

NOKUTs tilsynsrapporter

# Brannsikkerhet (Fire Safety)

Master's degree at Høgskolen Stord/Haugesund (Stord  
Haugesund University College)

January 2015



NOKUT 

NOKUT kontrollerer og bidrar til kvalitetsutvikling ved lærestedene. Dette gjør vi blant annet gjennom å akkreditere nye utdanningstilbud. Institusjonene som gir høyere utdanning har ulike fullmakter til å opprette nye studier. Dersom en institusjon ønsker å opprette et utdanningstilbud utenfor fullmaktsområdet sitt, må den søke NOKUT om dette.

<b>Institution:</b>	Høgskolen Stord/Haugesund (Stord/Haugesund University College)
<b>Name of educational provision:</b>	Brannsikkerhet (Fire Safety)
<b>Degree/ECTS:</b>	Mastergrad (Master's degree) 120 studiepoeng/ECTS
<b>Mode of educational delivery:</b>	Campus/Heltid (Campus/Full time)
<b>Expert Committee:</b>	Lektor Anne Dederichs, Danmarks tekniske universitet (Technical University of Denmark) Professor Javad Barabady, Universitetet i Tromsø – Norges arktiske universitet (University of Tromsø – The Arctic University of Norway)
<b>Date of decision:</b>	23rd of January, 2015
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## Introduction

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 Master's Degree in Fire Safety at Stord/Haugesund University College. The expert evaluation in this report is part of the accreditation process following Stord/Haugesund University College's application for accreditation of master's degree in technical safety (the name of the educational provision was changed to master's degree in fire safety during the process) submitted before the application deadline on 1 February 2014. This report clearly indicates the extensive evaluation performed to ensure the educational quality of the planned educational provision.

Master's Degree in Fire Safety at Stord/Haugesund University College fulfils NOKUT's conditions for accreditation and is accredited by resolution of 23 January 2015.

This decision does not have limited validity in time. NOKUT will however make a subsequent supervision of the educational provision within three years.

Oslo, 23 January 2015

Terje Mørland  
Director general

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## 1 Information regarding the applicant institution

Stord/Haugesund University College has around 3200 students, and consists of two campuses: Stord and Haugesund

As a University College, Stord/Haugesund University College does not have power of self-accreditation for educational provisions in the second and third cycle. The institution's quality assurance system was evaluated and approved in 2008. The following educational provisions at the institution have obtained accreditation from NOKUT (all are Master's degrees):

- IKT i læring, 2006
- Klinisk helse- og omsorgsvitenskap 2010
- Praktisk-estetiske fag og lærerprosesser, 2012

Stord/Haugesund University College applied for accreditation of a Master's degree in Technical Safety – 120 studiepoeng/ECTS (Mastergradsstudium i teknisk sikkerhet) by the application deadline of 01.02.2014. During the process of accreditation, the name has been changed to Fire Safety (Brannsikkerhet).

## 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.<sup>1</sup> (Hereafter referred to as the Quality Assurance Regulation on Higher Education.) For applications that have been approved administratively, NOKUT appoints 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 Quality Assurance Regulation on 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 Quality Assurance Regulation on Higher Education. NOKUT also 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 is given two weeks to submit the revised assessment. The director general then reaches a final decision about accreditation.

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<sup>1</sup> <http://www.lovddata.no/cgi-wift/ldles?doc=/sf/sf-20110127-0297.html>

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, and has in fact done so in this report. The final conclusion is found in part 7.

### **3 Administrative assessment**

#### **Quality Assurance Regulation on Higher Education § 4-1: 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. Høgskolen Stord/Haugesund offers accredited educational provision. Hence, it is presupposed that the demands expressed in the Universities and Colleges Act are fulfilled. Diploma supplement is evaluated as satisfactory (see part 4).

## 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 of the report

In this report the study programme in Technical Safety at Stord/Haugesund University College (HSH) is evaluated for accreditation. The application meets the requirements set by NOKUT in many, but not all ways. After careful evaluation, we hereby recommend that NOKUT declines the application. We recommend that HSH revises the application and implements a series of changes, which mainly have to do with the study plan.

The proposed study plan does not cover all topics within to the field of Technical Security. For the study to keep the name Technical Security, additional courses in the area of risk analysis and safety management need to be added. In order to determine the risk, consequences of unwanted events must be calculated. This topic is not included in any of the courses. In addition HSH needs to increase the focus on human error/factors, safety from an organizational point of view and regulations dealing with technical safety. In order to make room for these changes, the master degree project needs to be shortened. As an option to this, HSH could change the name of the study programme to Fire Safety as the courses are tilted towards this field. If this is chosen, the overall learning outcome of the study programme needs to be changed accordingly. HSH must also include at least one course in the area of consequence analysis of fire and barrier management and increase the focus on regulations dealing with fire safety. Of the two options, we suggest that HSH should keep the name and make the necessary changes to the study plan (see section 7-2 3). In addition to this, HSH has to make a few other minor changes in the study plan and in the admission requirements.

The other requirements set by NOKUT are met. We consider the academic community associated with the programme to be more than adequate to deliver a master degree program in Technical Safety, also if the necessary changes are done. The academic community has a high formal competence and can document research results of a high level of quality.

### 4.1 Basic prerequisites for accreditation

#### 7-1 1 Requirements laid down in the Universities and Colleges Act<sup>2</sup>.

##### Assessment

As requested, HSH has attached both a diploma in Norwegian and a Diploma Supplement in English. In general both the diploma and the Diploma Supplement are satisfactory. For the diploma, we suggest that the names of the courses should be translated into Norwegian. The Diploma Supplement should be

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<sup>2</sup> <http://lovdata.no/dokument/NL/lov/2005-04-01-15>

spellchecked. Furthermore, the list of courses is missing in the Diploma Supplement. This should be added.

## Conclusion

Yes, the requirements are fulfilled.

The institution is advised to:

- Translate the names of the English courses in the diploma into Norwegian.
- Spellcheck the diploma supplement.
- Add the list of courses (transcript of records) to the diploma supplement .

## **7-1 2 Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.**

### Assessment

The master degree in Technical Safety at HSH is a master degree of § 3 (120 ECTS credits) in the Ministry of Education and Research's Regulation of Master Degrees (mastergradsforskriften)<sup>3</sup>. The general requirement for admission is a relevant bachelor degree with at least 80 ECTS credits in technical courses. The applicants must also meet one of the following demands<sup>4</sup>:

- Bachelor degree or relevant education in engineering (180 ECTS credits) with at least 5 ECTS credits in each of the subjects thermo and fluid dynamics.
- Relevant education that according to § 3-4 in the University and Colleges Act is approved as equal to the above and has a subject specific concentration equal to the subject specific concentration demanded by Norwegian students.

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<sup>3</sup> <http://lovdata.no/dokument/SF/forskrift/2005-12-01-1392>

<sup>4</sup> The admission requirement is translated into English by NOKUT. The requirement is the following in Norwegian:

*Studiet er lagt til rette for ingeniører med bachelorgrad eller tilsvarende. Det generelle opptakskravet er relevant bachelorgrad med 80 studiepoengs faglig fordypning innen tekniske emner, eller tilsvarende faglig utdanning. Søkere til studiet må videre oppfylle ett av følgende spesifiserte krav:*

- Bachelorgrad eller relevant ingeniørutdanning på 180 studiepoeng der emnene, termo- og strømningsdynamikk er behandlet med minst 5 studiepoeng hver.
- Relevant utdanning som i henhold til §3-4 "Generell godkjenning" i UH-loven er godkjent som jevn god med ovennevnte og omfatter en faglig fordypning som er jevn god med den faglige fordypning som kreves av norske studenter.

*I tillegg til det vil enkelte av emnene bli lyst ut som enkeltemner:*

- Opptakskravet for enkeltemnesøkere vil bli minimum 120 studiepoeng fra ingeniørutdanning – relevant linje. Her stilles det ikke krav til faglig fordypning.
- Masteroppgaven vil ikke bli utlyst som enkeltemne.



In addition, some of the courses will be advertised for single course studies:

- The admission requirement for single course students is a minimum of 120 ECTS credits in engineering – relevant specialization.

The requirement listed in bullet point 1 presents a good requirement for admission. The last part of the text in bullet point 2 is abundant as it is already implied in the first part of the text. This bullet point should be shortened to “relevant education that according to § 3-4 in the University and Colleges Act is approved as equal to the above” (“Relevant utdanning som i henhold til § 3-4 i UH-loven er godkjent som jevngod med ovennevnte”).

The special admission requirement for single course studies has to be removed. The main reason is that the admission requirement is not in coherence with the regulation (mastergradsforskriften). In the regulation, the admission requirement is a bachelor degree or at least three years of study. The suggested admission requirement for single course students requires only two years of study. Furthermore, the requirements should be the same for all students regardless if they take single course or the whole degree. This is important since it could affect the quality of the education.

The programme carries in total 120 ECTS credits and the master thesis is worth 60 ECTS credits. This is in accordance with “mastergradsforskriften”.

## Conclusion

No, the requirements are not fulfilled.

The institution is required to:

- Change the requirement for admission in such way, that it is in accordance with the regulation (mastergradsforskriften) and are the same for all students. In specific the text must be changed as follows:
  1. The text for the requirement in bullet point 2 should be changed into “Relevant utdanning som i henhold til §3-4 i UH-loven er godkjent som jevngod med ovennevnte”.
  2. The admission requirement for single course studies has to be removed.

**7-1 3 The recruitment of students to the programme should be large enough to enable the institution to establish and maintain a satisfactory learning environment and a stable programme.**

## Assessment

HSH is expecting a student number of between 10 and 20 students once the study program is fully operative. Every year they aim at recruiting 10 students for the whole degree, in addition they also expect recruiting four students for single courses studies. In total they aim at 14 students in the different courses. Aiming at only 14 students may be a bit low as student numbers can fluctuate. On page 7 in the application, HSH states that it expects that some students will be part-time students. This could affect the number of students who take the different courses and might make the relatively low number of

students even lower. However, although the suggested number of students is low, we consider it enough for the maintaining of a satisfactory learning environment and a stable program. We advise HSH to aim at 20 students in order to make the learning environment less vulnerable.

HSH plans to recruit students from all the engineering programs they offer at the bachelor level. According to data from DBH, the number of students who finished their bachelor degrees in engineering at HSH in 2013 is 81. In addition to this, HSH will recruit from local industries and from other higher education institutions both in Norway and abroad. The recruitment is therefore well described and the actions chosen to recruit the chosen number of students seem appropriate. We suggest an even stronger focus on the recruitment of international students; our experience shows that the Norwegian job market sometimes makes it difficult to recruit Norwegian students.

## Conclusion

Yes, the institution's presented documentation is satisfactory.

The institution is advised to:

- Aim at 20 students.
- Focus on international students in order to increase the number of students.

### **7-1 4 For programmes including supervised professional training, there must be adequate agreements regulating material issues of importance to the students.**

Not relevant.

## **4.2 Plan for the programme**

### **7-2 1 The programme must have an appropriate title.**

#### Assessment

The title of the programme is "Teknisk sikkerhet" (Technical Safety). The aim of technical safety is to ensure that safety is implemented properly in the design, modification and operation phases (all phases) of a system. In a study program with this name, risk analysis should be the central part in order to identify unwanted events which may occur in a system, causes and consequences of an unwanted event, barrier identification and management, mitigation measures with respect to HSE (Health, Safety and Environment), and etc. The aspect of safety has to cover the consequences (personal safety e.g. evacuation and/or economic consequences) and emergency preparedness. However, according to the study plan of the programme, there is a lack of courses in the area of safety and risk analysis and the courses are tilted towards fire safety. We therefore suggest that HSH change the title to Fire Safety, unless the curriculum and the courses are changed according to our comments in section 7-2 3. In our opinion, technical safety should cover safety in general and not focus on fire science alone.

#### Conclusion

No, the title is not satisfactory.

The institution is required to:

- Change the title of the education unless the curriculum is changed as described in section 7-2 3.

**7-2 2 The programme must be described with reference to learning outcomes, cf. National Qualifications Framework for Lifelong Learning. The overall learning outcome for each programme, defined in knowledge, skills and general competence, shall be described.**

The overall learning outcome of study programme is presented as follow (from the application):

*- Kunnskaper*

Kandidaten:

1. Har avansert kunnskap som gir en helhetlig forståelse av fagområdet teknisk sikkerhet og vurdere ulike scenarioer hva gjelder utslipp, antennelse og konsekvenser.
2. Har kunnskap om iboende sikkerhet og scenariobasert tenkning, sikkerhetsvurderinger og barriereintegritet, konsekvensreducerende tiltak.
3. Har inngående kunnskap om tidligere storulykker, hva de ble forårsaket av og hva som kunne vært gjort for å unngå dem.
4. Kan oppdatere sin kunnskap innenfor fagfeltet teknisk sikkerhet, både gjennom selvstendig informasjonsinnhenting og kontakt med fagmiljøer og praksis.
5. Kjenner til forsknings- og utviklingsarbeid innenfor fagfeltet teknisk sikkerhet generelt og spesielt innen eget fordypningsfag.

*- Ferdigheter*

Kandidaten:

1. Kan anvende kunnskap og relevante resultater fra forsknings- og utviklingsarbeid for å løse teoretiske, tekniske og praktiske problemstillinger innenfor teknisk sikkerhet og begrunne sine valg.
2. Kan bruke relevante metoder for å vurdere sikkerhetsnivået på et anlegg enten alene eller i team.
3. Kan bidra til nytenkning, innovasjon systemer eller design som bedrer teknisk sikkerhet i prosess anlegg.
4. Kan analysere og forholde seg kritisk til ulike informasjonskilder og anvende disse til å treffe beslutninger om tiltak på prosessanlegg og andre systemer.
5. Kan gjennomføre et selvstendig, avgrenset forskning- eller utviklingsarbeid under veiledning og i tråd med gjeldende forskningsetiske normer.

*- Generell kompetanse*

Kandidaten:

1. Kan reflektere over egen faglig utøvelse, også i team og i en tverrfaglig sammenheng, og tilpasse denne til den aktuelle arbeidssituasjon.
2. Kan bidra til utvikling av god praksis innen teknisk sikkerhet og anvende sine kunnskaper og ferdigheter på nye områder.
3. Kan bidra til nytenking og i innovasjonsprosesser generelt og knyttet til eget praksisfeltet spesielt.
4. Kan kommunisere om branntekniske problemstillinger og brannrisiko til industri, relevante myndigheter, spesialister i fagfeltet og allmennheten og bidra til å synliggjøre teknologiens betydning og konsekvenser.
5. Kan formidle kunnskap innen teknisk sikkerhet og analysere faglige og forskningsetiske problemstillinger.

### Assessment

The learning outcome is in compliance with level 7 (master level) in the National Qualification Framework and communicates well with potential stakeholders (e.g. employers).

The learning outcome is also in compliance with the name of study programme; however, it does not fit to the course contents. In general, the learning outcome is acceptable if the study plan and course contents are changed according to our comments in section 7-2 3.

Furthermore, the third bullet point under skills is a general competence, and has to be merged with the third bullet point of the general competence.

### Conclusion

No, the description of the programme's overall learning outcome is not satisfactory.

The institution is required to:

- Make one of the following changes:
  1. change the study plan and course content and keep the title of the study programme as Technical Safety, or
  2. change the title of the study programme to Fire Safety and change the learning outcome so that it reflects the title and the course contents.

We recommend the first option.

- Merge the third bullet point under skills with the third bullet point under general competence.

The institution is advised to:

- Spell check the overall learning outcome.

## **7-2 3 The content and structure of the programme shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

### Assessment

The Master degree in Technical Safety consists of a total of 120 ECTS credits divided into four semesters with 30 ECTS credits in each. In the first two semesters the students will take theoretical courses. In the last two semesters the students will work on their master thesis. In the application the applicant institution gives an overview of every part of the study programme as well as indicating a progression from semester to semester. However, this is not clarified in the study plan in its current state, as only one course (ING4004 “Barriereintegritet og utslipp”) has the completion of other courses as a prerequisite, so the courses can be taken in any order. Furthermore, the master project only requires 30 study points as prerequisite and these are unspecified. We are of the opinion that the students should not be allowed to pass the master thesis before passing all the courses. In addition the course ING4006 “Brannodynamikk” (Fire Dynamics) should be a prerequisite for the course ING4005 “Fluiddynamisk simulering, CFD (Computational Fluid Dynamics)”. The course ING4003 Reliability and Safety Engineering should be a prerequisite for the courses ING4004” Barriereintegritet og utslipp” and ING4002 “Sikkerhet i prosessdesign”.

We are also of the opinion that optional courses are missing. Because students come from different branches of engineering at the bachelor level, they will to a certain degree have different sets of knowledge and skills. Some of the courses are similar to courses given on the bachelor level. For instance, a student with a bachelor degree in fire safety engineering at HSH has already taken a course equivalent to ING4006 (“Brannodynamikk”). In the application HSH does not clarify how they will deal with these students compared to other students with a different engineering background. For example, the existing course ING4006 should be considered obligatory for all students except those with fire safety education from HSH. The same applies for the students with a bachelor degree in HMS engineering from HSH and the course ING4003 (Reliability and Safety Engineering). We suggest that HSH adds other optional courses for these students.

Several courses in the study programme cover aspects of risk management. These courses are relevant to the study programme, dealing with technical safety with focus on fire safety. However, in order to determine the risk, consequences of unwanted events must be calculated. They can either be in form of human loss, environmental effect or financial losses. None of these subjects are mentioned in the application. There is also lack of courses focusing on the area of human, technology and organization, which is important for technical safety. If these topics are not included in the programme, the candidates will not have the expected learning outcome suggested above.

In short, courses dealing with human error/factors that have significant influence on safety must form a part of this program. Similarly, safety from an organizational point of view and regulation dealing with technical safety (or fire safety) must also be included in the program. If not, the content of the programme is not adapted to the learning outcome. Thus, we believe that the master project has to be shortened to make room for the additional courses needed to cover all these topics.

Although the title suggests that the focus of the programme is on technical safety, the courses are tilted towards fire safety (see our comments on the name in section 7-2 1). The institution has to make a choice between the two.

The students' total workload is expected to be 1,600 hours every year. This is within the norm of 1,500-1,800 hours given by the ECTS User's Guide. In each subject (10 ECTS credits) the students are expected to use 90 hours on teacher controlled work methods (lectures, seminars etc.), 100 hours on independent study and 80 hours on exam preparations. The suggested distribution of the students' workload is appropriate for the students in achieving the learning outcome.

## Conclusion

No, the content and the structure of the programme do not correspond and/or are not adapted to the overall learning outcome as it is described in the plan for the programme.

The institution is required to:

- Change the study plan so that the students need to pass all the obligatory courses in order to be allowed to pass the master thesis.
- Make the course ING4006 "Fire Dynamics" a prerequisite for the course ING4005 "Fluiddynamisk simulering, CFD (Computational Fluid Dynamics)"
- Make the course ING4003 "Reliability and Safety Engineering" a prerequisite for the courses ING4004 "Barriereintegritet og utslipp" and ING4002 "Sikkerhet i prosessdesign".
- Clarify how it plans to deal with bachelor students from the fire safety engineering education from HSH having taken an equivalent to course ING4006
- Clarify how it plans to deal with bachelor students from the HMS engineering education from HSH having taken a course in risk analysis, which is equivalent to a part of the course ING4003

In the case of keeping Technical Safety as the title of the programme, the institution is also required to:

- Shorten the master project and add courses in the area of risk analysis and safety management. Consequence analysis must also be included in the study programme.
- Increase the focus on human error/factors, safety from an organizational point of view and regulations dealing with technical safety (or fire safety). These points can be included in a separate course or as a part of the different courses.

In the case of changing the title of the programme to Fire Safety, the institution is also required to:

- Develop at least one course in the area of consequence analysis of fire and barrier management. Evacuation has to be a part of one of the courses.
- Include regulations dealing with fire safety in the programme.
- Change the learning outcome of the study programme so that it is more specified towards fire safety (see section 7-2 2).

## **7-2 4 The work and teaching methods shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

### Assessment

For the proposed study, a variety of work and teaching methods, such as lectures, group work, role-playing and excursions (visiting companies) will be used in the program. They are all clearly described. For example, through group work, the students can communicate with each other through sharing knowledge and discussing relevant problems. Through this work method they will learn about the issues and challenges of working in a group, which will make them ready to work well in a team after finishing their master degree. This is also mentioned in the overall learning outcome of the programme. Furthermore, it is important that the students will visit different companies in some of the courses. This will increase their motivation and will also help them to understand the main issues and problems of the industries dealing with technical safety, something that is also a part of the overall learning outcome of the program. These visits may also help them in the selection of their area of interest for the master thesis.

For students to achieve the knowledge set proposed in the learning outcomes; lectures, visiting companies, lab work and exercises are necessary methods of work and teaching. For the students to achieve the skills set proposed in the learning outcome, lectures, group work, lab work, computing, independent work are all necessary work and teaching methods. Furthermore, guidance and supervision is important for the students to achieve the total learning outcome of the programme. We believe that the application of described methods for teaching will help students to achieve the learning outcomes, and that there is a good balance between the different methods that will be used in the programme.

### Conclusion

Yes, the work and teaching methods correspond to and are adapted to the learning outcome as it is described in the plan for the programme.

## **7-2 5 Examinations and other types of evaluation shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

### Assessment

The assessment methods for each course of the study plan are described. With the exception of the master thesis, the evaluation forms of the courses will be in form of projects, oral exams and written exams. We believe that it is a very good idea to have the combination of these examination forms, but we found that too many courses have oral exam without written exam. In addition, written exam is included in the evaluation of only two courses ING4006 (60% of the total evaluation) and ING4007 (35 % of the total evaluation).

In order to assess the students achievement of the learning outcome of the study program, we believe that written exams should be included as part of the evaluation for more of the courses. For example; in the course of ING 4003 “Reliability and Safety Engineering”, the student should be able to quantitatively

assess reliability and safety of engineering system (as a part of the learning outcome), but it is difficult to evaluate it by an oral exam and we believe this should also be done in the form of a written exam.

In addition we advise the institution to change the examination form in the course ING 4005 so that the project counts more than 40 %. We give this advice since the project should count a major part in a course involving programming.

### Conclusion

No, examinations and other types of evaluation do not correspond to and/or are not adapted to the learning outcome as it is described in the plan for the programme.

The institution is required to:

- Change the examination form in the course ING 4003 in accordance with the comments above.

The institution is advised to:

- Change the examination form in the course ING 4005 so that the project counts more than 40%.

## **7-2 6 The programme must have a clear academic relevance for employment and/or further study.**

### Assessment

HSH has described the relevance of the study program both with respect to further study (PhD) and employment. Concerning relevance for employment, HSH has attached a number of recommendations from various industrial stakeholders who support and express a need for the proposed study. The relevance for employment is therefore adequately documented.

Concerning relevance for further study, HSH specifically mentions PhD programs at the University of Stavanger and the University of Bergen. HSH has over several years cooperated with, and employed doctoral students who take their PhD at the two aforementioned institutions. In total we believe that the study is academically relevant both for employment and further study.

### Conclusion

Yes, the programme has a clear academic relevance for employment and/or further study.

## **7-2 7 The programme must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.**

### Assessment

HSH describes that the institution has had, and will continue to have, a long-term cooperation with the industry in order to strengthen the field of technical safety. This master degree programme will be



included as a part of this cooperation. In order to define the priority areas for their research, HSH cooperates with industry partners and companies that include the entire value chain of the oil and gas activities from planning and design, via engineering and construction, to operation and maintenance.

It is described that that the students will be supervised by an academic community who has research experience within a broad range of topics and issues. In addition they plan on connecting the master degree theses with existing research areas, especially in the areas where they have staff working on their PhD. In this way the less experienced students (master degree students) will learn from more experienced students (PhD candidates). Staff from companies in the industry will also participate in these research areas. All these projects will be led by the staff at HSH.

The proposed study programme will be a research-based programme where the teaching will be based on the industry's "best available technology" through the cooperation between the R & D industry and HSH. This will enhance the students' ability to reflect on the interaction between research-based theory and development practice. Furthermore, the master thesis can be experimental using the laboratory facilities of HSH.

In addition to the master thesis course, the other courses are also linked to research. In all courses the theoretical parts of the courses are closely linked to the research within the field. Some of the courses also include practical experiments in labs. For instance in the course ING4006 "Fire Dynamics", the content is the initiation of a fire and its development, smoke development and control. The course includes laboratory exercises and practical exercises that the student can try out under supervision at the fire lab at HSH. This will be a useful and working experience for the students, relevant for later employment.

## Conclusion

Yes, the programme has satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

## **7-2 8 The programme must have student exchange and internationalisation arrangements, adapted to its level, scope and other characteristics.**

### Assessment

The plan and strategy for internationalization and arrangements for student exchange is discussed in detail in the application. With respect to student exchange, HSH has signed agreements on master level with University of Maryland (UMD) and UNI Magdeburg.

UMD will allow the master students of HSH to join the research community at UMD when working on their master thesis. UMD is a well-known university and have a strong academic environment in addition to study programmes in similar areas, especially in risk analysis.

The agreement with UNI Magdeburg is an Erasmus student exchange agreement. Several courses, namely "Consequence of Accident Industry", "Modeling and Simulation in Industrial Safety", and "Safety Aspect of Chemical Reaction", are suggested for the exchange students. These are all very relevant to the master study program at HSH.

In addition to the agreements already HSH has already entered into, we suggest that HSH also tries to develop more student exchange agreements, especially with Swedish and Danish universities.

With respect to internationalization, one of six courses of the master program will be taught in English while the other courses are planned to be in Norwegian. However, as mentioned in the application, it will be possible to teach all of these courses in English if exchange students from institutions abroad wish to attend the courses. We believe that HSH has a good strategy with respect to this point. However, we recommend planning more courses in English as this may increase the motivation for international students to apply for exchange to HSH.

## Conclusion

Yes, the programme has student exchange and internationalisation arrangements, adapted to its level, scope and other characteristics.

The institution is advised to:

- Include student exchange agreements with additional universities, especially Swedish and Danish universities.
- Teach more courses in English.

## **7-2 9 The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the programme**

### Assessment

HSH writes in the application that to be able to achieve the learning outcomes, the students require access to computers with capacity to do comprehensive simulations, especially within the course ING4005 and the master thesis (depending on the chosen topic of the thesis). HSH has 35 computers with a sufficient capacity for most of the simulations that the students will perform. 35 additional computers will be added soon. In addition, students who have chosen a thesis or a task that require an even better capacity, will have access to five server computers with an even larger computing capacity. In total, the ICT resources at HSH are adequate and well adapted to the programme.

HSH has several class rooms with available capacity which fit a class size of up to 20 people. The students also need access to different laboratories. HSH has well equipped machine computer, chemistry and fire labs. HSH also has an agreement with the security center ResQ which secures the students access to a large outdoor fire lab which will be used for larger experiments. Giving students access to these facilities is necessary for them to achieve the learning outcome of the programme.

HSH has a library where students have access to relevant books, journals and databases. The library also provides subject specific web pages with resources, relevant for engineering students, which easily can be identified and accessed. The library also has individual and group workplaces and offer guidance in database search and source reference. Off-campus students also have access to the library services.

## Conclusion

Yes, the institution has facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the programme.

### **4.3 Academic environment associated with the programme**

**7-3 1 The composition, size and collective competence of the relevant academic environment must be adapted to the programme as described by the programme description and also adequate for conducting relevant research and academic or artistic development work.**

#### Assessment

The competence profile, which is necessary for the study, is described in a proper way. The discipline community consists of 14 people. The staff (with the responsibility of teaching) will be teaching in areas relevant to their experience. Each course of the study plan has a responsible person with very good experience and knowledge within the course topics. In total, we believe that the staff in the academic community has a competence profile that is satisfactory for the planned study programme as it is described in the application. We also believe that the suggested staff has capability and expertise to develop the missing topics of the program of technical safety, which already discussed in section 7-2.3.

HSH propose to use 3.8 full-time equivalents (FTEs) on the programme, whereas 2.7 FTEs are allotted to teaching and supervising. We believe that the size of the academic community matches the number of students aimed for, also if it is increased to 20. The discipline community is very capable when it comes to supervising the students in their work with the master thesis. The size of the discipline community is also adequate for the continuing conducting of research.

#### Conclusion

Yes, the composition, size and collective competence of the relevant academic environment is adapted to the programme as described by the programme description and also adequate for conducting relevant research and academic or artistic development work.

**7-3 2 The academic environment must actively participate in national and international collaborations and networks relevant for the programme.**

#### Assessment

The national and international cooperation and research network community, which will actively participate in the study program, is described in the application. The discipline community has network agreements with the University of Bergen and Gassco. The agreements for the cooperations are attached in the application. They also have recommendations from some local industries, which show their interest and need for the study program. If the program is accredited, an advisory group consisting of members from HSH and relevant industrial partners will be constituted. With this group, HSH will

uphold the external national network. In addition, the group will help HSH in the improvement and maintenance of the program.

The international cooperation is described in section 3.3 and in the agreements on international cooperation found in Appendix III. For example, in addition to the agreements mentioned in 7-2 8, there is an agreement with the University of the Sunshine Coast, Sippy Downs, Queensland, Australia for faculty exchange with the aim of developing linkage between faculty that will lead to sharing ideas and, where feasible, research collaboration. These agreements create networks that are relevant for the programme, and secure satisfactory participation by the discipline community.

Furthermore, several employees of the HSH have international cooperation. One associate professor participates in a Nordic research project on fire in nuclear power plants together with VTT in Finland, the University of Lund in Sweden and Ringhals AB, which includes the prediction and validation of fire development using CFD models. One professor is a member of the scientific board of the International Water Mist Association and participates in the German user group for the open CFD software FDS, which has resulted in a Nordic FDS user group of about 30 members. Another professor is a member of the steering committee of the "International Journal of Mathematical Analysis and the Journal of Advanced Research in Scientific Computing". HSH also has a professor who is a visiting professor at Luleå University of Technology and has recently been nominated to lead the Special Interest Group on Systems Assurance Engineering and Management of Berkeley Initiative in Soft Computing at the University of California, Berkeley.

Based on our assessment, we believe that the national and international collaborations described are relevant and that the academic staff engages actively in them.

## Conclusion

Yes, the academic environment actively participates in national and international collaborations and networks relevant for the programme.

**7-3 3 At least 50 per cent of the academic FTEs allotted to the programme must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the programme. For the different cycles, the following additional requirements apply:**

- b) For second cycle programmes, at least 10 per cent of the collective academic environment must be professors or docents, and an additional 40 per cent with competence at the level of at least associate professor.

## Assessment

The discipline community consists of 14 people and the total contribution in the proposed study programme will be 3.8 FTEs. Of this, 3.2 FTEs or 84 % of the discipline community are members of the institution's own academic staff. 2.9 FTEs or 76 % are staff with full professor or associate professor competence. 1.3 FTEs or 34 % are staff with professor competence.

One of the core elements of the programme is ING4003 "Reliability and Safety Engineering" and a professor is responsible for this course. He has a fulltime position at HSH and has extensive experience in research and teaching in the area of reliability and safety. The course ING4002 "Safety in Process Design" is also a core element of the programme. This course is taught by an associate professor who has 30 years of industry experience, in close collaboration with local industry. In addition ING4006 "Fire Dynamics" and ING4005 "Fluid dynamic simulation, CFD" are two important elements of the programme. ING 4006 is taught by an associate professor and a professor who have relevant research background and experience. The associate professor responsible for the subject of ING4005 is a leading researcher in CFD and has a 20% position at HSH. The staff responsible for the subject of ING4007 "Contingency Planning" and ING4004 "Barrier Integrity and release" are professors with relevant research background. This means that there are staff with at least associate professor competence in the core elements of the programme.

In total we believe that the formal competence of the academic staff is more than adequate and in adherence with NOKUT's demands.

## Conclusion

Yes, the criteria and the demands specific to the cycle of the present programme are fulfilled.

### **7-3 4 The academic environment must be actively engaged in research, academic and/or artistic development work. For the different cycles, the following additional requirements apply:**

- b) For second cycle programmes, the academic environment must have documented results at a high level of quality.

## Assessment

The academic community participates and presents their publications in national and international conferences as well as international journals. For example, they participated in the International Fire Science and Engineering Conference in 2010 and 2013 and in the International Association for Fire Safety Science in 2011. The academic staff at HSH has also participated and had presentations in "Norsk Undervannssymposium" on several occasions.

In the application HSH writes that publications in peer reviewed journals indicate a high level of quality within this research field. We agree with this assessment. According to the publication lists in Appendix V and the academic community CVs in Appendix IV, the academic staff involved in research and professional development have a high number of publications in peer reviewed journals. HSH is also participating in several international projects described in section 7-3 2. In total HSH has documented research results at a high level of quality.

Three staff members have just finished or are in the process of finishing their PhD projects. The last PhD thesis entitled "Onset of Soldering and Transition to Flaming Fire" was defended at the University of Bergen. In collaboration with University of Stavanger, two PhD theses namely "Learning in Emergency Response Work" and "The Use and Effects of Risk-Matrixes" will be defended in the

autumn of 2014. The preliminary results were presented at a conference in Seoul this summer. This will additionally strengthen the research environment at HSH.

We believe the discipline community is actively engaged in research and development. The results are published in journal and presented at major conferences.

#### Conclusion

Yes, the criteria and the demands specific to the cycle of the present programme are fulfilled.

#### **7.3.5 For programmes with supervised professional training, the academic environment and external mentors must have appropriate experience in the field of practice.**

Not relevant.

### **4.4 Conclusion**

On the basis of the written application with attached documentation, the expert committee concludes the following:

**The committee does not recommend accreditation of the master programme in Technical Safety at the University College Stord/Haugesund.**

#### ***The following demands are not met:***

##### **7.1 Basic prerequisites for accreditation**

**7-1 2 Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.**

##### **7.2 Study Plan**

**7-2 1 The programme must have an appropriate title**

**7-2 2 The programme must be described with reference to learning outcomes, cf. National Qualifications Framework for Lifelong Learning. The overall learning outcome for each programme, defined in knowledge, skills and general competence, shall be described.**

**7-2 3 The content and structure of the programme shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

**7-2 5 Examinations and other types of evaluation shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

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

The institution is required to:

- Change the requirement for admission in such way, that it is in accordance with the regulation (mastergradsforskriften) and are the same for all students. In specific the text must be changed as follows:
  1. The text for the requirement in bullet point 2 should be changed into “Relevant utdanning som i henhold til §3-4 i UH-loven er godkjent som jevngod med ovennevnte”.
  2. The admission requirement for single course studies has to be removed.
- Change the title of the education unless the curriculum is changed as described in section 7-2 3.
- Make one of the following changes:
  1. change the study plan and course content and keep the title of the study programme as Technical Safety, or
  2. change the title of the study programme to Fire Safety and change the learning outcome so that it reflects the title and the course contents.
- Merge the third bullet point under skills with the third bullet point under general competence in the total learning outcome.
- Change the study plan so that the students need to pass all the obligatory courses in order to be allowed to pass the master thesis.
- Make the course ING4006 “Fire Dynamics” a prerequisite for the course ING4005 “Fluiddynamisk simulering, CFD (Computational Fluid Dynamics)”
- Make the course ING4003 “Reliability and Safety Engineering” a prerequisite for the courses ING4004 “Barriereintegritet og utslipp” and ING4002 “Sikkerhet i prosessdesign”.
- Clarify how it plans to deal with bachelor students from the fire safety engineering education from HSH having taken an equivalent to course ING4006
- Clarify how it plans to deal with bachelor students from the HMS engineering education from HSH having taken a course in risk analysis, which is equivalent to a part of the course ING4003
- In the case of keeping Technical Safety as the title of the programme, the institution is also required to:
  - Shorten the master project and add courses in the area of risk analysis and safety management. Consequence analysis must also be included in the study programme.
  - Increase the focus on human error/factors, safety from an organizational point of view and regulations dealing with technical safety (or fire safety). These points can be included in a separate course or as a part of the different courses.
- In the case of changing the title of the programme to Fire Safety, the institution is also required to:
  - Develop at least one course in the area of consequence analysis of fire and barrier management. Evacuation has to be a part of one of the courses.
  - Include regulations dealing with fire safety in the programme.
  - Change the learning outcome of the study programme so that it is more specified towards fire safety (see section 7-2 2).
- Change the examination form in the course ING 4003 in accordance with the comments section 7-2 5.

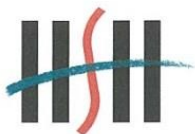
**The committee offers the following advice to develop this educational provision further:**

The institution is advised to:

- Translate the names of the English courses in the diploma into Norwegian.
- Spellcheck the diploma supplement.
- Add the list of courses (transcript of records) to the diploma supplement.
- Aim at 20 students.
- Focus on international students in order to increase the number of students.
- Spell check the overall learning outcome.
- Change the examination form in the course ING 4005 so that the project counts more than 40%.
- Include student exchange agreements with additional universities, especially Swedish and Danish universities.
- Teach more courses in English.



## 5 Commentary from the institution



HØGSKOLEN STORD/HAUGESUND

Dato : 13.08.2014  
Vår ref. : 2013/1074 - 7621/2014  
Deres ref. : 14/69-11  
Deres dato: : 03.07.2014

Nasjonalt organ for kvalitet i utdanningen  
Postboks 1708 Vika  
0121 OSLO

### KOMMENTAR FRA HSH VEDRØRENDE SAKKYNDIG VURDERING AV AKKREDITERINGSSØKNAD

Overordnet konklusjon fra den sakkyndige vurderingen var at opprinnelig søknad ikke kunne godkjennes, men vil kunne godkjennes dersom HSH implementerer en av to hovedendringer:

1. Beholde tittelen på studiet "Teknisk sikkerhet", og gjøre endringer på studieinnholdet i henhold til kommisjonens krav og definisjon av fagfeltet.
2. Endre tittelen på studiet til "Brannsikkerhet" (siden emnene allerede er vinklet mot dette fagfeltet) og gjøre nødvendige tilpasninger på studieinnholdet.

HSH velger alternativ 2 og søker om å opprette et mastergradsstudium i Brannsikkerhet. Dette medfører revisjon av opprinnelig studiemodell, emneplaner og læringsutbyttebeskrivelser slik at fokuset på Brannsikkerhet blir tydelig. Revidert søknad er vedlagt.

HSH imøtekommer komiteens krav og anbefalinger på samtlige punkter.

#### Krav fra sakkyndig komité:

7-1 2 *Change the requirement for admission in such way, that it is in accordance with the regulation (mastergradsforskriften) and are the same for all students. In specific the text must be changed as follows:*

1. *The text for the requirement in bullet point 2 should be changed into "Relevant utdanning som i henhold til §3-4 i UH-loven er godkjent som jevngod med ovennevnte".*

HSH godtar kommentaren og har endret teksten i tråd med dette.

2. *The admission requirement for single course studies has to be removed.*

HSH godtar kommentaren og stiller de samme krav til enkeltmestudentene som til studenter som blir tatt opp for hele graden.

7-2 1 - *Change the title of the education unless the curriculum is changed as described in section 7-2 3.* HSH har endret studiets tittel til "Master i Brannsikkerhet", engelsk "Master in Fire Safety".

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52 70 26 14

*7-2 2 - Make one of the following changes: 2. change the title of the study programme to Fire Safety and change the learning outcome so that it reflects the title and the course contents.*

HSH har endret tittelen på studiet til Master i Brannsikkerhet. Høgskolen Stord/Haugesund har utdannet branningeniører (Bachelorgrad) siden 1993. Fagmiljøet i Norge og den politiske ledelse har nå et stort fokus på fagfeltet brannsikkerhet. En egen mastergrad innen fagfeltet etterspørres.

- *Merge the third bullet point under skills with the third bullet point under general competence in the total learning outcome.*
- *Change the study plan so that the students need to pass all the obligatory courses in order to be allowed to pass the master thesis.*

Ovennevnte to punkter er implementert.

*7-2 3 Change the study plan so that the students need to pass all the obligatory courses in order to be allowed to pass the master thesis.*

- *Make the course ING4006 "Fire Dynamics" a prerequisite for the course ING4005 "CFD".*
- *Make the course ING4003 "Reliability and Safety Engineering" a prerequisite for the courses ING4004 "Barriereintegritet og utslipp" and ING4002 "Sikkerhet i prosessdesign".*
- *Clarify how it plans to deal with bachelor students from the fire safety engineering education from HSH having taken an equivalent to course ING4006*
- *Clarify how it plans to deal with bachelor students from the HMS engineering education from HSH having taken a course in risk analysis, which is equivalent to a part of the course*

Emnene har fått nye nummer og navn og undervises til dels i parallell. Progresjonen i fagene er ordnet slik at hensikten i dette punktet blir ivaretatt. Opptakskravet til Master i Brannsikkerhet er bachelorgrad i Brannsikkerhet fra HSH eller fra andre utdanningsinstitusjoner (utlandet). Personer med bachelorgrad innen bygg og maskin kan tas opp etter å ha bestått spesifiserte emner fra bachelorgrad i Brannsikkerhet.

*7-2 3 In the case of changing the title of the programme to Fire Safety, the institution is also required to:*

- *Develop at least one course in the area of consequence analysis of fire and barrier management. Evacuation has to be a part of one of the courses.*

ING4006 "Advanced Fire and Egress Modelling" omhandler barriere, konsekvensberegninger og rømning. Disse tema adresseres også i «Building Fire Safety» og «Fire Safety in the Oil and Gas Industry».

*7-2 3 Include regulations dealing with fire safety in the programme and change the learning outcome of the study programme so that it is more specified towards fire safety (see section 7-2 2).*

Implementert. Brannrelatert regelverk omhandles for bygg og industri i henholdsvis ING4008 "Building Fire Safety" og ING4007 "Fire Safety in the Oil & Gas Industry".

7-2 4 *Change the examination form in the course ING 4005 so that the project counts more than 40%.*  
Implementert, prosjektet vektet med 50%.

Anbefalinger fra sakkyndig komité: 7-1 1 *The institution is advised to:*

- *Translate the names of the English courses in the diploma into Norwegian.*
- *Spellcheck the diploma supplement.*
- *Add the list of courses (transcript of records) to the diploma supplement.*

Implementert. Karakterutskrifter fås når studiet er registrert i FS.

7-1 3 *Aim at 20 students and focus on international students in order to increase the number of students*

Implementert

7-2 8 *Include student exchange agreements with additional universities, especially Swedish and Danish universities.*

Vi arbeider med å få til utvekslingsavtaler med flere universitet, spesielt i Skandinavia.

7-2 4 *Teach more courses in English.*

Samtlige emner vil bli undervist på engelsk.

HSH takker komiteen for grundig arbeid og nyttige tilbakemeldinger.

Med vennlig hilsen



Liv Reidun Grimstvedt

Rektor



Monika Metallinou Log, PhD

Dekan, ATØM

Reviderte vedlegg til kommentarene:

Søknadsdokument (hoveddokument)

Vedlegg I: Vitnemål og Diploma for studiet

Vedlegg II: Studieplan

Vedlegg III: Avtaler om internasjonalisering og studentutveksling

Vedlegg IV: CV for studiets fagmiljø

Vedlegg V: Publikasjonslister for studiets fagmiljø

Vedlegg VI: Nasjonale og internasjonale samarbeid

## 6 Expert committee's additional evaluation

### 6.1 Assessment of the commentary from the institution

#### 7-1 2 Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.

*Change the requirement for admission in such way, that it is in accordance with the regulation (mastergradsforskriften) and are the same for all students. In specific the text must be changed as follows:*

3. The text for the requirement in bullet point 2 should be changed into “Relevant utdanning som i henhold til §3-4 i UH-loven er godkjent som jevngod med ovennevnte”.
4. The admission requirement for single course studies has to be removed.

#### Assessment

The admission requirement is included in the study plan and has been changed according to the comment in bullet point 1 above. In addition, the admission requirement for single course studies has been removed. The admission requirement for single course students are now the same as for the students admitted to the programme.

As a result of the change in title (see below), HSH has also made other changes to the admission requirement. Instead of requiring a bachelor degree with at least 80 ECTS in technical studies, the admission requirement has been changed to a bachelor degree in fire safety (80 ECTS in fire safety), or a bachelor degree in civil or mechanical engineering (80 ECTS in civil or mechanical engineering) with the following 30 ECTS from Bachelor in Fire:

- Fire Dynamics, ING2043 HSH or equivalent
- Active and passive fire protection system, ING2045 HSH or equivalent
- Fire safety design of buildings, ING2046 HSH or equivalent

This change in the admission requirement secures that only candidates with some prior knowledge in the subject of fire safety are admitted to the program. This is a very good change which will also solve some of the challenges presented in 7-2 3 in the first assessment. (see 7-2 3 below and in chapter 4). We consider that other bachelor degree programs in engineering (80 ECTS in technical studies) are also relevant for the admission to the master's degree program in fire safety, as long as the applicant has at least 30 ECTS from fire safety or equivalent.

#### Conclusion

Yes, the requirements are fulfilled.

The institution is advised to:

- Consider all types of bachelor program in engineering for the admission. If an applicant does not have 30 ECTS from fire safety or equivalent, he/she have to take those courses as prerequisites in the master study.

## **7-2 1 The programme must have an appropriate title**

*Change the title of the education unless the curriculum is changed as described in section 7-2 3.*

### **Assessment**

HSH has chosen to change the title to “Master i brannsikkerhet” (Master in Fire Safety). This change is in accordance with our recommendation, and the title now matches the curriculum.

### **Conclusion**

Yes, the requirements are fulfilled.

## **7-2 2 The programme must be described with reference to learning outcomes, cf. National Qualifications Framework for Lifelong Learning. The overall learning outcome for each programme, defined in knowledge, skills and general competence, shall be described.**

*Make one of the following changes:*

3. Change the study plan and course content and keep the title of the study programme as Technical Safety, or
4. Change the title of the study programme to Fire Safety and change the learning outcome so that it reflects the title and the course contents.

*We recommend the first option.*

*Merge the third bullet point under skills with the third bullet point under general competence.*

The new overall learning outcome (from the revised study plan):

### *Kunnskaper*

Kandidaten:

- har avansert kunnskap som gir en helhetlig forståelse av fagområdet brannsikkerhet
- kan analysere og vurdere ulike brannscenarier og deres forventede konsekvenser
- har inngående kunnskap om risikobaserte sikkerhetsvurderinger, barrierefilosofier med forebyggende og konsekvensreducerende tiltak
- kjenner til forsknings- og utviklingsarbeid innenfor fagfeltet brannsikkerhet generelt og spesielt innen eget fordypningsfag
- kan oppdatere sin kunnskap innenfor fagfeltet brannsikkerhet, både gjennom selvstendig informasjonsinnhenting og kontakt med fagmiljøer og praksis

### *Ferdigheter*

Kandidaten:

- kan analysere og løse teoretiske, tekniske og praktiske problemstillinger innen brannsikkerhet for bygninger, prosessanlegg, fartøy og tunneler

- kan utføre modellering av ulike brannscenarioer og gjøre konsekvensanalyser av disse
- kan beregne og modellere røykproduksjon og toksikologisk effekt avhengig av branntype og materialer
- kan bruke relevante metoder for å vurdere brannsikkerhetsnivået i en gitt sammenheng
- kan dimensjonere aktive og passive brannsikringstiltak
- kan identifisere fare for storulykker og identifisere tiltak for reduksjon av storulykkesrisiko
- kan anvende kunnskap og relevante resultater fra forsknings- og utviklingsarbeid for brannsikringstiltak og begrunne sine valg
- kan gjennomføre et selvstendig, avgrenset forsknings- eller utviklingsarbeid under veiledning og i tråd med gjeldende forskningsetiske normer

### *Generell kompetanse*

Kandidaten:

- kan beskrive og benytte nasjonale og internasjonale standarder innen sitt fagområde
- kan reflektere over egen faglig utøvelse, også i team og i en tverrfaglig sammenheng, og tilpasse innsatsen til den aktuelle arbeidssituasjon
- kan bidra til utvikling av god praksis innen brannsikkerhet og anvende sine kunnskaper og ferdigheter på nye områder
- kan drøfte menneskelig atferd, inkludert utfordringer relatert til risikogrupper, ved utforming av organisatorisk brannvern
- kan bidra til nytenkning, innovasjon av systemer, organisasjoner eller design som bedrer brannsikkerhet
- kan analysere og forholde seg kritisk til ulike informasjonskilder og anvende disse til å treffe beslutninger
- kan kommunisere om branntekniske problemstillinger og brannrisiko til virksomheter, relevante myndigheter, spesialister innen fagfeltet og allmennheten

### **Assessment**

HSH has changed the title of the study programme to Fire Safety and revised the learning outcome so that it reflects the title and the course contents. The new learning outcome complies with level 7 (master level) in the National Qualification Framework and communicates well with potential stakeholders (e.g. employers). HSH has also merged the third bullet point under skills with the third bullet point under general competence, as requested.

### **Conclusion**

Yes, the requirements are fulfilled.

### **7-2 3 The content and structure of the programme shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

*Change the study plan so that the students need to pass all the obligatory courses in order to be allowed to pass the master thesis.*

*Make the course ING4006 “Fire Dynamics” a prerequisite for the course ING4005 “Fluiddynamisk simulering, CFD (Computational Fluid Dynamics)”*

*Make the course ING4003 “Reliability and Safety Engineering” a prerequisite for the courses ING4004 “Barriereintegritet og utslipp” and ING4002 “Sikkerhet i prosessdesign”.*

*Clarify how it plans to deal with bachelor students from the fire safety engineering education from HSH having taken an equivalent to course ING4006*

*Clarify how it plans to deal with bachelor students from the HMS engineering education from HSH having taken a course in risk analysis, which is equivalent to a part of the course ING4003*

*In the case of keeping Technical Safety as the title of the programme, the institution is also required to:*

- Shorten the master project and add courses in the area of risk analysis and safety management. Consequence analysis must also be included in the study programme.
- Increase the focus on human error/factors, safety from an organizational point of view and regulations dealing with technical safety (or fire safety). These points can be included in a separate course or as a part of the different courses.

*In the case of changing the title of the programme to Fire Safety, the institution is also required to:*

- Develop at least one course in the area of consequence analysis of fire and barrier management. Evacuation has to be a part of one of the courses.
- Include regulations dealing with fire safety in the programme.
- Change the learning outcome of the study programme so that it is more specified towards fire safety (see section 7-2 2).

### **Assessment**

The progression in the study programme is clarified in the study plan. The study plan includes new or modified courses. The courses taught in the second semester, now has the first semester courses as a prerequisite. The students also need to pass all the obligatory courses before they can pass the master thesis.

HSH has changed the admission requirements from a bachelor degree in engineering to a bachelor degree in fire safety, or in civil or mechanical engineering with 30 ECTS in fire safety courses. The course ING4006 *Fire Dynamics* is changed to ING4004 *Advanced Fire Dynamics*. The new admission requirement secures that the student has a basic knowledge of Fire Dynamics at the bachelor level. In addition, the new course ING4004 is more advanced and better suited for students with prior knowledge of the topic than the originally suggested course ING4006. HMS engineers cannot apply for admission under the new admission requirement.

HSH has changed the title of the study programme to Fire Safety. The title and contents of the courses are changed towards the field of fire safety. For example, the course of ING4003 *Reliability and Safety Engineering* is modified to ING4005 *Fire risk assessment*.

The course of ING4004 *Barriereintegritet og utslipp* is removed from the study plan (some parts of such course are covered in ING4005) and the new course ING4007 *Fire safety in the oil and gas industry* is included in the new study plan. These changes are good and appropriate considering the new title and adjusted learning outcome of the programme. Regulations and standards dealing with fire safety is now included in ING4007 and ING4008. This is sufficient, but the regulations mainly has to do with preparedness, and the committee recommends HSH to include other regulations and standards such as well

The learning outcome of the program is changed and is now more specified towards fire safety (see section 7-2 2).

Although HSH write in their commentary that they intend to include consequence analysis (i.e. calculations of consequences in general and more specifically calculations of evacuation), the committee is of the opinion that this is dealt with too superficially in the current study program. The supplemental documentation received on October 20 does not change the committee's opinion on this matter. The new course ING4006 *Advanced Fire and Egress Modelling* appears to cover calculations of consequences and evacuation in the title, but the content of the course has not changed accordingly. If the committee is to recommend an accreditation of the study programme, HSH has to add these topics more clearly into the study plan, and especially into the course ING4006.

## Conclusion

No, the requirements are not fulfilled

The institution is required to:

- Consequences, namely evacuation need to be added clearly in the study plan. This topic has to be more clearly specified in the description and in the knowledge, skills and general competence (learning outcome) of the course ING4006.
- More specifically, the following topics need to be included in the learning outcome of ING4006:
  - Human behaviour in fire
  - Handcalculations on evacuation
  - Numerical models

The institution is advised to:

- Include other regulations and standards in addition to regulations on preparedness.



**7-2 5 Examinations and other types of evaluation shall correspond to and be adapted to the description of the learning outcome so that the learning outcome is achieved.**

*Change the examination form in the course ING 4003 in accordance with the comments above.*

**Assessment**

HSH was required to change the examination form in the course ING4003 from an oral to a written exam. In the revised study plan HSH has removed the course ING4003 from the programme. The content of this course is now moved to the course ING 4005 *Fire Risk Assessment*, where the examination form is a written exam.

**Conclusion**

Yes, the requirements are fulfilled.

## **6.2 Conclusion**

On the basis of the written application with attached documentation and the commentary from the institution, the expert committee concludes the following:

**The committee does not recommend accreditation of a master degree program in Fire Safety at Stord/Haugesund University College.**

## 7 Decision <sup>5</sup>

Vi viser til søknad innsendt til fristen 1. februar 2014 om akkreditering av mastergradsstudium i teknisk sikkerhet (endret til brannsikkerhet etter sakkyndig vurdering) ved Høgskolen Stord/Haugesund. De sakkyndige avga sin uttalelse i vurdering datert 3. juli 2014, med tilleggsvurdering av 28. november 2014.

Vi 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 brannsikkerhet (120 studiepoeng) ved Høgskolen Stord/Haugesund 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 3. Studiets innhold og oppbygning skal samsvare med og være tilpasset læringsutbyttebeskrivelsen slik at læringsutbyttet oppnås.

## Omgjøring av vedtak

Vi viser til NOKUTs vedtak 05.12.2014 der søknad om akkreditering av mastergradsstudium i brannsikkerhet (tidligere teknisk sikkerhet) ved Høgskolen i Stord/Haugesund ble avslått. De sakkyndige avga en negativ vurdering og påla høgskolen å gjøre følgende endring i punkt 7-2 3. (studiets innhold og oppbygning):

- *Consequences, namely evacuation need to be added clearly in the study plan. This topic has to be more clearly specified in the description and in the knowledge, skills and general competence (learning outcome) of the course ING4006.*
- *More specifically, the following topics need to be included in the learning outcome of ING4006:*
  - *Human behaviour in fire*
  - *Handcalculations on evacuation*
  - *Numerical models*

Høgskolen i Stord/Haugesund ba i brev 18.12.2014 om forlenget klagefrist. I forbindelse med denne henvendelsen ble det opprettet kontakt mellom NOKUT og høgskolen. De sakkyndige krevde kun at høgskolen gjorde noen mindre endringer i emnebeskrivelsen og læringsutbyttebeskrivelsen for ett emne (ING4006). I kontakten med Høgskolen Stord/Haugesund kom det fram at høgskolen ønsket å gjøre endringene som de sakkyndige påla dem. NOKUT vurderte endringene som måtte gjøres som mindre

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<sup>5</sup> 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 Fire Safety/brannsikkerhet (120 studiepoeng/ECTS ) at Stord/Haugesund University College is not accredited.

NOKUT has received new information about the programme. 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 27.01.2011 now are met, and the master degree program in Fire Safety/brannsikkerhet at Stord/Haugesund University College is accredited. The accreditation is valid from the date of the decision.

og at det derfor var lite hensiktsmessig at høgskolen måtte sende inn en ny fullstendig søknad til neste frist. Høgskolen fikk dermed anledning til å sende inn en ny studieplan som var i tråd med de sakkyndiges krav. NOKUT mottok 12.01.2015 ny studieplan fra Høgskolen Stord/Haugesund som er vedlagt dette vedtaket.

NOKUT har etter forvaltningsloven § 35 mulighet til å omgjøre et vedtak. Etter en vurdering og på bakgrunn av de nye opplysningene, mener NOKUT at det er hensiktsmessig å omgjøre vedtaket. Vedlagt følger en uttalelse fra de sakkyndige.

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

**vedtak:**

*Mastergradsstudium i brannsikkerhet (120 studiepoeng) ved Høgskolen Stord/Haugesund akkrediteres.*

Akkrediteringen er gyldig fra vedtaksdato. NOKUT forutsetter at Høgskolen Stord/Haugesund fyller de til enhver tid gjeldende krav for akkreditering. I tillegg forventes at institusjonen vurderer de sakkyndiges merknader og anbefalinger i det videre arbeidet med utvikling av studiet.

For mastergradsstudier som NOKUT akkrediterer, må institusjonen selv søke Kunnskapsdepartementet om rett til å etablere studiet.

## 8 Documentation

14/69-1: Søknad om akkreditering av mastergradsstudium i teknisk sikkerhet, 31. januar 2014 (Initial application for accreditation)

14/69-3: Supplering av søknad, 20. februar 2014 (Additional documentation from the institution)

14/69-13: Kommentarer til sakkyndig rapport, 13. august 2014 (Commentary from the institution)

14/69-15: Oversendelse av dokumentasjon, 15. august 2014 (Additional documentation from the institution)

14/69-19: Supplerende informasjon, 20. oktober 2014 (Additional documentation from the institution)

14/69-24: Ny studieplan 12. januar 2015 (New study plan)

## 9 Presentation of the expert committee

### Lektor Anne Dederichs, Danmarks tekniske universitet

Anne Dederichs har vært tilsatt ved Danmarks tekniske universitet (DTU) siden 2006 og er studieleder på mastergradsstudiet i brannsikkerhet (Master in Fire Safety) ved samme institusjon. Hun er emneansvarlig for emnene *Fire Dynamics* og *Funktionsbaserte Brandkrav* og underviser også i en rekke andre emner ved DTU. Hun har også veiledet studenter både på master- og doktorgradsnivå. Dederichs har utdanning fra Københavns universitet og tok sin doktorgrad ved Lunds universitet i 2006. Hun publiserer hyppig internasjonalt, blant annet innenfor temaet evakueringssikkerhet.

### Professor Javad Barabady, Universitetet i Tromsø – Norges arktiske universitet

Javad Barabady ble ansatt ved Universitetet i Tromsø i 2007 og ble professor i sikkerhet og teknologi ved samme institusjon i 2011. Barabady er studieleder for mastergradsstudiet *Technology and Safety in the High North* og er emneansvarlig og underviser i emnet *Risiko og pålitelighetsanalyse (Reliability Engineering)*. Han har også undervist i blant annet følgende emner ved UiT: *Reliability analysis*, *Technology in Arctic condition (Nordområdeteknologi)* og *Safety and risk analysis*. Han har også veiledet studenter både på bachelor-, master- og doktorgradsnivå og har vært sensor for over 30 mastergradsoppgaver ved Universitetet i Stavanger. Fra 2012 har han også hatt en stilling som professor II ved Høgskolen i Bergen hvor han underviser i emnet *Operation and Maintenance management* og veileder på bacheloroppgaver. Han har også tidligere undervist ved Azad universitet i Iran. Barabady tok sin doktorgrad ved Luleå tekniske universitet og disputerte i 2007 med avhandlingen *Production assurance. Cconcept, Implementation and Improvement*. Han har over 40 internasjonale fagfelleverderte publiseringer innenfor ulike områder som *reliability and risk analysis*, *operation and maintenance engineering and planning* og *production assurance analysis and management*.