a further specification on the relevance of the publication patterns.

Conclusion

YES, the faculty staff fulfils this criterion.

- We further refer to the previous points on integration of the engineering research environments to substantiate their involvement and hence the extent of their research publications.

7-3 5. For studier med praksis skal fagmiljøet og eksterne praksisveiledere ha hensiktsmessig erfaring fra praksisfeltet.

Assessment

The program has two practice parts, Gründerskolen or Bergen and the company-placement course in the third semester. Gründerskolen has well qualified faculty staff with experience with the practice field, so this should not represent a problem. For the Bergen option, the Bergen University College has a number of experienced internal supervisors with substantial experience from praxis. However, since we do not know if alternatives to the Gründerskolen are established, Bergen University College needs to make sure that any alternatives to Gründerskolen also fulfils this criterion. The staff also has experience with the company-placement course from a sister program. For the practice-components the program appoints a supervisor from each company. Since the company agreements are not formalized as of yet (see previous point as well), this criterion should be followed through in those arrangements.

Conclusion

YES, the staff fulfils this criterion.

- Bergen University College should make sure that the universities they cooperate with in the future can document sufficient experience with the practice field to continue to fulfil this criterion.
- Bergen University College should make sure that the company advisors are also experienced in supervision for the master level, and that they are fully acknowledging the content and scope of the program.

5 Conclusion

Based on the above assessments and conclusions on the single dimensions relating to the application: "*Søknad om akkreditering: Master i ledelse av teknologi og innovasjon – realfaglig retning"* the committee concludes the following:

The Committee does not recommend accreditation of the *Master i ledelse av teknologi og innovasjon – realfaglig retning* at Bergen University College.

The expert assessment states which demands the institution is required to meet in order to achieve accreditation. In addition, the committee has provided advice for the further development of this educational provision.

The following criterias are not met:

7-1 4. For studier med praksis skal det foreligge tilfredsstillende avtaler som regulerer vesentlige forhold av betydning for studentene.

7-2 1. Studiet skal ha et dekkende navn.

7-2 2. Studiet skal beskrives gjennom krav til læringsutbytte, jf. Nasjonalt kvalifikasjonsrammeverk for livslang læring. Det skal formuleres ett totalt læringsutbytte for hvert studium, definert i kunnskap, ferdigheter og generell kompetanse.

7-2 3. Studiets innhold og oppbygning skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

7-2 4. Arbeids- og undervisingsformer skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

7-2 7. Studiet skal ha tilfredsstillende kopling til forskning, faglig og/eller kunstnerisk utviklingsarbeid, tilpasset studiets nivå, omfang og egenart.

7-2 8. Studiet skal ha ordninger for studentutveksling og internasjonalisering relevant for studiets nivå, omfang og egenart.

7-3 1. Fagmiljøets sammensetning, størrelse og samlede kompetanse skal være tilpasset studiet slik det er beskrevet i plan for studiet og samtidig tilstrekkelig for å ivareta den forskning og det faglige eller kunstneriske utviklingsarbeidet som utføres.

The following demands must be met in order to achieve accreditation:

- Bergen University College is required to ensure that the sketched agreement with Gründerskolen is linked directly to the program and the links with the companies become sufficiently established.
- Bergen University College is required to ensure that if the first point is not possible an alternative agreement should be secured with a similar program.
- Bergen University College is required to ensure that agreements are made with companies for guaranteeing the practice aspects with the companies for the students and that these agreements clearly regulate and specify expectations and deliverables on both sides.
- Bergen University College must reconsider and define the fundamental conceptualization of "technology".
- Bergen University College must define how technology is integrated at the course level and specify the links between the innovation and technology courses.
- Bergen University College must describe the explicit involvement of the engineering research environments within the school, and link to the competencies of the associated professors.
- Bergen University College is requested to adapt the mentioned learning goals and the competence description to emphasize the technology and technology management component.
- Bergen University College is requested to change learning outcomes and course contents to reflect all phases of the technology development including commercialization.
- Bergen University College must align the learning outcomes with the requirements of the National Qualification Framework for the Master level (level 7) by stressing the two other components of the students abilities to apply knowledge obtained on new fields of knowledge and the ability of students to analyse problems.
- Bergen University College must reconsider the link between the master thesis and the learning outcomes and ensure a better integration.
- The proposed adjustment of learning outcomes must be undertaken, and the practice-based components are adjusted according to the comments made above.
- Bergen University College must develop the course MOØ222 and aligns the course with the intention described also in K4.
- Bergen University College must develop appropriate pedagogics for the master thesis to ensure integration of knowledge-based and skill-based outcomes with choice of appropriate methodological approaches.
- Bergen University College must consider how to ensure cross-disciplinarity among the courses to ensure that the students are meeting actual differences in courses, methods and approaches so that they experience the difficulties in cross-disciplinarity work and studies.

- The program must more clearly integrate researchers from the technology research areas in the program to ensure that the technology components are strengthened, that the cross-disciplinarity is facilitated, and that the students are involved directly in research programs that are core to the content of their bachelor that they bring into this program.
- Bergen University College needs to explain what alternatives exist to Gründerskolen, and also needs link to the earlier comment on the re-evaluation of the ECTS credits given to Gründerskolen and the practice-period.
- Bergen University College must develop and document further options for the students to pursue international student exchange evidently linked to the course requirements on the second semester.
- Bergen University College must describe how the technology environments are involved and how cross-faculty interaction is facilitated for the students engagement. If the environments are only involved in the form where students sit in in existing courses, we strongly recommend that further involvement is established and ensured over the duration of the study program. In particular, we find it crucial that the students are involved during their entire program to support their work on engineering-related master thesis projects.

The committee offers the following advice to develop this educational provision further:

- The Bergen University College is advised to adjust the "Vitnemål" and Diploma Supplement as described in the assessment.
- Bergen University College needs to more carefully address the challenges in the regulation of master's degree as mentioned above – concerning admission requirements and in particular with reference to the ambition of cross-disciplinarity.
- We recommend Bergen University College to look at the recruitment policy, and we emphasize the need to recruit either from a smaller number of engineering disciplines or to involve the engineering centers more directly in the program execution (and perhaps even development).
- We recommend that Bergen University College further outlines an explicit strategy to organize for cross-disciplinarity focusing on the learning environment from a diversity management perspective.
- We recommend that guidelines and procedures are developed for how to integrate and handle the practice periods.

- We suggest that the exam form for the master thesis may be adapted according to the adjustments of the learning outcomes.
- Bergen University College is encouraged to investigate in more detail the potential jobs that these students may undertake, and possibly develop additional electives if required by companies or businesses.
- Bergen University College is encouraged to ensure that infrastructure needs are covered in agreements with future exchange universities.
- Bergen University College is further encouraged to ensure enough resources for those students that may wish to be involved in the student incubator both to ensure study progress and relevant development of the idea.
- We further refer to the previous points on integration of the engineering research environments to substantiate their involvement and hence the involvement of their networks.
- Bergen University College should make sure that the universities they cooperate with in the future can document sufficient experience with the practice field to continue to fulfill this criterion.
- Bergen University College should make sure that the company advisors are also experienced in supervision for the master level, and that they are fully acknowledging the content and scope of the program.

6 Commentary from the institution

Bergen University College's comments to the report was received on 22 January 2014. There were 13 attachments to the main document. The comments is only in Norwegian, and will not be translated.

Overordnet kommentar – Master i ledelse av teknologi og innovasjon – realfaglig retning

Denne masteren er en videreutvikling av et studium som allerede eksisterer og fungerer meget bra. Det ble opprettet (egenakkreditert) av UiO i 2009 og HiB fikk det akkreditert som en fellesmaster i 2011 (Vedlegg 1 og 2). Den gang var tilbakemeldingene fra faglig kommisjon svært positive og vi ble oppfordret til å videreutvikle mastergraden og utvide opptaksgrunnlaget. Endringene som er foretatt i programmet i forbindelse med tilpasning til retningslinjene ved avdelingen, er etter vår mening en klar forbedring av opplegget og i tråd med NOKUTs anbefaling i 2011. Ikke minst betyr delingen av Teknologiledelse og Forskningsdesign i 3. semester en ryddigere grenseoppgang mellom de to fagområdene, samt at de økes med til sammen 5 studiepoeng.

Vi opplever at klassemiljøet i den pågående mastergraden (IET) er svært godt og har lite frafall. Oppstartsseminar, felles lesesal, opphold på Gründerskolen og masterseminar bidrar til dette. Vi ser også at studentene har gode praksisplasser i 3. semester, interessante problemstillinger for masteroppgaven og at de får jobb etterpå. Vi vil også presisere at IET-studiet vil bli lagt ned dersom vi får egenakkreditering for masterstudiet i Ledelse av teknologi og innovasjon – realfaglig retning.
I teksten under viser vi hvordan vi vil innfri anbefalingene fra faglig komite. Vedlegg 3 og 4 viser oppdatert «Vitnemål» og Diploma Supplement:

7-1 4 Avtaler om Praksisplasser

Vedlegg 5 dokumenterer avtaler om praksisplasser (vedlegg 5). Gjennom vårt tette samarbeid med regionale næringsklynger har vi tilgang til rundt 150 virksomheter og kan tilby praksis tilpasset hver enkelt students faglige bakgrunn, ønsker og behov. Vi mener derfor at ikke alle praksisplasser kan eller bør forhåndsdefineres. HiB ved Senter for nyskaping har etablert svært nære relasjoner til sentrale næringsklynger i regionen. Disse er NCE Subsea, MediArena og Maritim Cleantech West. NCE Subsea med om lag 130 bedriftsmedlemmer var også en pådriver for etableringen av studiet fra et tidlig tidspunkt. Dette samarbeidet er også en del av innovasjonsprogrammet Accel der våre masterstudenter deltar og som Høgskolen i Bergen driver sammen med Bergen Teknologioverføring AS. De sentrale bedriftene i de nevnte næringsklyngene har gjennom Accel programmet også tatt i mot studenter i tillegg til å bidra i innovasjonsprogrammet.
Vi tar etter anbefaling fra faglig kommisjon sikte på å utvide praksisperioden i 3. semester til 5-6 uker (Emne MOØ224)

7-2 1 Studiet skal ha et dekkende navn

Vi mener det vil være galt å endre mastergradens navn, da vi ønsker å beholde henvisningen til vår nære kunnskapskobling til ingeniørfagene og vår tunge utdanningsportefølje innen organisering og ledelse. På utdanningssiden er masteren er en hovedsatsing innen Avdeling for Ingeniørutdanning (AI) ved HiB. På forskningssiden er innovasjon og teknologiledelse blant de høyest prioriterte områdene (Vedlegg 6). HiB har fått akkreditert en fellesmaster med UiO med tittel «Innovation and Entrepreneurship / Teknologi innen innovasjon og entreprenørskap». I søknaden som denne merknaden gjelder, er teknologiledelsesinnslaget ved masteren utvidet i forhold til den vi alt har fått godkjent.
Teknologiledelse er i forsknings- og læreboktradisjonen gitt svært ulike definisjoner. To hovedtrender skiller seg likevel ut. Det er brukt som over- eller metabegrep for fagtradisjonene økonomi, innovasjon/entreprenørskap og organisasjon og ledelse. Dette er bl.a. vist i to nyere læreverk som er utgitt i Norge: Teknologiledelse (Torvatn, 2012) og Teknologiledelse. Innovasjon – Økonomi – organisasjon (Sending mfl., 2013). Den andre forståelsen er snevrere og dekker organisering og ledelsesfunksjoner i teknologibedrifter eller deler av virksomheter der den teknologiske dimensjonen

står sentralt (Skauge, 2011). Begge definisjonene er i overensstemmelse med faglig forankring i andre studier som bruker begrepet teknologiledelse. Det er den siste forståelsen som er lagt til grunn for emne MOØ222. I tittelen på studiet legger vi oss på den første definisjonen, men velger å synliggjøre den store innovasjonskomponenten i studiet særskilt.
Innovasjon og entreprenørskap står sentralt i enhver teknologibedrift i våre dager, da det vil være helt nødvendig for å videreutvikle virksomheten, men dette er ikke alt. En dyktig leder i en teknologibedrift må også ha forståelse for og kunnskaper om produksjon og produksjonsprosesser, organisering av virksomheter, strategiske- og økonomiske vurderinger, markedsanalyser prosjektledelse og ledelse mer generelt. Dette er et krav til to-hendig ledelse for både teknologisk fornying, forbedring og stabilitet.

Integrasjon av teknologi- og mti-kursene :
HiB er en stor høyskole med mange forskjellige bachelorprogrammer som vi ønsker skal rekruttere inn mot den omsøkte masteren. Vi kan ikke opprette egne fag for bare et par studenter og er derfor avhengig av at studenter fra andre masterprogrammer kan ta de samme fagene. Valgfagene er allikevel ikke tilfeldige, det ligger en bevisst plan bak hva studenter med en gitt bakgrunn skal velge og hvordan de skal utvikle seg faglig underveis i studiet. Poenget er at studentene skal få bygge videre på spesialiteten sin fra bachelorgraden, slik at de får styrket en profil/basis som kan brukes videre i innovasjonsfagene og i forbindelse med utplasseringene og masteroppgaven

Samarbeid med ingeniørinstituttene og lenke til kompetansene til tilhørende fagpersonale
Se kommentar under punkt 7-3 1.

7-2 2 og 7-2 3 Læringsutbytter
Vi har etter kommisjonens anbefaling justert læringsutbyttene til studiet, se vedlegg 8

De kommentarene som omhandler kurs MOØ222 må være en misforståelse, da dette er fagkoden til Technology Management som skal undervises av HiB på HiB i 3. semester. MOØ222 er en videreføring av MOØ204 som er en del av 3. semester i fellesmasteren. Kurset fra IET-masteren skal deles og utvikles videre slik at teknologiledelse får en bredere plass i det nye programmet. MOØ222 er beskrevet på side 66 i Vedlegg 9.

7-2.4 Arbeids og undervisningsformer skal samsvare med læringsutbyttene
Masteroppgaven skal være et selvstendig arbeide under veiledning. Vi mener kvalitetsrammeverkets føringer er inkludert i de fagspesifikke læringsutbyttene (Vedlegg 9, s 72), og at endringer i de overordnede læringsutbyttene nå også ivaretar dette (Vedlegg 8).
For å sikre koblingen mellom studentenes tekniske kompetanse og MTI-fagene, anbefales studentene å skrive tverrfaglige masteroppgaver. De tildeles i så fall 2 veiledere, både fra den tekniske og den

innovasjons-/ledelsesmessige siden av fagstaben og begge veilederne samarbeider med studenten for å få et godt resultat.

7.2.7 Kopling til forskning

Fagkomiteen etterlyser mer tverrfaglig forskning og tettere koblinger mellom teknologifagene og samfunnsfagene. Vi deler komiteens oppfatning om at koblingene kunne være tettere, men samtidig vil vi understreke at slik tverrfaglig jobbing er særdeles krevende og at det tar tid å utvikle en kultur for tverrfaglighet. Vi er imidlertid bevisst på at dette er nødvendig og vi har den siste tiden iverksatt flere prosesser for å styrke vår tverrfaglighet. For det første har vi under utvikling et stort tverrfaglig forskningsprosjekt med tittelen «Green innovation practice: New delopment paths in Norwegian salmon farming», som både skal analysere teknologiutvikling, teknologimplementering og teknologi/innovasjonsledelse. Her deltar fagpersoner både fra teknologifagene og samfunnsfagene, og prosjektet vil søke om finansiering i SHP-programmet i Forskningsrådet. Videre har vi et nylig iverksatte forsknings- og utviklingsprosjekt, «Kompetanseutvikling i CNC og robot-næringsmiljøet i Hordaland», som har en tydelig tverrfaglig innretning. Vi vil også understreke at det nye doktorgradsprogrammet som er under utvikling ved HiB, «Innovasjonspraksis i et profesjons- og samfunnsperspektiv», er en tverrfaglig satsing. Komiteen etterlyser også masteroppgaver som har tydeligere relasjoner mot teknologifagene. Også her har vi sett en positiv utvikling innenfor fellesmasteren de siste årene. Eksempelvis hadde 3 av oppgavene som ble levert inn våren 2013 veiledere fra teknologifagene og var koblet mot veiledernes forskning.

7-2.8 Studentutveksling

I 2. semester legger vi opp til at studentene kan ta Gründerskolen i Houston med tilhørende opplegg. Det er også mulig for studentene å delta på utveksling i regi av ingeniørprofesjonen sin. Det siste er noe vi aldri har prøvd ut, men dersom det skulle være interesse for det, vil vi gå i dialog med den aktuelle institusjonen for å sikre at studentene får et tilfredsstillende opplegg også innenfor innovasjon og ledelse. Studenter som ikke har mulighet til å reise utenlands tilbys et eget opplegg i Bergen. For at det skal bli mest mulig likt de som reiser til Houston, har vi besluttet å endre fagstørrelsene til 2x10 studiepoeng også for de som følger opplegget i Bergen (MOØ220 og MOØ221), se vedlegg 3, 4 og 9.

Gründerskolen er et samarbeidsprosjekt mellom mange utdanningsinstitusjoner i Norge. Programmet koordineres av Senter for entreprenørskap (SFE) ved Universitetet i Oslo. Det er dette senteret vi i dag har en fellesmaster med og de plasserte allerede fra starten av Gründerskolen inn som en naturlig del av opplegget. SFE, ved leder Truls Erikson, har sagt seg positive til å fortsette dette også dersom vi skulle utvide opptaksgrunnlaget og/eller få egenakkrediterte mastergrader hvor dette er relevant. Gründerskolen er et veletablert og kvalitativt godt tilbud på mastergradsnivå og integrert i flere liknende masterprogram ved norske universitet (f.eks. ved NMBU og UiO). Gründerskolen har også mottatt ros

for sitt opplegg (Kunnskapsdepartementets pris for fremragende arbeid med utdanningskvalitet – utdanningskvalitetsprisen i 2007) og var også en sentral del av søknaden fra Senter for entreprenørskap ved UiO om status som Senter for fremragende utdanning der senteret kom til finaleni.
På NOKUTs søkerkurs i mai 2013 spurte vi spesifikt om opphold på Gründerskolen var akseptabelt med tanke på internasjonalisering og fikk et bekreftende svar på dette. Vi har hele tiden gått ut fra at dette også innebærer en aksept av de studiepoengene som deles ut gjennom opplegget.

7-3 1 Fagmiljøets sammensetning
Fagkomiteen er opptatt av at fagpersoner innenfor teknologi ikke er godt nok integrert i vårt masterprogram. Vår målsetning er å styrke programmets tverrfaglig og som vi poengterte under punkt 7.2.7. har vi satt i gang flere tiltak som skal fremme tverrfaglig forskning ved HiB og som vil være gunstig for masterprogrammet. Vi har også i økende grad fått fram masteroppgaver innenfor den pågående fellesmasteren som både har veileder fra teknologifag og fra samfunnsfagene. Videre har vi også satt i gang et program for å rekruttere inn fagpersoner i II'er-stillinger som skal knyttes til masterens fagmiljø. (Vedlegg 10). Vi vil her bevist søke etter kandidater med en tverrfaglig bakgrunn.

Konklusjon:

Vi vil understreke at det masterprogrammet vi nå søker om akkreditering for er en videreutvikling av et studium som allerede eksisterer og fungerer meget bra. Det ble opprettet (egenakkreditert) av UiO i 2009 og HiB fikk det akkreditert som en fellesmaster i 2011 (Vedlegg 1 og 2). Den gang var tilbakemeldingene fra NOKUTS faglige komite svært positive og vi ble oppfordret til å videreutvikle mastergraden. Den nye fagkomiteen har innvendingen på en del andre punkt enn den forrige komiteen og vi har gjennomgått disse. Flere av innvendingene er konstruktive og vi har justert våre planer i henhold til anbefalingene. Vi ber om at NOKUT gir HiB tillit til at vi kan starte opp dette mastertilbudet som en erstatning for vår eksisterende master for ingeniører som vi i dag har i samarbeid med UiO.

7 Expert Committee's additional evaluation

Assessment of the Commentary from the Institution

7-1 4. For studier med praksis skal det foreligge tilfredsstillende avtaler som regulerer vesentlige forhold av betydning for studentene.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, the condition is not fulfilled. Bergen University College is required to ensure that:

- *the sketched agreement with Gründerskolen is linked directly to the program and the links with the companies become sufficiently established.*
- *if the first point is not possible an alternative agreement should be secured with a similar program.*
- *agreements are made with companies for guaranteeing the practice aspects with the companies for the students and that these agreements clearly regulate and specify expectations and deliverables on both sides.*
- *Further, we recommend that a guidelines and procedures are developed for how to integrate and handle the practice periods.*

Assessment

In the attachments to the application from the institution, there are now included formal agreements with several companies. Although the number of companies still seems to be lower than the need (at least when the program is fully implemented), the committee finds that the formal contracts attached to the application shows that the institution has the necessary network among local industry to arrange for the practice period, and that additional practice places can be added when necessary. We cannot, however, see that quality assurance procedures have been developed for ensuring the quality of the practice period, as we asked for. We do, however, realize that the institution needs more time to develop these thoroughly, and we therefore accept this point, but advise that the institution develops such procedures before the start of the program. We also find that the relationship with Gründerskolen has been clarified and adjusted according to our recommendation.

Conclusion

- YES, nevertheless we advise the institution to develop and document quality assurance procedures to ensure the quality of the learning processes in and around the practice period.

7-2 1. Studiet skal ha et dekkende navn.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

No, the name of the program is not appropriate.

- *Bergen University College must reconsider and define the fundamental conceptualization of "technology"*
- *Bergen University College must define how technology is integrated at the course level and specify the links between the innovation and technology courses*
- *Bergen University College must describe the explicit involvement of the engineering research environments within the school, and link to the competencies of the associated professors.*
- *While addressing these requirements, we encourage Bergen University College to also consider the points made earlier on cross-disciplinarity.*

Assessment

The name has not been changed. The committee pointed to the problems with the technology concept in the evaluation and particularly requested a fundamental conceptualization of "technology". The committee does not find that the use of the technology management concept reflects the contents of the disciplines in the courses and the learning outcomes.

In the response of HiB to the four points the school mentions the book "Teknologiledelse" by Torvatn, and says that this book shows that technology management is a concept that covers economic and managerial topics applied to technological companies. It is correct that this book as well as other conceptualizations emphasize the managerial components of technology management, which naturally leads to a cross-disciplinary approach. We entirely agree with this point, and can only stress the importance of welcoming and facilitating a cross-disciplinary approach (as also pointed out in the evaluation of the original application). However, the point in this respect is the lack of concern for the actual technology component. The committee's reservations are exactly focused on the specific technology contents of the program and at the course levels. These are not addressed in the response.

We also do not find that the HiB has addressed issues two and three directly.

Conclusion

No, the criterion is not met.

- Bergen University College must define how technology is integrated at the course level and specify the links between the innovation and technology courses
- Bergen University College must describe the explicit involvement of the engineering research environments within the school, and link to the competencies of the associated professors.

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7-2 2. Studiet skal beskrives gjennom krav til læringsutbytte, jf. Nasjonalt kvalifikasjonsrammeverk for livslang læring. Det skal formuleres ett totalt læringsutbytte for hvert studium, definert i kunnskap, ferdigheter og generell kompetanse.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, the learning outcomes are not suited to the content and intentions of the program and do not sufficiently reflect the requirements specified in the National Qualification Framework for the Master level (level 7).

The school must more clearly relate the learning outcomes to the content of the study program. In particular, we emphasize the technology concept as needing more grounding conceptually, in the program description and hence in the description of the learning outcomes. Particularly, we request that:

- *Bergen University College adapts the mentioned learning goals and the competence description to emphasize the technology and technology management components.*
- *Bergen University College change learning outcomes and course contents to reflect all phases of the technology development including commercialization.*

- *Bergen University College must align the learning outcomes with the requirements of the National Qualification Framework for the Master level (level 7) by stressing the two other components of the students' abilities to apply knowledge obtained on new fields of knowledge and the ability of students to analyse problems.*
- *Bergen University College must reconsider the link between the master thesis and the learning outcomes and ensure a better integration.*

Assessment

We acknowledge the improvements in the learning outcomes K1, K2, and K3. However, we still find the recognition of the commercialization aspects of the innovation process as missing. In particular, we point to the problems in MO223 that only focus on research design for setting up the master thesis, whereas the skills and competencies for performing market analysis for new technologies are not addressed (i.e. focusing on all aspects including establishing the actual potential for commercialization of new technologies as mentioned in K5). Hence, bullet 2 has not been addressed.

In terms of S5 and S6 these are now better and accommodate our earlier criticism.

Conclusion

No, the criterion is not satisfactorily fulfilled.

- The committee does not find that Bergen University College has addressed bullet 2 from the previous conclusion and therefore re-emphasize that Bergen University College must change learning outcomes and course contents to reflect all phases of the technology development including commercialization, which implies re-investigating the contents of the courses that should contribute to K5 and ideally also S2. This is required to support that the students can in fact manage technology-based firms.

7-2 3. Studiets innhold og oppbygning skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, the structure of the program needs some adjustment to become aligned with the learning outcomes.

- *The proposed adjustment of learning outcomes must be undertaken, and the practice-based components are adjusted according to the comments made above.*
- *Bergen University College must develop the course MOØ222 and aligns the course with the intention described also in K4.*

Assessment

Bergen University College has adjusted the course points related to Gründerskolen as suggested. With regards to the practice period we see that the school has also decided to extend the period from 4 to 6 weeks, which we find positive and a step in the right direction although we would have appreciated an even further integration of the course into the program as it strengthens the problem-solving capabilities of the students.

Conclusion

No, we find that Bergen University College has not sufficiently accommodated the comments.

- Bergen University College must adjust the learning outcomes as described and is further recommended to consider a wider integration of the MOØ224 practice components into the program to strengthen the learning towards S5.

7-2 4. Arbeids- og undervisningsformer skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, we find that the Bergen University College needs to investigate and develop the teaching pedagogics for the master thesis in light of the discussion of the previous practice elements and to develop the cross-disciplinary nature of the program.

- *Bergen University College must develop appropriate pedagogics for the master thesis to ensure integration of knowledge-based and skill-based outcomes with choice of appropriate methodological approaches.*
- *Bergen University College must consider how to ensure cross-disciplinarity among the courses to ensure that the students are meeting actual differences in courses, methods and approaches so that they experience the difficulties in cross-disciplinarity work and studies.*

Assessment

Bergen University College argues that they recommend the students to write cross-disciplinary projects and in these cases assign two supervisors. We support that two supervisors is an appropriate solution when cross-disciplinary master theses are written. However, we do not find that a "recommendation" is sufficient to ensure a cross-disciplinary approach among the courses. Other schools experiment with two teachers in core courses – e.g. MOØ222 (Technology Management) or share teaching among different teachers that mutually challenge the perspectives using different methods or literatures. The experiences are that such active and strongly supported approaches are necessary to achieve the ambitions of cross-disciplinarity. Since such approaches are not discussed in the response, we do not find that Bergen University College has sufficiently considered in especially bullet 2, but also partly in bullet 1. The committee does not find that bullet point 2 has been addressed in the response.

Conclusion

No, the committee does not find that the criteria *teaching and student work must be suited for the achievement of intended learning outcomes, as expressed in the plan,* is satisfactorily achieved.

- Bergen University College must consider how to ensure cross-disciplinarity among the courses to ensure that the students are meeting actual differences in courses, methods and approaches so that they experience the difficulties in cross-disciplinarity work and studies.

7-2 7. Studiet skal ha tilfredsstillende kopling til forskning, faglig og/eller kunstnerisk utviklingsarbeid, tilpasset studiets nivå, omfang og egenart.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, the criterion is not sufficiently fulfilled.

- *The program must more clearly integrate researchers from the technology research areas in the program to ensure that the technology components are strengthened, that the cross-disciplinarity is facilitated, and that the students are involved directly in research programs that are core to the content of their bachelor that they bring into this program.*

Assessment

In the response from the university college, the institution shows that they have new research projects, which the committee finds positive. These projects carry clear cross-disciplinary implications and work, and will thereby expectedly strengthen the study programs connection to research in a good manner. If Bergen University College is successful in implementing the plans for a new PhD programme in innovation, the committee expects this to offer a positive contribution to further develop and strengthen the research and the competencies of the faculty/academic staff within this (cross-disciplinary) area. The committee stresses though that such efforts should not divert the focus from the development of the master programme.

Conclusion

Yes, we find that Bergen University College is successfully continuing the attempts at strengthening the cross-disciplinary approach on the research side and that students are actively included in these projects. We advise that these initiatives are further strengthened in the future.

7-2 8. Studiet skal ha ordninger for studentutveksling og internasjonalisering relevant for studiets nivå, omfang og egenart.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, the study program looks as if it may satisfy the criteria, but the assessment committee is in doubt about whether Gründerskolen can actually fulfil the role that is required to award the study points. Also, we lack descriptions and actual agreements as alternatives to Gründerskolen. We also find that the program should be able to offer further opportunities for international exchange also emphasizing the research interests of the students.

- *Bergen University College needs to explain what alternatives exist to Gründerskolen, and also needs link to the earlier comment on the re-evaluation of the ECTS credits given to Gründerskolen and the practice-period.*
- *Bergen University College must develop and document further options for the students to pursue international student exchange evidently linked to the course requirements on the second semester.*

Assessment

The institution has secured an agreement with Gründerskolen, which allows for expansion of the number of students coming from HiB, and as also changed the courses at their own institution to allow for a comparable alternative for students who cannot or will not go abroad. Thus, they have satisfied our comments. Also with respect to the ECTS credits, we are happy with the solutions found.

Conclusion
Yes, the exchange arrangement is solved organized in a satisfactory way.

7-3 1. Fagmiljøets sammensetning, størrelse og samlede kompetanse skal være tilpasset studiet slik det er beskrevet i plan for studiet og samtidig tilstrekkelig for å ivareta den forskning og det faglige eller kunstneriske utviklingsarbeidet som utføres.

In the assessment based on the application from the university college, we concluded that the following demands had to be met in order to fulfil the criteria:

NO, we find that the engineering competencies are insufficiently described and involved in the program. Given the information in the application, we cannot assess the quality and involvement of the engineering (i.e. technology) research environments at the school.

- *Bergen University College must describe how the technology environments are involved and how cross-faculty interaction is facilitated for the students engagement. If the environments are only involved in the form where students sit in in existing courses, we strongly recommend that further involvement is established and ensured over the duration of the study program. In particular, we find it crucial that the students are involved during their entire program to support their work on engineering-related master thesis projects.*

Assessment

The committee is aware of the challenges in building the right competencies for a program of a cross-disciplinary nature. Bergen University College has satisfactorily described measures to strengthen the cross-faculty interaction, which we find crucial to fully pursue and implement. The plan to hire researchers at different levels to ensure resources in this area is important. We are though concerned with the use of courses where the students are part of larger student groups, which may jeopardize their feeling of «belonging to the program». We find that the students are at risk in feeling marginal when sitting in on courses from other programs despite of the structural measures described in the response.

Conclusion

Yes, we find that the initiates are constructive and trust that the school will continue to develop the initiatives in the same direction.

- We strongly advise Bergen University College to offer specialized technology courses for these students alone.
- We further advise Bergen University College to carefully recruit research capacity along the suggested lines to develop the research base of the program.

Conclusion

Based on the written application "*Søknad om akkreditering: Master i ledelse av teknologi og innovasjon – realfaglig retning"* and the comments from Bergen University College to the expert assessment, the committee concludes the following:

The Committee does not recommend accreditation of the *Master i ledelse av teknologi og innovasjon – realfaglig retning* / MSc in Technology Management of Technology and Innovation – Natural Science Track at Bergen University College.

8 Decision[3]

Høgskolen i Bergen søkte til søknadsfristen fristen 1. september 2013 om akkreditering av mastergradsstudium i ledelse av teknologi og innovasjon – realfaglig retning ved Høgskolen i Bergen. De sakkyndige avga sin uttalelse i vurdering datert 19. desember 2013, med tilleggsvurdering av 12. mars 2014.

NOKUT har vurdert vilkårene i NOKUTs forskrift om tilsyn med utdanningskvaliteten i høyere utdanning av 28. februar 2013, og har etter dette truffet følgende **vedtak:**

Søknad om akkreditering av mastergradsstudium i ledelse av teknologi og innovasjon (120 studiepoeng) ved Høgskolen i Bergen avslås.

Begrunnelse for vedtaket

Følgende krav i forskrift om tilsyn med utdanningskvaliteten i høyere utdanning av 28. februar 2013 (studietilsynsforskriften) er ikke oppfylt:

7-2 Plan for studiet

Studiet skal ha dekkende navn.

Studiet skal beskrives gjennom krav til læringsutbytte, jf. Nasjonalt kvalifikasjonsrammeverk for livslang læring. Det skal formuleres ett totalt læringsutbytte for hvert studium, definert i kunnskap, ferdigheter og generell kompetanse.

Studiets innhold og oppbygning skal samsvare med og være tilpasset læringsutbyttebeskrivelse slik at læringsutbyttet oppnås

Studiets arbeidsformer skal samsvare med og være tilpasset læringsutbyttebeskrivelse slik at læringsutbyttet oppnås

9 Documentation

Høgskolen i Bergen - søknad om akkreditering av masterstudium i ledelse av teknologi og innovasjon - realfaglig retning, 29.08.2014, 13/4097 / 13/614-1

Oppdatert dokumentasjon - Høgskolen i Bergen - søknad om akkreditering av masterstudium i ledelse av teknologi og innovasjon - realfaglig retning, 27.11.2013, 13/5827 / 13/614-6

Kommentar til sakkyndig rapport - Høgskolen i Bergen - søknad om akkreditering av masterstudium i ledelse av teknologi og innovasjon - realfaglig retning, 22.01.2014, 14/322 / 13/614-8

[3] The decision is not translated into English, but in the letter informing the applicant of the decision, we write the following: "It is NOKUT's assessment that the conditions in NOKUT's Regulations concerning NOKUT's supervision and control of the quality of Norwegian higher education of 28 February 2013 are not met, and the master degree program in Management of Technology and Innovation – Natural Science track/ Ledelse av teknologi og innovasjon – realfaglig retning (120 studiepoeng/ECTS) at Bergen University College is not accredited.

10 Presentation of expert committee

Professor Mette Præst Knudsen, Syddansk universitet
Mette Knudsen Præst is Professor at the Department of Marketing & Management and Director of the Centre for Integrative Innovation Management at the University of Southern Denmark. Knudsen has PhD in Economics from Aalborg University in 1999. She teaches and is a researcher within the disciplines of product development, innovation in particular open innovation, collaborative innovation and attitudes to innovation, and sustainability. The Centre for Integrative Innovation Management is an interdisciplinary research unit established by the Faculty of Social Sciences and The Faculty of Engineering. Her experience with the pairing of the technical and the social sciences is relevant for the assessment of the application from Bergen University College. An overview of Knudsen's scientific and professional work can be found at the website of University of Southern Denmark: http://findresearcher.sdu.dk:8080/portal/da/person/mpk

Førsteamanuensis Tim Torvatn, Norges teknisk- og naturvitenskapelige universitet
Tim Torvatn is affiliated with the Department of Industrial Economics and Technology Management. He has dr.ing. in Industrial Economics and Technology Management (Productivity in industrial networks - a study of the Purchasing function) from NTNU (formerly NTH) in 1996. Torvatn has also a degree in Master of Business Administration from Queen's University Canada in 1991. He has taught at NTNU since 1995, and has since 2005 been program director at the Institute for Industrial Economics and Technology Management. He has relevant experience leading and developing studies / study programs in the field.