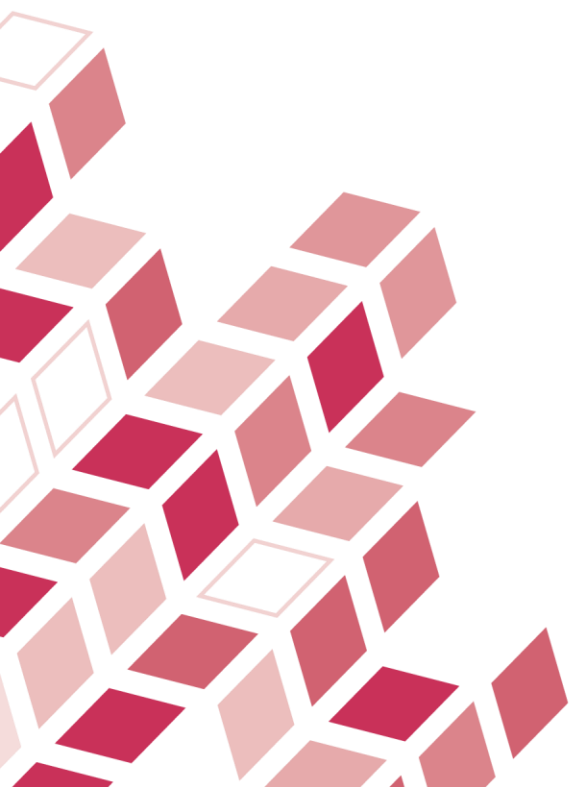


NOKUTS tilsynsrapporter

Digital Forensics

Bachelor ved Noroff AS

April 2012



Institusjon:	Noroff AS
Studietilbud:	Digital Forensics, stedsbasert og nettstudium
Grad/Studiepoeng:	bachelor, 180 studiepoeng
Dato for vedtak:	19.04.2012
Sakkyndige:	Professor Svein Johan Knapskog, Norges teknisk- naturvitenskapelige universitet
	Førsteamanuensis II André Årnes, Høgskolen i Gjøvik
Saksnummer:	09/280

Forord

NOKUTs tilsyn med norsk høyere utdanning omfatter evaluering av institusjonenes interne system for kvalitetssikring av studier, akkreditering av nye, og tilsyn med etablerte studier. Universiteter og høyskoler har ulike fullmakter til å opprette studietilbud. Dersom en institusjon ønsker å opprette et studietilbud utenfor sitt fullmaktsområde, må den søke NOKUT om dette.

Herved fremlegges rapport om akkreditering av bachelorgradsstudium i Digital forensics ved Noroff AS (Noroff). Noroff har utformet søknaden og søkt om akkreditering av bachelorgradsstudium i 2010, og er vurdert etter kriterier fastsatt den gangen, Forskrift om standarder og kriterier for akkreditering av studier og kriterier for akkreditering av institusjoner i høyere utdanning av 25.01.2006.

Vurderingen som er nedfelt i tilsynsrapporten, er igangsatt på bakgrunn av søknad fra Noroff. Denne rapporten viser den omfattende vurderingen som er gjort for å sikre utdanningskvaliteten i det planlagte studiet.

Bachelorgradsstudium i Digital forensics ved Noroff tilfredsstillende NOKUTs krav til utdanningskvalitet og er akkreditert i vedtak av 19.04.2012.

Vedtaket er ikke tidsbegrenset. NOKUT vil imidlertid følge opp studietilbudet gjennom et oppfølgende tilsyn etter 3 år.

Oslo, 19. april 2012



Terje Mørland
direktør

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1 Informasjon om søkerinstitusjon

Noroff holder til i Kristiansand og tilbyr fra før utdanning på fagskolenivå og på videregående skolenivå. De har søkt for første gang om akkreditering av studier på høyere utdannings nivå. Noroff har som mål å tilby utdanning på første syklus både steds- og nettbasert.

2 Faglig vurdering

Name of study programme: Bachelor in Digital Forensics and Network Security (180 sp)

Name of the institution: Noroff Instituttet AS

Program in ECTS: 180

On campus and online

1. Introduction

Committee's understanding of the subject area:

The committee believes that the topic of specialization is a field with substantial public interest and that there is a large potential for study programs in network security and digital forensics. This application comes at a good time, and the committee believes that there are good possibilities for establishing a good student base for a program like this.

The committee assumes that the proposed Bachelor program is a specialization program in Computer science, and the program should fulfill the requirements of a Bachelor program according to the Bologna process (3 + 2 years). A bachelor program may be seen as consisting of the three first years of a five year program for obtaining a Masters Degree in technology. Ideally, it should serve both as an independent study program leading up to a Bachelor's Degree, whereby a successful candidate could apply for a position in an appropriate business or administration, and a preparation for a potential extension encompassing two years of further specialization to obtain a Master's Degree as the next natural step on a continuing education ladder.

The necessary requirements for fulfilling this dual role are that the topics offered in the study program are providing both general technology competence, and some more specific specialized knowledge necessary for the candidate to be able to enter into a practical working situation in a company. Our assessment of the study program proposed by Noroff University College will be made under the assumption that the aim of their study programs is in compliance with the overall intentions expressed in the Bologna process.

2. Standards and criteria for accreditation of programme of study at first degree level

2-1 (1) A plan shall be available for each programme of study.

1. The programme of study shall have a representative name.
Studiet skal ha et dekkende navn.

Description

The study program is named *Digital Forensics and Network Security* with specializations in *Digital Forensics* and *Network Security* respectively. However, in the detailed descriptions of the specializations, the terms *BSc in Digital Forensics* and *BSc in Network Security* are used, as if these were independent study programs.

Assessment

The two study programs are presented as two different BSc degrees, albeit with the majority of courses in common. We find it somewhat misleading to present these two programs as separate BSc degrees as indicated by using different names. The two study programs should be merged to one and presented with one appropriately descriptive name. Whether or not it is necessary or beneficial to indicate the intended specializations on the final exam credentials is an open question.

Conclusion

The programme of study does not have a representative name

2. The admission requirements shall be commensurate with the objectives, contents and the level of the programme of study.

Opptakskravene skal være i samsvar med studiets mål, innhold og nivå.

Description

Admittance requirements are stated as fulfilled secondary education (norsk: videregående), resulting in general study competency. This is in principle in compliance with national and international practice. However, for most technologically flavored BSc study programs, there will be additional requirements, such as secondary education with a defined minimum of credits in mathematics, physics and/or chemistry. This seems not to be taken into consideration in this proposal.

Assessment

The admittance criteria are not described in sufficient level of detail. There is a mention of “exit regulations based on §3-6 in the law” – this seems to be misplaced, since the law only contains entry regulations. More specific information is needed to unequivocally describe the admittance criteria. In particular, care should be exercised when candidates applies for admittance based on work experience/portfolio and age.

Conclusion

The admittance requirements are not consistent with the objectives and contents of a technology BSc program intended to fulfill the exit qualifications of a BSc program compliant with the Bologna agreement.

3. The objectives of the programme of study shall be stated explicitly. These objectives shall state the knowledge, skills and attitudes that students are to have acquired on completion of the programme of study, and the nature of the skills provided by the programme of study in relation to further studies and/or professional practice.

Studiets mål skal være klart formulert. Av målene skal det framgå hvilke kunnskaper, ferdigheter og holdninger studentene skal ha ved slutført studium, samt hva slags kompetanse studiet gir i forhold til videre studier og/eller yrkesutøvelse.

Description

The aims for the acquired knowledge, skills and attitudes are described for the study program and for each individual course

Assessment

In the introduction of the description of the study plan, there seems to be some confusion with respect to what parts of the information security area to home in on. The focus of both the computer forensics and network security specializations is unclear – whether networks or computers will be at the center of attention is important – in most real world situations it will be necessary to make a choice. The scope of the description of the objectives for the study program needs to be narrowed down to be in better compliance with the topics included in the study plans.

Conclusion

The objectives of the study program are not met. The knowledge, skills and attitudes provided by the program of study are not adequate for admittance to an MSc study in technology.

General introductory science courses need to be incorporated in the study plans. The specialization needs to be stronger focused on network security and forensics.

4. The plan shall set out the structure of the programme of study and its compulsory and elective components; its breadth and level of specialisation.

Planen skal vise oppbygging av studiet med obligatoriske og valgfrie deler, bredde og fordypning.

Description

The structure of the study programs is accurately described, semester by semester. However, there is still some uncertainty around the concrete role of the Studio part for each semester. It is said that it should be kept open for innovation, experimentation, etc. It is not quite clear how this will pan out in practice. A significant number of teaching and assessment methods are named. The only concrete detail is the statement "one 4 hour studio session per week", whether this is centralized or distributed (network based) seems not to be decided.

Assessment

In the study plan, no elective units are described. This is rather unusual for a BSc technology program. In addition, the shared courses, which are in majority, seems to be rather specialized, and perhaps not particularly well suited to be offered to candidates graduated from general study programs in secondary schools. In most existing BSc programs in technology, in addition to requiring some competence in mathematics, physics and/or chemistry from the secondary school curricula, courses in general science topics are offered in the first two semesters as a common basis for the more specialized topics to be covered in the later part of the program. In particular, the program does not contain a number of central theory courses usually included in a Bachelor Program in Computer Science. This characteristic seems to be played down in this proposal, and the justification for this choice is not very clear (or convincing).

The description of the study plan as a whole is only partly acceptable. The specification of the Studio part needs some more concretization and the scope of the objectives for the program as a whole needs to be pruned down. The major criticism of the plan, however, is on the choice of topics for the first two semesters, where there is an inadequate emphasis on basic science as a preparation for the ensuing specializations. The fact that the plan has no room for electives is adding to the impression that the study is in danger of becoming fragmented and shallow, with parts that are less mutually supportive than one would wish and expect from this type of education.

Conclusion

The criterion is not met. The plan describes most of the components of the study as disconnected elements, and places little emphasis of the reciprocity of the elements. It does not discuss the consequences of not having a set of basic courses in the first part of the study whereupon the specialization may be successfully built. It does not point to any elective courses which the students might want to consider to diversify their study programs based on personal preferences for probing into special areas of security and forensics. The relationship between the scope and the depth is not thoroughly discussed.

5. The syllabus and teaching shall be designed to provide students of the programme of study with skills in relation to the programme of study objectives.

Pensum og undervisning skal være egnet til å sikre kandidatenes kompetanse i relasjon til målene for studiet.

Description

The curricula for both specializations seem to be rather specialized from the start. Considering that the students have been recruited with general study competence from secondary schools, their background in basic science will presumably be quite weak. Some of the courses offered are given in one semester only, without any natural successor to offer more depth in the topic under consideration.

Assessment

The curricula as they are described seem to be limited to an applied professional education and less suitable as a basis for the students to continue with a Master program. Students with an ambition to obtain a higher degree need sufficient theory to be able to enroll to and complete a two year Master program in Computer Science, based on the Bologna process (3+2 years)

It is highly questionable whether the described curricula are sufficient for obtaining a Computer Science Bachelor degree. Sufficient supporting basic science topics such as mathematics, in particular discrete mathematics, are not mentioned at all. Neither are pivotal computer science topics such as algorithm design, databases and general software engineering. User interfaces, networking, and statistics are other topics which should be included, see for example ACM Computing Curricula 2001 Guidelines for Computer Science (http://www.acm.org/education/education/education/curric_vols/cc2001.pdf).

Compared with a regular Computer Science Bachelor at a Norwegian University, this Bachelor program proposal seems to put little emphasis on the fundamental issues of computer science and network technology. As already mentioned, this creates a major challenge for the students who have the ambition to apply for a Master's program in related fields.

Further, it is strongly recommended to include an introductory course in information security in the first semester. The topic "Network documentation" seems to be unsubstantial compared to a standard 10 credits course. In addition, the committee finds that the Studio courses contain material from art/design direction which is not described in sufficient detail for evaluation of suitability for a security/forensics degree program. One central question stands unanswered: Who is involved in the Studio courses? The same problem exists for the term "Audits"; is it IT Audit and Controls?

The assessment model for "NSX106-v01-10.0Network Security" is non-intelligible and seems to contain references to other areas than network security and digital forensics (with reference to "non-linear text", etc.)

Finally, the application does not provide a clear description of how the educational quality is assured for online students. How and with what tools are the online students to participate in the study program, and how will these students be able to get effective supervision from the course academic staff?

Conclusion

The criterion is not met. The curriculum must be designed in compliance the ACM Curriculum Guidelines, or equivalent. Unsupervised online teaching methods are acceptable as complementary parts of the teaching of a course, but more traditional methods are needed for quality control. The structure and content of the Studio courses needs to be more specifically described. The general requirement that the teaching must be based on relevant research performed by the permanent scientific staff always applies.

6. The programme of study shall provide students with an introduction to research and development work.

Studiet skal gi studentene innføring i forsknings- og utviklingsarbeid.

Description

The description of this aspect of the curricula is rather sketchy. The students are supposed to be introduced to research methodology in two ways:

- Through the NAX101_V01-05.0 course given in the first year of study
- Through studio projects

Studio projects can be purely research based or they can be based on collaboration with industry.

Assessment

In general, the committee finds that research and development is not sufficiently emphasized in course descriptions. The nature of the studio activities is not well defined, and it is difficult to reach a clear and unequivocal decision that the research and development requirements are adequately covered by the proposed arrangements. It is mentioned in the application that it is an aspiration to collaborate with partner universities on research activities, and also to seek involvement with local industries to participate in their project activities through student internships. While this is commendable as an aspiration, it is not necessary a binding commitment on which prospective students could rely.

The introduction of students to the research and development area needs to be better integrated into the study programs as a whole. The fact that every specialization course is based on research by the scientific staff should permeate the teaching and practical training of the students to convey a scientifically sound attitude towards their problem solving both in their studies and future working life careers.

Conclusion

The criterion is not met. The introduction of students to the research and development area must be strengthened. It must be clearly demonstrated that every course is based on and related to research performed by the employed scientific staff.

7. The teaching shall be based on relevant research, and professional or artistic or development work and experiential knowledge.

Undervisningen skal bygge på relevant forskning, samt faglig eller kunstnerisk utviklingsarbeid og erfaringskunnskap.

Description

The rationale for being in compliance with this requirement is expressed in the application as: Quote - Our internationally recruited academic staff and our partner institutions are in the forefront of Research & Development – Unquote. The research activities performed by the Noroff staff are documented in the attached CVs and publication lists. The one staff member

who stands out with a sizeable publication list is Dr. Iain Sutherland. For the courses where Dr. Sutherland is listed as academically responsible, it is reasonable to assume that the course has a certain research basis, in particular for the courses in the areas of database and digital forensics technologies. However, the fact that Dr. Sutherland is the only staff member academically responsible for all 18 ordinary courses may be seen as a major weakness in itself. Building the whole study program structure on the research competence of one single person seems questionable from a risk assessment point of view. Whether it is reasonable to assume that one person can realistically cover the full scope of the study program in his research also remains an open question.

Assessment

The committee finds that direct relationship between the courses described in the study plans and ongoing research is not well documented for all courses. To make a justified claim that the full scope of the study program is based on relevant research, it seems to be necessary to employ additional senior scientific staff with a documented research and development track records.

Conclusion

The criterion is not met. More scientific staff with a documented research production in relevant areas must be involved in curriculum planning, teaching and course evaluations.

8. The arrangements for examination and assessment shall be adapted to the teaching and academic supervision provided and shall be appropriate for attainment of the objectives of the programme of study.

Eksamens- og vurderingsordningene skal være tilpasset den undervisning og veiledning som blir gitt, og skal være egnet for å nå målene for studiet.

Description

Evaluation of most courses (except studio) is based on online tests (weight: 30 %), case studies and problems (weight: 40 %), and reflective online journals (weight: 30 %). Ordinary exams are evaluated by Noroff's own staff, but a quality control scheme under which approx. 10 % of the delivered exam papers are evaluated by an external censor exists.

Assessment

The overall evaluation structure for ordinary courses is deemed satisfactory. However, it is not quite clear what the reflective journal is, and how it is to be evaluated. Also, it is not specifically stated whether the online tests are supervised or not. Consequently, it is not possible to decide whether the planned examination and evaluation arrangements are adequate for their purpose, or not. The precise structure of the reflective journals needs to be documented, as well as the evaluation criteria used for this part of the evaluation..

Conclusion

The criterion is not met. The combination of possibly unsupervised online tests, qualitative assessment of case studies and problems and the assessment of a reflective journal which

origin is not documented to be uniquely identifiable is not appropriate for attaining the stated objectives of a Bachelor of Technology degree.

9. Plans for performance of any practical training shall be related to the objectives of the programme of study and such skills as students are to have on completion of the programme of study.

Not Applicable

2-1 (2) The institution shall maintain a stable body of academic staff assigned to the programme of study.

1. The size of the academic staff shall be stated in terms of full-time equivalents (*årsverk*), and shall be adapted to the programme of study requirements for teaching and academic supervision, and the research-based and academic or artistic development work to be undertaken.

Størrelsen på fagmiljøet angis i årsverk, og skal være tilpasset undervisnings- og veiledningsbehovet for studiet, samt den forskning og det faglige eller kunstneriske utviklingsarbeidet som skal utføres.

Description

In total, 5 persons (Sutherland, Roarson, Drange, Sundt, NN) are said to have plans to be “further engaged in the school once it is accredited and established”. However, to obtain accreditation, an adequate research and teaching environment for the declared purpose should be established and documented, resulting in a so-called Catch 22 like situation, even if the intended staff as such would constitute an adequately competent group fully dedicated to teaching courses based on their ongoing research.

Assessment

In the present case, the assessment of the adequacy of the scientific staff will have to be based on idealized assumptions. All non-Studio courses are assigned collectively to three teachers (Sutherland, Roarson, Drange) with various roles, with approximately 75 ECTS for the three teachers each term, averaging 25 ECTS per teacher. The workload on each teacher seems clearly excessive. The time estimated for continued research (estimated to at least 50% for each professor/associate professor in a full time position) is most likely not achievable. Table 5 indicates that Frode Roarson is only employed 50%, dedicated to research, but he is also assigned to teaching, indeed for a large number of courses.

The number of scientific staff with research track record and potential for doing research in an internationally recognized level is clearly inadequate. It is important to note that hiring new scientific staff necessitates the use of standardized procedures as given in relevant laws and personnel regulations.

Conclusion

The requirements are not met. The scientific staff with full academic qualifications is inadequate for the intended number of courses and students

2. At least 50% of the academic staff assigned to the programme of study shall be employees with main posts (*hovedstilling*) at the institution.

Minst 50 % av fagmiljøet knyttet til studiet skal være ansatte med hovedstilling på institusjonen.

Description

The submitted CVs relevant to the area with the respective workload outlined in the application are:

- Iain Sutherland (MSc in related area) – 100%
- Harald Holt (MSc and MBA) – 80%, Chairman of the Board
- Frode Roarson (MSc in related area) – 50%
- Tom Georg Sigfrisson Drange (MSc) – 50%
- Geir Johansen (MSc) – 100%
- Gareth O. D. Davies (PhD candidate) – 20%
- Konstantinos Xynos (PhD candidate) – 20%
- Ernst Sundt (MSc candidate) – 40%
- Ari Magnus Mathiesen – not part of security/forensics area

Assessment

According to table 5, only 2 of in total 8 persons are full-time (not counting unnamed resource, NN). Nevertheless, it is claimed in the application (page 31 of 40): Quote – the majority of staff will be employed full time including most of the academic responsible persons – Unquote. The committee finds that the information stated in the application is not consistent. Furthermore, the committee needs to understand whether any of the staff members (including Dr Iain Sutherland) are employed elsewhere and if their total workload across employers exceeds 100%, as well as whether there will be critical mass at one geographical site or whether the staff is distributed.

Only if we interpret the information offered in the application in the most possible positive way, the requirements listed in § 2-1, Criterion 2 are adequately met, and only with the smallest possible margin.

Conclusion

The criterion is not met.

3. At least 20 % of the academic staff shall have senior lecturer/professorial status (*førstestillingskompetanse*).

Minst 20 % av fagmiljøet skal dekkes av ansatte med førstestillingskompetanse.

Description

The staff with research competency is claimed to be Sutherland (PhD), Holt (MSc, MBA) and NN

Assessment

Even if Harald Holt is considered to have "forstestillingskompetanse", the 20% requirement is not adequately met. The academic competency of NN is not known, consequently, he can not be counted. For Harald Holt's competency to be formally recognized, his scientific qualifications would have to be validated by an independent scientific competency assessment committee. It is also noted that Dr Iain Sutherland does not have Professor qualifications as of today, and that his PhD is in an unrelated field. In addition, it is questionable whether an administratively responsible person can be counted into the academic staff.

Conclusion

The requirement that at least 20 % of the staff shall have research competency is not adequately met.

4. For programme of study involving practical training, the academic staff shall also have experience from the field of practice.

For studier med praksis skal fagmiljøet også ha erfaring fra praksisfeltet.

Description

The Bachelor program outlined in the application is related to applied network security and digital forensics. The application demonstrates that the scientific staff has long experience with the ICT area in general, and e-learning. According to their CVs, Sutherland and Davies also have practical experience from forensic laboratory work.

Assessment

The requirement must be understood as work related to Network Security and/or Digital Forensics. The evaluation committee finds that the practical experience of the staff is extensive, and that core staff members have practical experience within these fields.

Conclusion

The requirement in §2-1, Criterion 4, Experience from industry, is fully met.

5. For areas in which the institution requires supplementary competence, a realistic plan shall be produced for how this is obtained.

For områder der institusjonen har behov for supplerende kompetanse, skal det legges fram en realistisk plan for hvordan denne skal skaffes.

Description

The application contains a high level plan to develop the competency of existing staff members, including a training program for online learning, as well as ongoing studies for three of the staff members.

Assessment

The application does not contain a plan for recruitment of additional personnel with research competency or an analysis of the need for additional competency. This plan does not address

the need for additional resources to deliver the program, and the resource “NN” in Table 5 is not a part of the recruitment plan. However, development plans for some of the existing staff is covered.

Conclusion

The criterion is not met.

2-1 (3) Infrastructure shall be adapted to the organisation and teaching and related to the programme of study objectives.

1. Technical and administrative services shall be adapted to the programme of study and the number of students.

Tekniske og administrative tjenester skal være tilpasset studiet og antall studenter

Description

The application includes a description of infrastructure and facilities, an online library system, as well as an education community system. Noroff outlines plans to further develop the facilities in Kristiansand by introducing two laboratories and making use of an additional floor. The application states that Noroff received a positive evaluation of its system for distance learning in 2008. The Noroff organization is described in Appendix 8, where administrative support is indicated to be a support function of “Noroff Holding”.

Assessment

The planned infrastructure covering the Noroff locations seems to be fully satisfactory. The evaluation committee would like more information regarding the purpose and properties of the two laboratories, a clarification of whether the e-learning infrastructure is sufficient to handle 120 concurrent students per year, as well as additional information regarding the positive evaluation in 2008. Note also that there is too little information regarding administrative support to evaluate its sufficiency for the Bachelor program.

Conclusion

The supporting infrastructure is sufficient for the purpose if implemented according to plan, provided that adequate administrative support is documented..

2. Students shall be provided with adequate access to ICT resources.

Studentene skal sikres tilstrekkelig tilgang på IKT-ressurser.

Description

The ICT infrastructure is described in Appendix 5. The application states that all Noroff departments are connected through VPN, ensuring access to joint digital storage and archive services. The department in Kristiansand has a 100 MB connection to the Internet. The application mentions that there are two labs in the fields of Network Security and Digital Forensics.

Assessment

The planned ICT infrastructure covering the Noroff locations seems to be satisfactory. However, there seems to be no detailed description of existing or planned laboratory environments. The evaluation

committee is unable to evaluate to what degree the students will be able to practice the technical fields (such as network monitoring, computer and device forensics) in a laboratory environment.

Conclusion

The requirement for a functional infrastructure is not met.

3. Library services shall be readily accessible and commensurate with academic content and level of the programme of study.

Bibliotektenestene skal være lett tilgjengelige og i samsvar med studiets faglige innhold og nivå.

Description

The application states that there is funding for an updated library at the Noroff University College, that there is an online system for making reservations, that library services are available through partner universities (including UiA), and that training in the use of library services is offered to students during enrollment week.

Assessment

The application does not quantify the amount available for updating the library, and the application does not indicate that Noroff has separate online library service agreements, or that this is commercially agreed upon in the MoUs. The plans for updating the library and the commercial agreements related to online library services should be clarified with respect to these matters.

Conclusion

The criterion is not met.

4. The institution shall provide appropriate premises for teaching purposes.

Institusjonen skal ha egnede lokaler til undervisningen.

Description

The application states that necessary new premises will be established during the next year, and the premises are described in a separate Appendix. Noroff rents 4 floors in an office building in Kristiansand, with an option to rent a fifth floor in the same building. The premises include management and staff offices, classrooms, group work areas and meeting facilities, as well as laboratories. An auditorium is rented in a nearby building.

Assessment

The evaluation committee finds the planned premises to be sufficient, covering all essential needs for the study program.

Conclusion

The physical premises are sufficient for the purpose if implemented according to plan.

2-1 (4) The institution shall engage actively in international cooperation within subject areas of relevance to the programme of study.

Institusjonen skal delta aktivt i internasjonalt samarbeid innenfor fagområder med relevans for studiet.

Description

The application provides an overview of collaboration agreements with two universities, CVs of faculty with international experience, a description of joint international research projects, as well as an overview of staff mobility over the last three years. Two partner universities, Glamorgan University and Deakin University, are both active in the field of Digital Forensics,

Assessment

The evaluation committee acknowledges that Noroff has developed a culture for internationalization, long lasting partnerships with universities abroad, as well as both student and staff mobility. The fact that the students are given the opportunity to work in an international environment as part of their study is a very positive aspect of the study program.

Conclusion

The requirements are met.

2-1 (5) The institution shall have arrangements in place for internationalisation associated with the programme of study.

Institusjonen skal ha ordninger for internasjonalisering knyttet til studiet.

Description

The application provides an overview of collaboration agreements with two universities, CVs of faculty with international experience, a description of joint international research projects, as well as an overview of staff mobility over the last three years. A "2+1" agreements is already existing, providing the possibility for student mobility between the partner universities.

Assessment

The evaluation committee acknowledges that Noroff has developed a culture for internationalization, long lasting partnerships with universities abroad, as well as both student and staff mobility. The research projects in Appendix 7 (also listed in MoUs) are mainly initial project description and the projects do not seem to be funded and do not include publication lists. The committee recommends that plans for funding and publication activities for the projects are developed.

Conclusion

The requirements for internationalization are met.

2-1 (6) The institution shall state how the programme of study is quality assured within the institutions quality assurance system.

Institusjonen skal redegjøre for hvordan studiet kvalitetssikres i institusjonens system for kvalitetssikring.

Description

The application states that a new quality assurance of the program is under development, and that it will be submitted to Nokut as a separate transmission during the autumn 2010. The application includes refers to the goals for the quality systems and lists a number of routines that will be implemented for both education, R&D, learning environment, and administration..

Assessment

The evaluation committee did not have access to the separate transmission concerning the quality system.. However, the high level description seems to address all main concerns, including student participation. The QA program should be sufficient if implemented as it is described.

Conclusion

The criterion is met.

3. Conclusion

The committee recommends that the application is rejected. Although Noroff has established a foundation with academic staff in the area and formalized international agreements, the committee is of the opinion that the application has some major shortcomings that needs to be addressed.

Most significantly, the program does not provide the necessary academic background in computer science. Its scope is insufficient as an entry level for Master studies at an internationally well reputed university. A stronger foundation of general science topics, as well as in computer science should be included in the curriculum. Furthermore, the teachers involved in teaching the courses in the planned Bachelor program seems to be overloaded with responsibilities and it is unlikely that they will be able to both do relevant high quality research and provide research based teaching for all courses.

As a summary of this document, the following criteria are not met:

- § 2-1 (1) 1, 2, 3, 4, 5, 6, 7, 8
- § 2-1 (2) 1, 2, 3, 5
- § 2-1 (3) 2, 3,

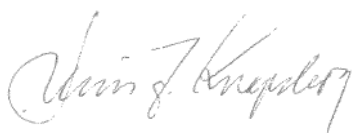
The committee's recommendation on areas of further development of the programme

The study plans needs to be amended/changed so that room is made for inclusion of pivotal computer science basics. A study plan in closer conformance to the generic study plan found in http://www.acm.org/education/education/education/curric_vols/cc2001.pdf would be a commendable starting point.

To strengthen the research profile and the pedagogical development of the core curriculum of the program, one or more research oriented full time academic positions (in addition Dr. Sutherland and the already listed NN) should be established.

The practical activities intended to be performed in the Studio sessions should be clarified and a full (thorough) integration of this activity with the ordinary coursework should be emphasized. The emphasis and number of students being online students versus on-site students, as well as the geographic location of the staff needs to be clarified.

DATE and SIGNATURE:



Svein J Knapskog, Trondheim 18/2-2011



André Årnes, Oslo 18/2-2011

3 Institusjonens kommentar



Nokut
Kronprinsens gate 9
0121 Oslo

Kristiansand, 06.04.2011

Deres ref : 09/280-21 Vår ref : HH/07/04/11

Vedrørende Sakkyndig komité rapport: Noroff AS – søknad om akkredittering av "Bachelor of Digital Security"

Summary

The committee's report highlighted a number of issues all of which have been addressed in the following sections. Where appropriate, changes have been made to the program of study.

The name of the program has been revised to reflect the content of the award and is now more appropriately titled B.Sc. Digital Security with specializations in Forensics and Networks. The admission requirements will be brought in line with those of other Norwegian Universities.

The program has been revised to more effectively meet the objectives of the degree. In accordance with suggestions made by the committee two new courses have been introduced and other courses revised to ensure Noroff University College graduates will be equipped with the skills and knowledge in alignment with both NQF and EQF guidelines to enable entry in a wide range of postgraduate programs. We have included a representative list of such programs.

The career outcomes for our graduates have been specified in greater detail. A number of possible employment opportunities have been highlighted for which our graduates could be expected to apply.

As research is an integral element of the Noroff University College learning experience, we have ensured that this commitment to research and development is both more transparent and strengthened throughout the program; highlighting the way in which research is fed into the courses and underpins the teaching of the program. All Studio courses throughout the program also include opportunities for the students to hone their research skills.

The following sections address the points raised by the committee in more detail and explain how the individual courses and overall program, have been revised to fully resolve all of the issues raised by the committee.

It should be noted that we have not modified the course codes to make it easier to track the changes to the application. Once the program has been approved the module codes will be revised.

A summary of the curriculum changes in response to the committee's comments is held in Table one below.



Table 1. - Amendments in response to the committee's comments.

New Courses					
Ref.	Name	Comments	Course code		
§ 2-1 (1) 3 § 2-1 (1) 4 § 2-1 (1) 5	Discrete Mathematics	Core course	MAT101_v01-10.0		
§ 2-1 (1) 3 § 2-1 (1) 4 § 2-1 (1) 5	Introduction to Information Security	Core course	NDSC201_v01-10.0		
§ 2-1 (1) 4	Cryptography and Steganography	Elective	NDSB303_v01-05.0		
§ 2-1 (1) 4	Data Recovery	Elective	NDSB301_v01-05.0		
§ 2-1 (1) 4	Ethical Hacking	Elective	NDSB304_v01-05.0		
§ 2-1 (1) 4	Honeypots	Elective	NDSB302_v01-05.0		
§ 2-1 (1) 4 § 2-1 (1) 6	Critical Thinking and Research skills	Elective	NEX301_v01-10.0		

Name Changes				
Ref.	Old Names	New Name	Comments	Course code
§ 2-1 (1) 4 § 2-1 (1) 5	Network Infrastructure	NET1 - Network Principles		NSX103_v01-10.0
§ 2-1 (1) 4	PRG2 – Programming, Databases + web	PRG2 – Programming and Databases		NSX202_v01-10.0
§ 2-1 (1) 4	Digital Forensics Practice and Procedure	DF1 - Digital Forensics Practice and Procedure		NSX102_v01-10.0
§ 2-1 (1) 4	Digital Investigation	DF2 - Digital Investigation		NSF201_v01-10.0
§ 2-1 (1) 4	Wireless Security and Mobile Devices	Wireless and Mobile Devices		NSX303_v02-05.0
§ 2-1 (1) 4	File System Analysis	DF3 - File System Analysis		NSF206_v01-10.0
§ 2-1 (1) 4	Advanced Device Security	DF4 - Advanced Device Forensics		NSF301_v01-10.0
§ 2-1 (1) 4	Secure Systems Configuration	NET2 - Secure Systems Configuration		NSN201_v01-10.0
§ 2-1 (1) 4 § 2-1 (1) 5	Network Documentation	NET3 - Network Administration		NSN206_v01-10.0
§ 2-1 (1) 4	Penetration Testing	NET4 - Penetration Testing		NSN301_v01-10.0

Merged Courses				
Ref.	Old Course	New Course	Comments	Course code
§ 2-1 (1) 5 § 2-1 (1) 4	PRG2 – Programming, Databases + web	PRG2 – Programming and Databases		NSX202_v01-10.0

Courses content change				
Ref.	Name	Comments	Course code	
§ 2-1 (1) 5	NET3 - Network Administration	Revised content and name change	NSN206_v01-10.0	
§ 2-1 (1) 5	Network Security	Revised the assessments	NSX106_v01-10.0	

Level Changes					
Ref.	Name	Old Level	New Level	Comments	Course code
§ 2-1 (1) 3	PRG2 – Programming and Databases PRG3/PRG2	Lv3/Lv2	Lv1		NSX202_v01-10.0
§ 2-1 (1) 3	DF1 - Digital Forensics Practice and Procedure	Lv1	Lv2		NSX102_v01-10.0
§ 2-1 (1) 3	Operating and File Systems	Lv1	Lv2		NSX105_v02-05.0
§ 2-1 (1) 3	Network Security	Lv1	Lv2		NSX106_v01-10.0
§ 2-1 (1) 3	Wireless and Mobile Devices	Lv3	Lv2		NSX303_v02-05.0
§ 2-1 (1) 3	Security Law	Lv2	Lv3		NSX205_v01-10.0

ECTS Changes					
Ref.	Name	Old ECTS	New ECTS	Comments	Course code
§ 2-1 (1) 5	Wireless and Mobile Devices	10	5		NSX303_v02-05.0
§ 2-1 (1) 4 § 2-1 (1) 5	Introduction to programming	5	10		NSX104_v01-10.0
§ 2-1 (1) 4	Final Year Project	30	20	To make room for electives in the 6 th sem.	NSS301_v01-20.0



§ 2-1 (1) Plan for the study

1) *The programme of study shall have a representative name*

Conclusion from committee:

The programme of study does not have a representative name

Answer from Noroff:

Following the feedback from the committee, the name of the Bachelors program has been review along with similar degree programs at other universities. Based on the content of the proposed program the name has been revised to:

BSc in Digital Security, with specializations in Forensics and Networks

- BSc in Digital Security: Forensics
- BSc in Digital Security: Networks

The justification for the selection of "Digital Security" rather than "Computer Security" is:

1. The definition of the term "computer" can be considered as too restrictive as the program covers a broad range of current and emerging areas, for example:
 - a. Computers, data networks
 - b. Game Consoles,
 - c. Mobile phones, smartphones (iPhone, Android), mobile network (GSM, 3G, 4G, etc.)
 - d. Tablets (iPad, etc.)

This naming format will enable future expansion with specialisations in areas such as:

- BSc in Digital Security: Application Development
- BSc in Digital Security: Ethical Hacking

2) *The admission requirements shall be commensurate with the objectives, contents and the level of the programme of study.*

Conclusion from committee:

The admittance requirements are not consistent with the objectives and contents of a technology BSc program intended to fulfil the exit qualifications of a BSc program compliant with the Bologna agreement

Answer from Noroff:

Noroff has adopted similar entry requirements as existing Norwegian universities and university colleges and will require the appropriate specialization in mathematics in addition to the general study admission requirements:

- MATRS – (Math's R1 / (S1 + S2) (2MN 2MX or equivalent)



3) *The objectives of the programme of study shall be stated explicitly. These objectives shall state the knowledge, skills and attitudes that students are to have acquired on completion of the programme of study, and the nature of the skills provided by the programme of study in relation to further studies and/or professional practice.*

Conclusion from committee:

The objectives of the study program are not met. The knowledge, skills and attitudes provided by the program of study are not adequate for admittance to an MSc study in technology. General introductory science courses need to be incorporated in the study plans. The specialization needs to be stronger focused on network security and forensics.

Answer from Noroff:

The committee has highlighted two key issues in relation to the objectives of the study program;

1. On graduation from this program students will possess the required knowledge, skills and attitudes to pursue further postgraduate study in a MSc study in technology or to obtain a relevant job in the field.

Graduates of NUC would be prepared for postgraduate study in a range of degree programs offered nationally and internationally. The following list is a representative sample of the diversity of choice available for our graduates:

Forensics:

- University of Glamorgan – Computer Forensics
<http://courses.glam.ac.uk/courses/254-msc-computer-forensics>
- University of Derby - Computer Forensic Investigation
<http://www.derby.ac.uk/computing/computer-forensic-investigation-msc#coursesummary>
- University of Bedfordshire - Computer Security and Forensics MSc
<http://www.beds.ac.uk/courses/bysubject/com/infosys/msc-comforsec>
- Purdue University – Cyber Forensics
<http://cyberforensics.purdue.edu/masters.aspx>
- University of Central Florida – Master of Science in Digital Forensics
<http://msdf.ucf.edu/>

Networks:

- University of Glamorgan – Computer Systems Security
<http://courses.glam.ac.uk/courses/254-msc-computer-systems-security>
- Abertay University - Ethical Hacking & Computer Security
<http://www.abertay.ac.uk/studying/finf/pg/ehcs/>
- Abertay University - Network Security
<http://www.abertay.ac.uk/studying/finf/pg/netsec/#d.en.7237>
- Teesside University - Network Systems
http://www.tees.ac.uk/postgraduate_courses/Computing/MSc_Network_Systems.cfm
- University of Derby - Advanced Computer Networks
<http://www.derby.ac.uk/computing/advanced-computer-networks-msc>



- **University of Bedfordshire - Computer Networking**
<http://www.beds.ac.uk/courses/bysubject/cominfsys/msc-comnet>

Those graduates of the degree program who choose employment, rather than further study, will be equipped with the required knowledge and skills for a number of possible security roles. Noroff / Glamorgan graduates are already working in a number of investigative roles including within Norway in the Bergen Police. The following section details a number of representative positions along with current advertisements that Noroff graduates would be qualified to undertake.

Typical jobs for a Forensics graduate include:

- **Computer Forensics Associate**
http://seeker.dice.com/jobsearch/servlet/jobSearch?op=302&dockey=xml/0/3/03b84ef7e31f1b6feb040acbfdf15bdb@endecaIndex&source=19&FREE_TEXT=computer+forensics&rating=99
- **Corporate Security Investigator**
<http://www.totaljobs.com/jobSearch/jobDetails.aspx?jobId=50155219&PageNum=1&Keywords=computer+forensics&Sort=0>
- **Forensic Analyst**
<http://www.totaljobs.com/jobSearch/jobDetails.aspx?jobId=50247961&Keywords=computer+forensics>

Typical jobs for Network Specialist graduates include:

- **IT Network Security Analyst**
<http://www.totaljobs.com/jobSearch/jobDetails.aspx?jobId=50191187&PageNum=1&Keywords=computer+forensics&Sort=0>
- **Network Forensic Engineer**
<http://www.totaljobs.com/jobSeeking/Network-Forensic-Engineer---40K+-Benefits.job50011157>

2. The degree should be both broader in terms of introductory science and more specialised in the chosen specialisation.

In response to the committee's comments, the timing of the delivery has been revised to ensure students receive a thorough introduction to general computer science early on in the program. We have increased the introductory background in the first year of the degree to include courses in mathematics and an introductory course on information security. The latter will enable the students to sample some of the electives they can choose in the third year. In alignment with NQF requirements, the NUC graduate will now have 80 ECTS in the specialisation of their choice with at least 20 ECTS of the specialisation at year level 2 or above. The studio modules (40ECTS) will also enable students to explore related areas and contribute to the development of the students specialised knowledge. We have adjusted the names of specific courses to highlight the intended subject progression.



4) *The plan shall set out the structure of the programme of study and its compulsory and elective components; its breadth and level of specialisation.*

Conclusion from committee:

The criterion is not met. The plan describes most of the components of the study as disconnected elements, and places little emphasis of the reciprocity of the elements. It does not discuss the consequences of not having a set of basic courses in the first part of the study whereupon the specialization may be successfully built. It does not point to any elective courses, which the students might want to consider diversifying their study programs based on personal preferences for probing into special areas of security and forensics. The relationship between the scope and the depth is not thoroughly discussed.

Answer from Naroff:

The semester plan has been revised in response to the issues raised, the general computer science courses will now run in the first two semesters and as highlighted previously, now includes a further two courses; mathematics and an introductory course in information security.

The subject areas have been reviewed to consider the way in which the courses are related. In the light of this review some of the courses and course names have been revised. The names of some of the courses have been changed to reflect the content and indicate the subject continuity throughout the program of study. For instance; DF2 (Digital Investigation) builds upon the knowledge developed in DF1 (Practice and Procedure) that provides the student with the required knowledge to maintain evidential integrity. The study plan has been revised to detail the way the courses are related. An example of the course refinement that demonstrates the relationship between the courses is the modifications to the programming courses:

The programming courses have been refined to demonstrate a more practical approach and to provide a grounding in the first year that will support studio work during the remainder of the degree. The first programming course originally titled *System Design* is now *Introduction to programming (PRG1)* has been expanded to become a 10ECTS course that will now provide an introduction to programming and programming concepts. An advanced course *Programming and Databases (PRG2)* has been created by merging the second programming and database module. This provides students with a strong grounding in basic concepts in the first year and introduces database technologies that enable students to explore programming issues that they can practically implement in the studio courses. Dr. Simon Lynch, who is academically responsible for both courses, is therefore in a position to ensure that PRG2 builds upon PRG1 and the students are able to demonstrate progression from PRG1.

In relation to the committee's suggestion to provide electives to enable student specialisation, these have been introduced in semester 5 and 6 for both of the specializations. Students now have the opportunity to choose courses within their interest area for further research. Initially the degree program will run with a fixed set of electives in the first year. This is done in order to ensure the quality



of the implementation. The students will also be able to specialise in particular topics in the studio sessions which run throughout the program and in the final year project agreed with, and supervised by, a member of academic staff.

5) The syllabus and teaching shall be designed to provide students of the programme of study with skills in relation to the programme of study objectives.

Conclusion from committee:

The criterion is not met. The curriculum must be designed in compliance the ACM Curriculum Guidelines, or equivalent. Unsupervised online teaching methods are acceptable as complementary parts of the teaching of a course, but more traditional methods are needed for quality control. The structure and content of the Studio courses needs to be more specifically described. The general requirement that the teaching must be based on relevant research performed by the permanent scientific staff always applies.

Answer from Noroff:

Noroff has extensive experience with online education being a major source of learning for Noroff students for the last 10 years. Approximately 30% of the students currently enrolled at the vocational school are online students. In addition, Noroff has developed an in-house learning management system "Webstudent" currently used by more than 1300 students. This experience, combined with the approach developed by UNU/GVU, which to a large degree builds on principles in extensive use by Open University in UK, will be of great benefit to the NUC students and staff. However, NUC does not plan on introducing online education in the first years of the degree program.

It was noted that some courses required further clarification. In particular the committee queried the level of content in the "Network Documentation" course. This has now been revised to include network management topics and has been re-titled "Network Administration", and is now more appropriate for a 10ECTS course

The committee questioned the content of the studio. In the studio the student will be encouraged to draw together, and build upon, courses they have previously taken. The studio will allow the student to explore new topics in their area of specialisation.

The studio assessment will be based on the development of a project. The specification of the project will be agreed at the beginning of the semester of study with a member of academic staff. It may have one or more milestones prior to completion, and will permit the student to go through a number of iterations to develop their final 'product'. A first year project might include one or more of the following examples:

- A literature review of into a particular issue in Information Security.
- A small program demonstrating a particular concept.
- A guideline / policy for an aspect of security



It is expected that the complexity, degree of critical reflection and the level of evaluation will increase as the student progress through the various studio courses in the program of study. This is described in more detail in the study plan.

The changes made in the light of the committee's comments correspond to the ACM and the NQF guidelines. Currently there is no specific program of study guidelines specifically for degrees in the area of computer forensics. Commercial standards are still being developed in this area and include:

- ISO 27037 (Under development) Guidelines for identification, collection, acquisition and preservation of digital evidence. Prof. Sutherland and his graduate student have participated in the BSI discussions contributing to this standard.
http://www.iso.org/iso/catalogue/catalogue_tc/catalogue_detail.htm?csnumber=44381
- The UK Forensic Science Society in the UK is developing an accreditation program for computer forensics degrees at UK universities. The newly validated B.Sc. at Glamorgan designed in part by Prof. Sutherland is likely to be the pilot to test the new accreditation program.
<http://www.forensic-science-society.org.uk/Accreditation/Guide%20for%20Course%20Providers>

We have evaluated our study program against a number of other universities worldwide to compare our coverage of the subject area.



6) *The programme of study shall provide students with an introduction to research and development work.*

Conclusion from committee:

The criterion is not met. The introduction of students to the research and development area must be strengthened. It must be clearly demonstrated that every course is based on and related to research performed by the employed scientific staff.

Answer from Noroff:

The material used in the degrees is currently being developed in accordance with common university practice. Experienced staff will prepare the course material, which will be based upon current research in the subject area. In addition to this, staff are drawing on their personal areas of current research expertise and experience to enrich the course material.

In particular, lecturers will rely on the works of seminal researchers such as:

- Fred Cohen
- Gary Kessler
- Eoghan Casey
- Phil Turner
- Brian Carrier
- Dan Farmer
- Golden Richards III
- Harlan Carvey

The research training component of the award has also been strengthened by the introduction of an elective in the third year entitled "Critical thinking and Research Skills". Students will also have the opportunity to gain practical research experience during the studio sessions that run throughout the degree.

The program will also be supported by the appointment of research active adjunct staff who will from time to time deliver specialist guest lectures.



7) The teaching shall be based on relevant research, and professional or artistic or development work and experiential knowledge.

Conclusion from committee:

The criterion is not met. More scientific staff with a documented research production in relevant areas must be involved in curriculum planning, teaching and course evaluations.

Answer from Noroff:

Noroff has a small core of senior academics that are able to provide guidance and mentoring in the development of material. These staff will take academic responsibility for the majority of the modules in the degree program:

- Prof. Iain Sutherland has now been appointed to the position of Professor in Computer Forensics at Glamorgan and also adjunct professor at Edith Cowen University in Perth Australia.
- Dr Simon Lynch has been recruited to provide expertise in the programming subject area for all the degree programs of NUC.
- Prof. Katherine Blashki will support the studio
- Dr Huw Read, Lecturer in Glamorgan will assist NUC
- Mr Frode Roarson, Mr Tom Drange and Mr Paul Bettinson have a number of years experience in the development and delivery of E-learning courses and will support this aspect of the degree program.

There are a number of other academics that have offered expertise and advice and have submitted letters of intent. In addition to this once Noroff University College has officially started, the intention is to offer adjunct lectureships to research active staff. This will support research activity and course development.

8) The arrangements for examination and assessment shall be adapted to the teaching and academic supervision provided and shall be appropriate for attainment of the objectives of the programme of study.

Conclusion from committee:

The criterion is not met. The combination of possibly unsupervised online tests, qualitative assessment of case studies and problems and the assessment of a reflective journal which origin is not documented to be uniquely identifiable are not appropriate for attaining the stated objectives of a Bachelor of Technology degree.

Answer from Noroff:

The assessment strategy has been clarified and revised according to the committee comments. The level of documentation was examined and has been revised. The assessment model now includes a portfolio based system; a combination of course works and a reflective journal.



One or more courseworks form the basis for the majority (80%) of a course assessment. A coursework consists of a piece of assessment assigned by a tutor. The reflective journal (20%) is defined as a personal record of the student's learning activities, recorded in an e-portfolio (see Moodle 2.0 for more info on portfolio https://docs.moodle.org/en/Portfolios#Using_portfolios). This is reviewed at intervals during the course and assessed at the end of the course. The reflective journals are assessed according to a predefined framework. This will include reviewing the student's progress and understanding of the subject.

The reflective journal, where used, will clearly demonstrate the student's personal involvement in the course and their meeting the course learning outcomes. It is focussed on determining the student's progress in the subject area and graded in the same way as a coursework.

9) Plans for performance of any practical training shall be related to the objectives of the programme of study and such skills, as students are to have on completion of the programme of study.

Conclusion from committee:

- Not Applicable

§ 2-1 (2) The institution shall maintain a stable body of academic staff assigned to the programme of study.

1) The size of the academic staff shall be stated in terms of full-time equivalents (årsverk), and shall be adapted to the programme of study requirements for teaching and academic supervision, and the research-based and academic or artistic development work to be undertaken.

Conclusion from committee:

The requirements are not met. The scientific staff with full academic qualifications is inadequate for the intended number of courses and students

Answer from Noroff:

The need for more academic staff is clear. Noroff will develop existing staff and recruit more staff as the University College project develops. The gradual introduction of program specializations, (starting with forensics) will enable Noroff to recruit and develop in-house staff and reduce the financial and academic risk. Staff numbers will be increased in-line with increasing numbers of student enrolments. Noroff already has letters of intent from additional academic staff with PhD's.

The course descriptors have been updated regarding who will teach and who is responsible for the given course. The gradual introduction of courses and the use of course tutors to deliver material ensures that Noroff has sufficient scientific staff at the start of the program.



2) *At least 50% of the academic staff assigned to the programme of study shall be employees with main posts (hovedstilling) at the institution.*

Conclusion from committee:

The criterion is not met.

Answer from Noroff:

Prof. Iain Sutherland is not going to be employed elsewhere during his period at NUC so his time at NUC is 100%. Regarding other staff we have employed Dr. Simon Lynch in subject area of programming and he is employed 100%.

We have a number of agreements to support Noroff from academics holding PhD.s, this includes staff for teaching and research collaboration.

3) *At least 20 % of the academic staff shall have senior lecturer/professorial status (førstestillingskompetanse).*

Conclusion from committee:

The requirement that at least 20 % of the staff shall have research competency is not adequately met.

Answer from Noroff:

Prof. Iain Sutherland has now been appointed the position as Professor in Computer Forensics and Dr. Simon Lynch has his background and PhD in computing. Dr Huw has a PhD in Computer Science. Noroff now meets the requirements.

In the future the number of research active staff will increase incrementally as NUC grows in both size and reputation. Noroff has a number of staff involved in postgraduate study. All staff working in Noroff University College are expected to be research active. They will be mentored by a senior member of staff who support them in achieving specific research outputs. Collaboration with international academic partners and with industry will also provide opportunities for research.

4. *For programme of study involving practical training, the academic staff shall also have experience from the field of practice.*

Conclusion from committee:

The requirement in §2-1, Criterion 4, Experience from industry, is fully met.



5) For areas in which the institution requires supplementary competence, a realistic plan shall be produced for how this is obtained.

Conclusion from committee:

The criterion is not met.

Answer from Noroff:

Based on an analysis of the need for competencies, Noroff has agreements in place in terms of Letters of Intent with Prof. Iain Sutherland, Dr. Simon Lynch and Dr Huw Read. Noroff can also, once approval has been granted, obtain additional staff on a permanent basis or short contract basis.

Other teaching hours may be obtained from our partner universities and from our adjunct lecturing staff.

The tutoring staff at Noroff University College can be used to provide support for the on-line delivery. These staff will also be developed to provide the necessary level of competent teaching staff. This is already in process with one member of staff studying for an M.Sc. (Mr. E. Sundt), One member of staff having completed his MSc. (Mr. T. Drange) and one member of staff having achieved an M.Sc. and is now pursuing a Ph.D (Mr. F. Roarson).

§ 2-1 (3) Infrastructure shall be adapted to the organisation and teaching and related to the programme of study objectives.

1) Technical and administrative services shall be adapted to the programme of study and the number of students.

Conclusion from committee:

The supporting infrastructure is sufficient for the purpose if implemented according to plan, provided that adequate administrative support is documented.

2) Students shall be provided with adequate access to ICT resources.

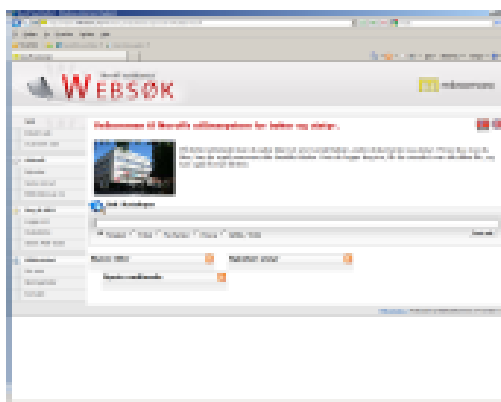
Conclusion from committee:

The requirement for a functional infrastructure is not met.

Answer from Noroff:

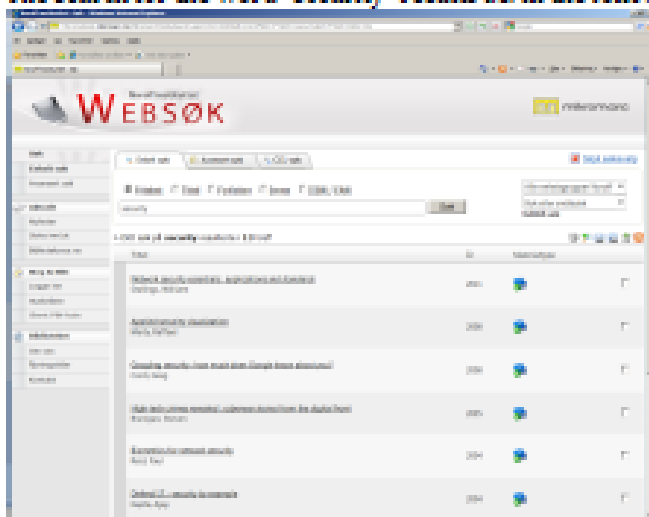
The student body will be provided with personal MacBook Pro notebook computers.

The infrastructure will comprise of two components: the on-line hosted system which is based 1Km from Kristiansand campus and connected to the campus by a IP-VPN with a bandwidth of 100Mb. On campus a 1Gb network will connect systems internally. The on campus systems will include a laboratory infrastructure, which includes a number of new high specification computers, and servers with specialised software for Forensics and Networks. This supports the Digital Security students in gaining appropriate practical experience. This will include local network access to systems providing storage for teaching material and case files.



When logged in the students can search for books and equipment.

The search for the word "security" results i.e. in the following screen:



There are several titles that are already in the library, and have been in use for quite some time. The books in the library are titles used/connected with the one year vocational program "Nettverk og system Administrasjon", and the two year vocational program "Nettverk og IT Sikkerhet". Both programs are approved by NOKUT. These are the most relevant programs in relation to the BSc program in Digital Security.

The program BSc in Digital security covers a higher level of expertise than the vocational school in which the current book titles has been in use. Therefore Noroff has a budget for buying a great deal of additional titles to cover both added width and more specialized depth of the relevant content in the library.

University of Agder has offered NUC access to their library if needed.



Further Noroff is establishing a collection of e-books for students and staff to access. These are made available for usage on PC, MAC, tablets and even smaller mobile devices with reader capabilities i.e. Android and/or iPhones with Kindle or iBooks Apps.

Noroff is also located in the center of Kristiansand. Currently Noroff is located in about a 5 minutes' walk distance from the Kristiansand public library (<http://www.kristiansand.folkebibli.no/>) which is the fifth largest library in Norway according to their website. All students are welcome to use the library facilities and access the library resources.

4) *The institution shall provide appropriate premises for teaching purposes.*

Conclusion from committee:

The physical premises are sufficient for the purpose if implemented according to plan.

§ 5 of the Board's statutes do not follow the higher education law. Staff and students will have one member each on the board of a private college. These shall also be entitled to vote. The instructions for the board makes NOKUT note that "it shall to the greatest extent possible, be transparent about its work, see Universities and Colleges Act § 9-2 (6). Information about appeals is missing; see § 5-1 in the higher education law.

Answer from Noroff:

The bylaws of NUC were previously discussed with NOKUT, and the advise given was to write the bylaws according to the requirements of "akseloven" in such a way that that the requirements of "høyskoleloven" could be accommodated.

Thus section 5 reads: "Selskapets styre består av 5 til 9 styremedlemmer etter generalforsamlingens nærmere beslutning."

Employees and students will have one member each on the Board with voting rights.

Kristiansand 7/4 2011

Harald Holt

Chairman of the Board



Attachments:

1. Study plan
2. New course descriptions:
 - a. Introduction to Information Security
 - b. Critical Thinking and Research Skills
 - c. Data Recovery
 - d. HoneyPots
 - e. Cryptography and Steganography
 - f. Ethical Hacking
3. Modified course description:
 - a. NET3 - Network Administration
4. Letter of Intent Simon Lynch
5. Letter of Intent Huw Read
6. CV: Simon Lynch
7. CV: Huw Read

4 Sakkyndig tilleggsvurdering

1. Introduction

Committee's understanding of the subject area:

The committee has evaluated the response from Noroff from April 6th 2011. As previously communicated, the committee believes that the topic of specialization is a field with substantial public interest and that there is a large potential for study programs in network security and digital forensics. This application comes at an appropriate time, and the committee believes that there are good possibilities for establishing a solid student base for a program like this.

Based on the changes made in Noroff's response, it is the conclusion of the committee that Noroff has described a program that fulfills all requirements in the area of "Digital Forensics". There are, however, still major shortcomings with regards to the program in the Security and Networks fields.

The structure of the "BSc in Digital Security: Networks" study plan itself seems acceptable, but the individual curriculum descriptions do not seem to have the same quality as those of the "Forensics" program. The literature proposed for some of the courses is outdated (e.g., one textbook is published in 1996), and some of the course descriptions seem to contain cut-and-paste text from identical courses elsewhere (e.g., Abertay University and University of Illinois Springfield). Furthermore, the majority of publications and research background for the academic staff is in the field of Digital Forensics, and the partner universities (Glamorgan University and Deakin University) also seem to be selected for their excellence in the field on the area of Digital Forensics, rather than in Network Security. The general requirement that the teaching must be based on relevant research performed by the permanent scientific staff always applies, and this does not seem to be adequately met in this case.

2. Standards and criteria for accreditation of programme of study at first degree level

2-1 (1) A plan shall be available for each programme of study.

1. The programme of study shall have a representative name.
Studiet skal ha et dekkende navn.

Description

The study program is named "BSc in Digital Security", with specializations in "BSc in Digital Security: Forensics" and "BSc in Digital Security: Networks".

Assessment

According to NOKUT, the designation "BSc" or "Bachelor of Science" should not be used in the Norwegian education system, and special characters (including colon) should not be used in the study program title. The designation thus needs to be changed to "Bachelor".

As described in the Introduction, the study direction "BSc in Digital Security: Network" is not sufficiently developed to be accepted

It is thus recommended that the program at this stage is named "Bachelor in Digital Forensics", which is the conventional name used by well known international teaching institutions offering suitable courses at both Bachelor and Master level in the area.

Conclusion

The program "BSc Information Security: Networks" can not be approved.

The committee approves the program with specialisation in “Digital Forensics” and recommends the name “Bachelor in Digital Forensics” for the program.

2. The admission requirements shall be commensurate with the objectives, contents and the level of the programme of study.

Opptakskravene skal være i samsvar med studiets mål, innhold og nivå.

Description

Noroff has introduced a requirement for appropriate specialization in mathematics in addition to the general study admission requirements, specified as “MATRS – (Math’s R1 / (S1 + S2) (2MN 2MX or equivalent)”

Assessment

The admission requirements are commensurate with the objectives, contents and the level of the programme of study, and they are now described in sufficient level of detail. The

introduction of the “MATRS” requirements for mathematical background is sufficient, and the criteria are similar to the practice of similar study programs in Norway.

Conclusion

The criterion is met.

3. The objectives of the programme of study shall be stated explicitly. These objectives shall state the knowledge, skills and attitudes that students are to have acquired on completion of the programme of study, and the nature of the skills provided by the programme of study in relation to further studies and/or professional practice.

Studiets mål skal være klart formulert. Av målene skal det framgå hvilke kunnskaper, ferdigheter og holdninger studentene skal ha ved sluttført studium, samt hva slags kompetanse studiet gir i forhold til videre studier og/eller yrkesutøvelse.

Description

The description provided in the response from Noroff indicates a strengthening of the relevance of the program, both in terms of academic and professional applicability. The program has been redesigned to include a stronger focus on general topics in the first year, making the program more aligned with the requirements of a Computer Science program.

Assessment

The objectives of the study program “BSc in Digital Security: Forensics” are met. The aims for the acquired knowledge, skills and attitudes are described for the study program and for each individual course

As described in the Introduction of this document, the overall quality and structure of the study program “BSc in Digital Security: Networks” is not considered sufficient. Some of the program courses are copy-paste descriptions from existing courses at other universities, and some textbook material seems to be outdated. Also, the research background of the Faculty is mostly focused on Digital Forensics. This leads to the committee’s conclusion that Noroff has not demonstrated sufficient independent effort in defining and describing the objectives of the “BSc in Digital Security: Networks” program.

Conclusion

The criterion is met for the study program “BSc in Information Security: Forensics”.

The criterion is not met for the study program “BSc in Digital Security: Networks”.

4. The plan shall set out the structure of the programme of study and its compulsory and elective components; its breadth and level of specialisation.

Planen skal vise oppbygging av studiet med obligatoriske og valgfrie deler, bredde og fordypning|

Description

Noroff has redesigned the study programs with stronger emphasis on a scientific foundation in the areas of computer science and mathematics, as well as inclusion of a number of elective courses in the final stage of the program.

Assessment

As described in the Introduction of this document, the overall quality and structure of the study program “BSc in Digital Security: Networks” is not considered adequate. Some of the program courses are copy-paste descriptions from existing courses at other universities, and some textbook material seems to be outdated. Also, the research backgrounds of the Faculty are mostly focused on Digital Forensics. In conclusion, Noroff does not demonstrate that the structure of this part of the program is the result of a sufficiently serious and dedicated process, neither with regard to the teaching material or the personnel resources required. .

Conclusion

The criterion is met for the study program “BSc Information Security: Forensics”.

The criterion is not met for the study program “BSc Information Security: Networks”.

5. The syllabus and teaching shall be designed to provide students of the programme of study with skills in relation to the programme of study objectives.

Pensum og undervisning skal være egnet til å sikre kandidatenes kompetanse i relasjon til målene for studiet.

Description

In the response letter, Noroff has elaborated upon the experience with online education, provided an update for some courses including the studio courses, as well as addressed the requirements of the ACM/NFQ guidelines.

Assessment

The changes addressed in Noroff's response are considered sufficient for the study program "BSc in Digital Security: Forensics".

As described in the Introduction of this document, the overall quality and structure of the study program "BSc in Digital Security: Networks" is not considered sufficient. Some of the program courses are copy-paste descriptions from existing courses at other universities, and some textbook material seems to be outdated. Also, the research background of the Faculty is mostly focused on Digital Forensics. In conclusion, Noroff has not demonstrated sufficient commitment to design an adequate syllabus and recruit a sufficiently dedicated staff to teach the courses in the "BSc in Digital Security: Networks" program.

Conclusion

The criterion is met for the study program "BSc Information Security: Forensics".

The criterion is not met for the study program "BSc Information Security: Networks".

6. The programme of study shall provide students with an introduction to research and development work.

Studiet skal gi studentene innføring i forsknings- og utviklingsarbeid.

Description

Noroff has, in their response, strengthened the academic staff, in particular in the area of digital forensics. A new course in research methodology has been established, and a number of seminal researchers (again with an emphasis on digital forensics) are referenced.

Assessment

The evaluation committee evaluates the revised proposal to be adequate with respect to the "BSc in Digital Security: Forensics" study program.

As described in the Introduction of this document, the quality of the study program "BSc in Digital Security: Networks" is not considered sufficient. Some of the program courses are copy-paste descriptions from existing courses at other universities, and some textbook material seems to be outdated. Also, the research background of the Faculty is mostly focused on Digital Forensics. In conclusion, Noroff does not demonstrate that sufficient introduction to research and development work can be expected for the "BSc in Digital Security: Networks" program.

Conclusion

The criterion is met for the study program "BSc Information Security: Forensics".

The criterion is not met for the study program "BSc Information Security: Networks".

7. The teaching shall be based on relevant research, and professional or artistic or development work and experiential knowledge.

Undervisningen skal bygge på relevant forskning, samt faglig eller kunstnerisk utviklingsarbeid og erfaringskunnskap.

Description

In Noroff's response, the number of faculty with research experience in digital forensics has been increased.

Assessment

In the area of "Digital Security: Forensics", Noroff is now demonstrating that the study program is founded on a faculty, both in terms of senior and junior members, with a suitable background in the research area.

In the area of "Digital Security: Networks", Noroff does not provide the same level of research background, as most of the faculty research background is mainly in the area of digital forensics. The general requirement that the teaching must be based on relevant

research performed by the permanent scientific staff always applies, and does not seem to be adequately met in this case.

Conclusion

The criterion is met for the study program "BSc Information Security: Forensics".

The criterion is not met for the study program "BSc Information Security: Networks".

8. The arrangements for examination and assessment shall be adapted to the teaching and academic supervision provided and shall be appropriate for attainment of the objectives of the programme of study.

Eksamens- og vurderingsordningene skal være tilpasset den undervisning og veiledning som blir gitt, og skal være egnet for å nå målene for studiet.

Description

Noroff has revised its assessment strategy and clarified the assessment for individual courses. The proposed assessment model is portfolio based, with a combination of course works and a reflective journal.

Assessment

The assessment model has been clarified and the committee evaluates the new model to be satisfactory, and the expectations for students, faculty and external reviewers are now clear. Also, it is now the understanding of the evaluation committee that the assessment is no longer based on unsupervised on-line tests.

Conclusion

The criterion is met.

9. Plans for performance of any practical training shall be related to the objectives of the programme of study and such skills as students are to have on completion of the programme of study.

Not Applicable

2-1 (2) The institution shall maintain a stable body of academic staff assigned to the programme of study.

1. The size of the academic staff shall be stated in terms of full-time equivalents (*årsverk*), and shall be adapted to the programme of study requirements for teaching and academic supervision, and the research-based and academic or artistic development work to be undertaken.

Størrelsen på fagmiljøet angis i årsverk, og skal være tilpasset undervisnings- og veiledningsbehovet for studiet, samt den forskning og det faglige eller kunstneriske utviklingsarbeidet som skal utføres.

Description

Noroff has provided Letters of Intent for additional academic staff.

Assessment

The academic staff outlined in the revised application is considered sufficient for the “Digital Security: Forensics” study program. However, the academic staff is clearly focusing on digital forensics, and not on information or network security. It is therefore the conclusion of the evaluation committee that the size of the academic staff in the area of “Digital Security: Networks” is not sufficient for the purpose.

Conclusion

The criterion is conditionally met for the study program “BSc Information Security: Forensics”, provided that Noroff is successful in hiring faculty according to the Letters of Intention received, or faculty with equivalent credentials.

The criterion is not met for the study program “BSc Information Security: Networks”.

2. At least 50% of the academic staff assigned to the programme of study shall be employees with main posts (*hovedstilling*) at the institution.

Minst 50 % av fagmiljøet knyttet til studiet skal være ansatte med hovedstilling på institusjonen.

Description

Noroff has in its response provided information that additional resources will be hired, and that key faculty members will be employed full time at NUC.

Assessment

The evaluation committee finds that the percentage of academic staff assigned to the program with main posts is adequate.

Conclusion

The criterion is met.

3. At least 20 % of the academic staff shall have senior lecturer/professorial status (*førstestillingskompetanse*).

Minst 20 % av fagmiljøet skal dekkes av ansatte med førstestillingskompetanse.

Description

In the revised proposal, Noroff has provided information that three persons have "Førstestillingskompetanse".

Assessment

The requirement of 20% staff with "Førstestillingskompetanse" is met.

Conclusion

The criterion is conditionally met for the study program "BSc Information Security: Forensics", provided that Noroff is successful in hiring faculty according to the Letters of Intention received, or faculty with equivalent credentials.

4. For programme of study involving practical training, the academic staff shall also have experience from the field of practice.

For studier med praksis skal fagmiljøet også ha erfaring fra praksisfeltet.

This criterion was met in the Evaluation Committee report February 18th 2011.

5. For areas in which the institution requires supplementary competence, a realistic plan shall be produced for how this is obtained.

For områder der institusjonen har behov for supplerende kompetanse, skal det legges fram en realistisk plan for hvordan denne skal skaffes.

Description

Noroff has provided information that the number of academic staff will be increased.

Assessment

The revised application documents a suitable plan for providing the right competencies for the "BSc in Digital Security: Forensics" study program. However, there is still a need for more experienced expertise in the area of "Digital Security: Networks", as discussed in the Introduction of this document.

Conclusion

The criterion is met for the study program "BSc Digital Security: Forensics".

The criterion is not met for the study program "BSc Digital Security: Networks".

2-1 (3) Infrastructure shall be adapted to the organisation and teaching and related to the programme of study objectives.

1. Technical and administrative services shall be adapted to the programme of study and the number of students.

Tekniske og administrative tjenester skal være tilpasset studiet og antall studenter

This criterion was met in the Evaluation Committee report February 18th 2011.

2. Students shall be provided with adequate access to ICT resources.

Studentene skal sikres tilstrekkelig tilgang på IKT-ressurser.

Description

The revised proposal from Noroff specifies that there will be a laboratory infrastructure with new high specification computers and servers with specialized software for Forensics and Networks. A variety of hardware and software will enable the students to experiment with network configurations and monitoring.

Assessment

The planned ICT infrastructure covering the Noroff locations was deemed to be satisfactory in the initial application evaluated, and the necessary emphasis on a laboratory for digital forensics and network security has been established in the revised application.

Conclusion

The criterion is met.

3. Library services shall be readily accessible and commensurate with academic content and level of the programme of study.

Bibliotektenestene skal være lett tilgjengelige og i samsvar med studiets faglige innhold og nivå.

Description

The revised application has specified the use of the library system www.micromarc.com, provided information that there are many relevant books (including e-books) in the library related to the fields covered by the application, and also highlighted the fact that the University of Agder has offered NUC access to their library if needed and that the public library of Kristiansand is in walking distance.

Assessment

The revised application provides information that seems to indicate that Noroff has adequate library services. The evaluation of Noroff's application from February 18th 2011 requested information regarding the funding available for library book purchases, as well as documentation of library service/ access agreements with third parties.

Conclusion

The criterion is met on the condition that Noroff provides an agreement regarding library services with at least one partner institution.

The committee emphasizes the need for planning and budgeting the internal library services to be suitable for a Bachelor program. It is expected that this is developed and maintained by Noroff at all times.

4. The institution shall provide appropriate premises for teaching purposes.
Institusjonen skal ha egnede lokaler til undervisningen.

This criterion was met in the Evaluation Committee report February 18th 2011.

2-1 (4) The institution shall engage actively in international cooperation within subject areas of relevance to the programme of study.

Institusjonen skal delta aktivt i internasjonalt samarbeid innenfor fagområder med relevans for studiet.

This criterion was met in the Evaluation Committee report February 18th 2011.

2-1 (5) The institution shall have arrangements in place for internationalisation associated with the programme of study.

Institusjonen skal ha ordninger for internasjonalisering knyttet til studiet.

This criterion was met in the Evaluation Committee report February 18th 2011.

2-1 (6) The institution shall state how the programme of study is quality assured within the institutions quality assurance system.

Institusjonen skal redegjøre for hvordan studiet kvalitetssikres i institusjonens system for kvalitetssikring.

Conclusion

This criterion was evaluated to be fully met in the Evaluation Committee report February 18th 2011.

3. Conclusion

The evaluation committee has evaluated the revised application from Nokut and recommends that Noroff at this time establishes a focused Bachelor program in Digital Forensics only. There are still major shortcomings with regards to the study program "BSc in Digital Security: Networks", and the evaluation committee has concluded that this study program cannot be recommended.

Based on the changes made in Noroff's revised application, it is the conclusion of the committee that the study program "BSc in Digital Security: Forensics" fulfills all requirements in the area of "Digital Forensics" for both on-site and online studies, with the following conditions:

- Program name is updated in accordance with NOKUT naming convention and to reflect the fact that the "Digital Security: Networks" cannot be accepted at this time
- The key personnel outlined in the application (or candidates with equivalent credentials) accept employment with Noroff
- Noroff provides an agreement regarding library services with at least one partner institution

5 Vedtak

Noroff AS (Noroff) søkte NOKUT om akkreditering av bachelorstudium i Digital Forensics og Network Security (180 sp). Søknaden er søkt og vurdert etter Forskrift om standarder og kriterier for akkreditering av studier og kriterier for akkreditering av institusjoner i høyere utdanning av 25.01.2006. De sakkyndige avga sin uttalelse i rapport datert 18.02.2011. I henhold til NOKUTs rutiner ble rapporten oversendt Noroff for kommentarer. De sakkyndig har vurdert Noroffs kommentarer i tilleggsvurderingen datert 01.06.2011.

NOKUT vurderte at vilkårene i NOKUTs forskrift om akkreditering av studier er oppfylt når Noroff kan dokumentere følgende:

- Navnet endres til bachelorstudium i Digital Forensics og at Digital Security: Networks blir fjernet fra studieplanen. Revidert studieplan for bachelorstudium i Digital Forensics sendes NOKUT
- Underskrevet avtale om bibliotek tjenester
- Dokumentasjon på ansettelse av nøkkelpersoner, slik det er beskrevet i søknaden

NOKUT sendte tilsagn om akkreditering til Noroff 28.06.2011. NOKUT mottok alle dokumentasjonene 09.02.2012. Da den fagpersonen som opprinnelig ble vurdert av de sakkyndige er blitt erstattet med en annen, var det i tillegg nødvendig å få en sakkyndig vurdering av dette. De sakkyndiges felles uttalelse ble mottatt 17. april 2012 med følgende vurdering: «De sakkyndige har vurdert den tilsendte dokumentasjonen med spesiell vekt på kompetansen til personalet som er ansatt av Noroff AS til dette formålet, og uttaler følgende: Based on the changes made in Noroff's revised application, and a review of the CVs of its presently employed staff allocated to the study program, it is the conclusion of the assessment committee that the study program "BSc in Digital Security: Forensics" fulfills all requirements in the area of "Digital Forensics" for both onsite and online studies.".

Med dette oppfyller Noroff vilkårene i NOKUTs forskrift, og følgende studium akkrediteres:

- Bachelor i Digital Forensics (180 studiepoeng), stedsbasert
- Bachelor i Digital Forensics (180 studiepoeng), nettstudium

Akkrediteringen er gyldig fra vedtaksdato.

NOKUT forutsetter at Noroff fyller de til enhver tid gjeldende krav for akkreditering. I tillegg forventes det at Noroff vurderer de sakkyndiges merknader og anbefalinger i det videre arbeidet med utvikling av studiet. Det gjøres oppmerksom på at opptakskravet til studiet skal stå i studieplanen.

Noroff må også søke Kunnskapsdepartementet om rett til å etablere graden, jf. universitets- og høyskoleloven § 3-2 (1).

6 Dokumentasjon

Søknad, supplert og revidert utgave 12.10.2010-7

Sakkyndig rapport 18.02.2011-20

Kommentarer til sakkyndigrapport 06.02.2011-22

Tilleggsvurdering 01.06.2011-24

Svar på tilsagn 09.02.2012-32