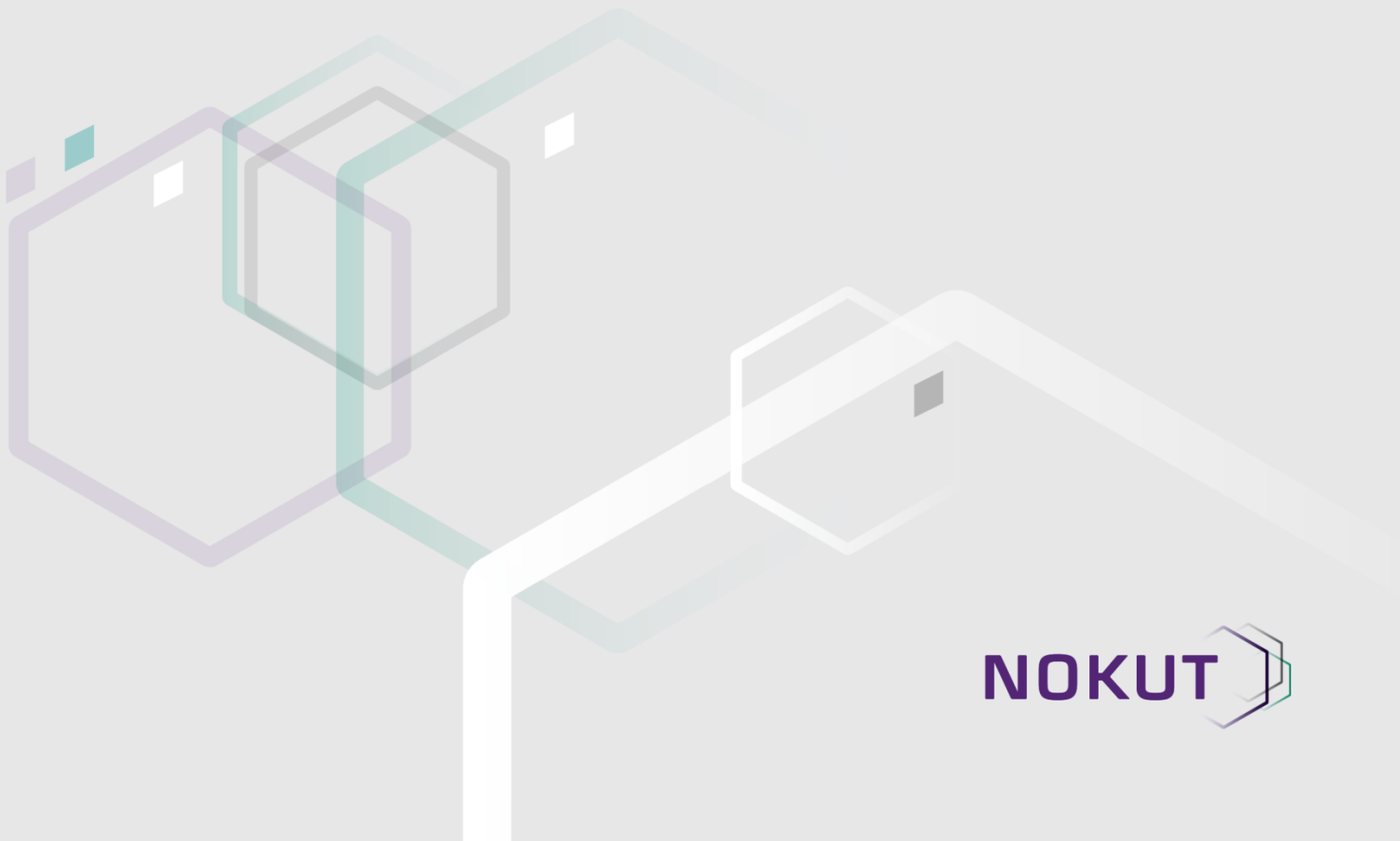# Data Science

Bachelor Degree at Noroff University College

October 2015

NOKUT

NOKUT (Norwegian Agency for Quality Assurance in Education) is the controlling authority for educational activity at all Norwegian higher educational institutions. This is achieved, among other, through accreditation of new study programs. Institutions that provide higher education have different authorization to create new study programs. If an institution want to create a provision outside of its field of authorization, it must apply to NOKUT for accreditation.

Institution:	Noroff University College
Name of educational provision:	Data Science
Degree/Credits (ECTS)	Bachelor Degree (180 ECTS)
Mode of delivery	Campus/on-line, full time/part time
Expert Committee:	Associate professor Ragnhild Kobro Runde, Universitetet i Oslo Associate professor Anne Cathrine Elster, Norges teknisk-naturvitenskapelige universitet
Date of decision:	12.10.2015
Archive number	15/48

NOKUT

Introduction

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

Hereby NOKUT presents the accreditation report of Bachelor Degree in Data Science at Noroff University College. The expert evaluation in this report is part of the accreditation process following Noroff University College's application for accreditation of Bachelor Degree in Data Science submitted before the application deadline on 1st of February 2015. This report clearly indicates the extensive evaluation performed to ensure the educational quality of the planned educational provision.

Bachelor Degree in Data Science at Noroff University College does not fulfil the conditions for accreditation in the *Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education*.

Oslo, 12th October 2015

Terje Mørland
Director general

Information on accreditation of educational provisions (in Norwegian):

http://www.nokut.no/no/Norsk-utdanning/Universitet-og-hogskole/Akkreditering-av-studietilbod/Korleis-sokje-akkreditering/

All of NOKUT's assessment are public and this assessment along with similar quality assurance reports are available electronically on our web pages www.nokut.no/NOKUTs-publikasjoner

Content

1 Information regarding the applicant institution

Noroff is one of Norway's largest private educational institutions. The institution consists of a university college, vocational schools, online studies and secondary schools. Noroff University College (NUC) is situated in Kristiansand and shares locations with a number of vocational studies, Noroff Secondary School and the central administration office.

NUC is a university college with accredited study programs. NUC must apply to NOKUT for accreditation of study programs of all cycles.

NUC has the following accredited study programs:

- Bachelor in Interactive Media (campus program) (180 credits), 2012
- Bachelor in Interactive Media (on-line program) (180 credits), 2012
- Bachelor in Digital forensics (campus program) (180 credits), 2012
- Bachelor in Digital forensics (on-line program) (180 credits), 2012

2 Description of procedures

NOKUT makes an administrative assessment to ensure that all basic conditions for accreditation are fulfilled as expressed in the Regulation concerning NOKUT's supervision and control of the quality in Norwegian higher education.[1] (Hereafter referred to as the Quality Assurance Regulation on Higher Education.) For applications that have been approved administratively, NOKUT appoints external experts for the evaluation of the application. The external experts have declared that they are legally competent to perform an independent evaluation, and carry out their assignment in accordance with the mandate for expert assessment passed by NOKUT's board, and in accordance with the requirements for educational quality as determined by the Quality Assurance Regulation on Higher Education.

Following their assessment, the expert committee shall conclude either with a yes or no as to whether the quality of the educational provision complies with the requirements in the Quality Assurance Regulation on Higher Education. NOKUT also requests that the expert committee advise on further improvements of the educational provision. All criteria must be satisfactorily met before NOKUT accredits an educational provision.

If the conclusion reached by the expert committee is negative, the report is sent to the applicant institution, which is then given three weeks to comment. Thereafter NOKUT decides whether the comments should be sent to the committee for additional consideration. The committee is given two weeks to submit the revised assessment. The director general then reaches a final decision about accreditation.

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

3 Expert assessment

This chapter is the expert committee's assessment. The term "we" refers to the expert committee as such.

3.1 Summary of the report

Overall, the application lacks structured organization and details that can convince the reviewers that this will be a satisfactory Bachelor program in Data Science.

With regards to the application format, the application lacks the general introduction as described on page 7 in "søkerveiledningen". This is not strictly required, but would have made it easier to understand the context and content of the application. In particular, it would have been useful with a description of the relationship between the different applications from NUC. In addition, this could have been a suitable location for an overall description of the various modes (campus/online and full/part-time).

Several parts of the application are repetitive and also a bit cut and paste from the guideline rather than providing detailed insight regarding accomplishing the goals. The application also lacks sufficient justification for many of the choices made.

The learning outcomes are largely taken directly from the National Qualifications Framework, instead of elaborating on what learning outcomes are actually expected for this particular program. This needs to be improved, and consequently also the other parts of the application dependent on the learning outcomes (e.g. the content and structure of the program, teaching and learning methods, and methods for assessment). In addition, recruitment and retention of students to satisfy a suitable learning environment as well as staffing issues are major concerns.

Note that it is not that this application is not lengthy enough, but an applications has to address the central issues, and preferably in a much more succinct and precise manner (quality over quantity).

We do not recommend accreditation of this program. The application should be thoroughly revised to correct all the issues raised in this report. We strongly suggest that NUC spend more time developing the study program, and hand in a new, revised application for approval at a later stage.

3.2 Basic prerequisites for accreditation (§ 7-1)

3.2.1 Requirements assessed by NOKUT

§ 7-1 (1) The following requirements laid down in the Universities and Colleges Act shall be assessed for accreditation:

     a) Internal regulations and governance

     b) Appeals committee

     c) Learning environment committee

     d) Education plan

     e) Diplomas and Diploma Supplement

f) Quality assurance system.

Assessment

Noroff University College (NUC) is regulated by bylaws, by instructions for the board and by regulations (general regulations and specific regulations for both the learning environment committee and the complaints committee); all dated January 2013. NUC's regulations are in accordance with the act relating to universities and university colleges of 1 April 2005 (hereafter "the Act"), except for the matters discussed below.

a) Internal regulations and governance

The following stipulations relating to NUC's board are not in accordance with the Act:

- According to the Act § 8-1, the board is the highest executive body and this needs to be stipulated in the bylaws (not in the instructions for the board). In addition, the board cannot be overruled by the general assembly; regulations of the Act precede company law. NUC's bylaws need to be amended accordingly.
- According to the Act § 8-1, representatives from students and staff are full members of the board with equal rights e.g. voting rights. Their rights cannot be limited to attend board meetings, speak and make proposals. NUC's bylaws paragraph 5 need to be amended accordingly.

b) Appeals Committee

The following stipulations relating to NUC's complaints committee are not in accordance with the Act:

- According to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) and the regulation of 10 October 2005 on a national appeals body for appeals according to the Act, the national appeals body is the only body competent to process complaints on expulsion and exclusion, complaints on annulment of examinations or tests and complaints on cheating (as a second instance organ).
  The NUC complaints committee is the only competent organ to process the abovementioned procedures as a *first* instance organ according to the same regulations. NUC's regulations on the complaints committee paragraph 3 need to be altered accordingly.
  It is correctly stipulated that NUC's complaints committee is competent to process appeals as a second instance organ on other matters such as complaints on local admission, complaints on decisions regarding exemption from examination, complaints on approval of courses, complaints on procedural errors in exams and other matters the board refers to the complaints committee.
  The complaints committee regulations paragraph 2 on the power of the administration to decide on appeals, constitutes in essence a reversal of a previous decision. Regarding the abovementioned matters, where NUC's complaints committee is the only competent body according to the Act to decide as a first instance organ (and the national appeals body as a second instance organ); there is logically no possibility for NUC's administration to reverse a decision. NUC's regulations on the complaints committee paragraph 2 need to be amended accordingly.

c) Learning Environment Committee

The mandate for NUC's learning environment committee and its composition are correctly described in NUC's regulations paragraphs 13 and 44.

d) Education plan

As NUC has accredited studies on bachelor level and has not made any changes to their education plan in these applications, this criteria is not assessed here,

e) Diplomas and Diploma Supplement:

The diploma has a simple design, and includes the elements recommended by UHR. It also includes the student number, which seems irrelevant to have on a diploma.

The transcript of Records lacks information as to when the course was taken (semester + year). The transcript should only include the courses actually taken by the students. Currently, all courses at the program is listed, with N/A instead of grade for the courses not taken by the student. This is confusing, and can be misinterpreted as a course with the result "pass".

Part 3.3 of the diploma supplement states that the access requirements are "General Norwegian matriculation standards with specific requirements for mathematics (see section 8)". However, section 8 does not contain any information on the mathematics requirements.

Part 4.2 of the diploma supplement should be updated with the revised learning outcomes (see separate section).

f) Quality assurance system

NUC is in the process of having their quality assurance system evaluated by NOKUT during autumn 2015. Thus, the quality assurance system is not assessed as part of this accreditation process.

Conclusion

No, the criterion is not fulfilled in any of the three applications.
NUC must:
- Amend NUC's bylaws according to the Act § 8-1, so that NUC's board is the highest executive body and cannot be overruled by the general assembly.
- Alter NUC's bylaws paragraph 5 according to the Act § 8-1, so that student and staff representatives are full board members (with voting rights).
- Alter NUC's complaints committee regulation paragraph 3 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) and the regulation of 10 October 2005 on a national appeals body for appeals according to the Act so that the mandate is in accordance with these regulations.
- Amend NUC's complaints committee regulation paragraph 2 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) so that the administrations competence to reverse

previous decisions is limited to those matters where NUC's complaints committee is a second instance appeals body.

- Revise Diplomas and Diploma Supplement.

3.2.2 Requirements in applicable regulations and curricula

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

Assessment

Admission requirements:

The admissions requirements must comply with the Norwegian admission regulations as dictated in "opptaksforskriften". Admission to the provision refers to "opptaksforskriften", and the main entry requirements are as follows:

1) Norwegian certificate of upper secondary education (generell studiekompetanse) with the added qualification criteria of specialization in natural science math (R1) or social science math (S1+ S2) . In addition, foreign students have to document English language proficiency equivalent to 140 hours of English from upper secondary education.

2) Applicants that are 23 or older with minimum 5 years of employment/education

In addition, 2-year vocational education or prior learning consisting of education, vocational experience or other qualifications may grant admission.

According to the applicant, ranking of the students will be done automatically through the FS GENS ranking rule.

The mathematics requirement of R1 or S1+S2 is in accordance with "opptaksforskriften", and suitable for this program of study. The general admission requirements are also in accordance with "opptaksforskriften", but NUC should elaborate on how they rank students and how the quota for first-time applicants (førstegangsvitnemålskvote) is distributed.

The applicant states that there will be two intakes per year, but does not address the practical consequences that follows, e.g. the minimum and maximum number of students admitted in each of the intakes. In addition, it is not clear if all courses will be given both semesters, or if the students starting in January will have a modified study plan. NUC initially estimated to recruit 15-20 students "typically divided between on-line and campus students", but do not set a lower minimum bound for campus students that would ensure a satisfactory learning environment (e.g. at least five on-campus students).

The intake in July is part of the SO admission system, but it is not described whether NUC intend to offer secondary admissions "etterfyllingsopptak" in the case of available student slots.

Conclusion

No the requirements are not satisfactory met.

NUC must:
- Justify how the admission requirement is in accordance with "opptaksforskriften", specifically how applicants are ranked and how the quota for first-time applicants is distributed.
- Include a description of how they will organize and structure the program for those that start in January.

NUC should:
- Consider whether to offer local secondary admissions in August or not, if any students many be admitted after the SO admission.

3.2.3 Recruitment of students

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

Assessment

NUC has estimated that an intake of 20-25 students per year will be sufficient both for financial reasons and for providing the students with a good learning environment. This number is said to be equally divided between online and campus students. In addition, as mentioned in the assessment in section 3.3.3 below, the number of electives that the students can choose from the third year poses a challenge: it is not clear if a student intake of 20-25 per year will be enough to maintain a satisfactory learning environment on each course.

Student retention is an issue for most institutions and programs of study. NUC presents the tuition fees as an argument in favor of students committing to the study. While this may be true for a given semester/year, the same is not necessarily the case for commitment to the three-year study as a whole. Or is NUC requiring a financial commitment for the full three years? If so, can this be justified? How will NUC then handle unforeseen circumstances such as sickness etc.? The tuition fee may very well have the opposite effect, and motivate students to transfer to public institutions. NUC also describes how the flexible learning environment and being a small institution can promote retention. However, NUC has not provided any documentation of their current dropout rates, or how the stability is ensured for the remaining students.

NUC states that during the first year, the students will study a common set of foundation courses alongside program specific subjects, so that they can easily change to a related program of study. This seems to be a good idea, but the detailed study plan does not indicate which subjects are foundation courses and which are program specific, and it is not clear if the change can be done without losing time (or taking more than 30 credits in one or more semesters). The possibility to change between programs also poses a challenge to the stability and the learning environment for the remaining data science students if many students change to others programs.

Although there are several positive elements, NUC has not justified that retention will be sufficient to ensure stability and a good learning environment for both online and campus students. Initial intake of 20-25 students seems to be too close to the normal class size of 20 and breakeven estimate of 15 to ensure that the students will be able to complete all three years of their degree study.

The learning environment for part-time students is not explicitly addressed in the application. For on-line students, it is positive that they are able to participate both in ordinary tutorial and studio sessions via the learning management system, and also in discussions in forums, blogs etc. However, on-line studying will always be more demanding of students with respect to e.g. self-discipline, and NUC should describe how they advise student to select between campus and on-line studies. In addition, for on-line students studying part-time, many of the positive elements described above are not applicable, if they are studying at a different pace that what is needed to follow that ordinary teaching sessions and hence with few other students to discuss with.

The description of student recruitment focuses primarily on companies and organizations, in addition to students attending other universities. There is little doubt that these are relevant markets, but probably more with respect to supplemental continuing education rather than complete degrees. Having a mix of students with different backgrounds and different motivation and goals for their studies can be a challenge, but also result in a stimulating environment as argued in the application. However, while this creates a good learning environment for each particular course, it does not necessarily give a stable learning environment for students studying for a complete bachelor degree.

Conclusion

No, the requirements are not satisfactory met.

NUC must:
- Describe and justify how the study program and study environment will remain stable enough despite possible drop-outs and especially that the drop-out rate does not become so high that they will have problems delivering what was promised to the students already admitted.
- Justify how the learning environment in year three is satisfactory given the large number of electives compared to the total student number.
- Explain how to recruit students to this Bachelor program in particular, not just NUC in general, or to certain courses.
- Explain how the part-time and/or on-line students can be guaranteed a satisfactory study environment.

NUC should:
- Consider setting a minimal limit not only for the program as a whole, but also with respect to number of on-campus students in each course, in order to ensure a satisfactory learning environment.
- Consider measures to ensure the students get a feeling of belonging and class-cohesion, especially in the common subjects that are taken across study program and/or by many part-time/single subject continuing education students.

3.2.4 Agreements regarding professional training

§ 7-1 (4) For programs including professional training, there must be adequate agreements regulating material issues of importance to the students.

Assessment

External practice or study is not part of this degree program.

3.3 Plan for the program (§ 7-2)

3.3.1 Program name

§ 7-2 (1) The program must have an appropriate title.

Assessment

The cover page states "Application for 180 ETCS in Data Science/Datavitenskap"

«Bachelor in Data Science» is an appropriate name for the program of study, covering the basics of computer science with a specialization in data science. However, the Norwegian name "Bachelor i Datavitenskap" is not appropriate.

"Datavitenskap" is not commonly used in Norwegian, but implies a broader field and possibly a more theoretical focus than what seems to be proposed here. "Data Science" more clearly implies a specific sub-discipline of computer science.

As Data Science is an emerging field, there is yet no established translation to Norwegian. We hence suggest using "Data Science" also in Norwegian since it is used in Norway as a concept within computer science, describing the area of study that concerns "Håndtering av Store Datamengder".

Although the applicant compares their program to the Data Sciences program offered by the University of Bergen (page 15), the program as specified by this application is not exactly comparable as the program offered in Bergen is much more comprehensive with a strong academic bent. The program proposed by NUC is much narrower and more applied.

NUC argues well that the Data Science name communicates to potential employers and to some extent to society as a whole, regarding what the study entails. However, it does not say anything regarding how this study program name communicates what this study program entails to student.

Conclusion

No, the study programs name is not sufficiently descriptive

NUC must:
- Find a better Norwegian name, or use the term "Data Science" also in Norwegian
- Justify how the name of the study program communicates the content of the program to potential students. This should be seen in context with recruitment measures for this specific study (see Section 3.2.3 of this report).

NUC should:
- Consider if "Applied Data Science" is a more appropriate title of the program

3.3.2   Overall learning outcome

§ 7-2 (2) The program must be described with reference to learning outcomes, cf. National Qualification Framework for Lifelong Learning. The overall learning outcome for each program, defined in knowledge, skills and general competence, shall be described.

The overall learning outcome as presented in the application is as follows:

Overall learning outcome:

Knowledge

An understanding of theories, facts, principles, procedures in the subject area of data science
- K1   Knowledge of important topics, theories, issues, processes, tools and methods within the fields of computing and data science
- K2   Demonstrate familiarity with current research and development work in the general computing domain and in data science
- K3   Knowledge of the key principles, theories, tools and techniques in the area of data science, ability to evaluate these tools and techniques, and to apply them in a variety of situations
- K4   Demonstrate ability to update his/her knowledge in the area of data science and computing, both through academic study and professional development
- K5   Knowledge of the history, traditions, and distinctive character of data science and its place in, and potential impact on society
- K6   Understand the legal and ethical issues relating to obtaining and analysing data, and presenting the results to stakeholders
- K7   Knowledge of applying data science principles, tools and techniques within complex scientific and industrial fields

Skills

The ability to utilise knowledge to solve problems or tasks (cognitive, practical, creative and communication skills)
- S1   Demonstrate the ability to apply academic knowledge and relevant results of research and development work to practical and theoretical data science problems, and make well--- founded, informed and justified decisions and choices

- S2   Demonstrate ability to reflect upon own academic practice and professional development, identify areas for improvement, and to adapt to future tools, techniques and technology
- S3   Demonstrate ability to find, evaluate and refer to information and scholarly subject matter and present it in a manner that sheds light on the problem
- S4   Demonstrate ability to appropriately and effectively find and analyse large heterogeneous data sets, and present the results of analysis in an appropriate form in a manner that sheds light on the problem
- S5   Demonstrate ability to select and use the primary tools and techniques for managing, manipulating and visualizing data in an appropriate and professional manor
- S6   To critically select and apply a range of analytical and methodological problem solving techniques, based on research, and to be able to interpret the solutions and present results appropriately.
- S7   The ability to identify appropriate stakeholders and communicate, network and collaborate with these stakeholders at an appropriate level.

General Competence

The ability to utilise knowledge and skills in an independent manner in different situations
- G1   Identify and appropriately act on complex ethical issues arising within academic and professional practice within the specialist field of data science, and the broader context of a computing professional
- G2   Plan, execute and manage a variety of assignments and projects over time, alone or as part of a group, to successful conclusion and in accordance with ethical requirements and principles
- G3   Communicate effectively using appropriate forms of communication electronically, orally and written, being able to present problems, solutions, theories and academic arguments in a professional manner.
- G4   Communicate and exchange opinions, ideas and other subject matters such as theories, problems and solutions, with others with background and/or experience in data science, through the selection and application of appropriate methods of communication, thereby contributing to the development of good practice within the data science community of practice
- G5   Demonstrate the ability for self---reflection as part of a lifelong learning strategy
- G6   Familiarity with current and new thinking and trends within the field of data science, and innovations in the field

Assessment

The learning outcomes described in Tables 2A, 2B and 2C are too general and nearly identical to a selection of bullet points from the bachelor descriptions in National Qualification Framework (NKR). Learning outcomes K6, K7, S4 and S5 are the most specific, while most of the other learning outcomes can be valid for almost any study by replacing "data science" with another field of study. The learning outcomes should be described much more specific for this particular program in data science.

A good starting point for developing more specific learning outcomes, is the overall descriptions of data science given at other places in the application, e.g. on page 14, page 16, page 30. In particular, something similar to the list "What is a data scientist" from IBM, given on pages 33 and 61, should be reflected in the learning outcomes. For instance, NKR should be used to describe the kind and level of knowledge and skills the students should get with respect to "Collecting organizing and managing data". Another example is ethical issues, which on page 16 is focused on personal privacy. This particular focus could e.g. be integrated into the formulation of a revised version of G1 ("Identify and appropriately act on complex ethical issues […] within the specialist field of data science").

Defining appropriate and useful learning outcomes is a challenging task, and should be given careful consideration. However, once defined, more specific learning outcomes have the potential to make it easier for potential students to decide whether to apply for the program or not, and to make it easier for NUC to use the learning outcomes as a guide for developing the content of the program (and for the committee to evaluate if the content of the study is aligned with the learning outcomes for the program).

Conclusion

No, learning outcomes are not satisfactory described.

NUC must:
- Make the description of learning outcomes more specific with respect to Data Science. It is not about filling in more details, but start from the overall descriptions, which are elsewhere in this application, and formulate them according to NKR.

3.3.3   Content and structure of program

§ 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
   a)   Content and structure of the program.

Assessment

The overall course structure of the program is fairly classical in that the first year starts with introduction to programming and other foundation courses, followed by an object-oriented programming class and algorithms and data structures the second year and more specialized program courses the third year. The overall study plan indicates that NUC will be offering 12 new courses (including the basic Computer Science course on algorithms).

The program of study includes two electives chosen from six possible courses. The electives are said to be grouped in two, so that the students will have to select one from each group. The grouping is not clear from the application, but the committee has assumed that one group consists of the courses in Smart Societies/Technologies/Industries, while the other group consists of Cryptography, Incident Management, and Natural Language Processing.

As mentioned above under section 3.2.3 - with an initial intake of 20-25 students and some expected drop-outs before the final term - when dividing the class in potentially three different groups based on

choice of electives, it is neither clear if this will be enough to maintain a satisfactory learning environment on each course, nor if NUC has the financial resources to offer all electives. NUC should carefully consider how many electives they offer, and the consequences of their choices.

It is positive that NUC has included courses on Problem-based Learning and Research Methodologies and "Professional Aspect of Computing". However, these courses need to be tied closer together with the other course offerings, including having the other courses refer back to aspects from these more general courses. Especially the Professional Aspect of Computing course needs a more significant two-way tie-in to the Information Security course and maybe also the database course.

In the course UC1PR1101: PRG1 – Introduction to Programming, there is a mismatch between the objectives/learning outcomes which focuses solely on pseudo-code, and the content description which states that the students will learn simple programming in C, including memory management and the use of libraries. For an introductory course in programming, NUC should consider using another language than C. As a first language, it is much more common to use Java or Python, or an educational language such as Scratch or Processing. Alternatively, the choice of C should be justified.

The Discrete Math course does not include expected topics such as recursion and induction, which are central concepts in basic computer science, including Data Science. Moreover, the total course content is not only limited in respect to the concepts covered but also with respect to the depth of which the selected topics are covered, yet the students are given a full 10-study point credit for this course.

Introduction to Information Security is only five credits. It could advantageously be merged in with "Professional Aspects of Computing" to ensure tighter integration. This is particularly relevant as the content of "Professional Aspects of Computing" is also quite security focused.

The courses Smart Societies/Technologies/Industries have on page 44 the identical learning outcome description except «the potential impact of Big Data on [Society/the technology sector/Industry]. This indicates that it should be one course with three different projects assignments. This would also be a good choice with respect to resources needed. The learning goals «Identifying, obtaining, analyzing and evaluating appropriate social media data» is too narrow. For all Data Sciences areas other types of data than what you find on social media is more relevant. Moreover, also here the ethical aspects are largely tied to privacy and not more general ethical issues related to how to exploit technology in important societal areas.

Full-time students are expected to take 4-5 courses per semester. NUC uses a block-like course structure where students take several individual courses, but need to complete a given course before starting the next course that builds on it, in addition to the studio/project courses that run throughout the academic year. This is not very well structured for part-time students. Even though NUC has this structure for each course in their course descriptions, there are no study plans or flow charts showing how part-time students can follow the program – both with respect to the fact that part-timers rarely can use 100% of their time for weeks at a time, and with respect to how it is possible to create a reasonable study plan where students at all times have enough prior knowledge. Or is NUC implying that part-time students do not sign up for the full bachelor program, but rather take one or more individual courses?

The existing description of learning outcomes as assessed above is too general to be able to make a good assessment regarding whether the content and structure of the study program is in agreement with the learning outcomes.

Overall, there seems to be many issues concerning how the various courses in the program are organized, their contents and their specific learning outcomes. A more detailed plan regarding learning outcomes needs to be developed. The above courses are just examples of the issues we are pointing out. A similar review needs to be done for almost all courses.

We do want to mention that the idea of Studio courses is really nice, as long as they are tied sufficiently to the rest of the program and the learning outcomes for the given semester. Although most courses seem to be significantly lighter than comparable courses at the major Norwegian Universities, this could be compensated by more thorough reflections and papers written as part of the corresponding studio courses. However, a lot of the quality then depends on how well this is implemented.

Conclusion

No, the study program's content and structure is not satisfactory with respect to learning outcomes as it is described in the plan submitted.

NUC must:
- State clearly which electives are grouped together – in that students may choose one from each groups.
- Describe whether NUC count on being able to offer all the courses described, or whether it would depend on sign-up/drop-out.
- Show an example of a realistic study program for the part-time students.
- After making more specific learning outcomes, describe and explain how the study program's structure and content agrees with it so that that the learning outcomes are achieved.
- Change the course description of UC1PR1101 (PRG1 – Introduction to programming) so that there is a match between learning outcomes and course contents.

NUC should:
- Consider if the courses societies/technologies/industries should be one common course rather than three separate, alternatively it should be considerable overlap in awarded study credits between the courses.
- Design a strategy to ensure that valuable aspects from the courses with focus on general/professional competence are integrated in the consecutive courses.
- Consider using another language than C in the first programming course; alternatively justify the choice of C.

3.3.4   Work and teaching methods

§ 7-2 (4) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
  b)   Work and teaching methods.

Assessment

Except from the studio-courses, all courses seem to follow the same structure with 9 hours of lectures, 27 hours of tutorials and supported study, 56 hours of self-study coursework and 33 hours on assessment for a 5 ECTS course (and the double for a 10 ECTS course). For a 6-7 week course of 10 ECTS, this gives a total of 10-12 hours per week of organized teaching, which is less than many comparable studies, particularly for first-year students. NUC argues that from experience, this is sufficient due to the use of the learning management system with online support material for each course. However, it is not obvious that the same teaching and learning methods are appropriate for all (non-studio) courses regardless of the learning outcomes and year of study.

For a majority of the courses, the course description states "Teaching will be based on problem based learning, where students will interact with peer reviews, in addition to tutor support." It is not clear from the application whether NUC uses the term "problem based learning" as the specific pedagogical approach PBL, or as a more general term. Other courses, including the course "Problem Based Learning and Research Methodologies" does not use problem based learning, but instead state that "Teaching activities will be mainly instructor lead, with a number of problem solving exercises." It is not clear whether these two sentences describe the same or different teaching methods, and in the latter case, the application lacks a justification (with respect to the learning outcomes) as to why the chosen method is the appropriate one for each course.

It is a bit unclear how much of the coursework will be offered in-class or if larger portions of the coursework will be done through on-line teaching only. If mostly on-line teaching, it is not entirely clear whether NUC can show sufficient proof of learning outcomes achieved given all the recent issues with MOOCs. For example, being able to communicate orally is part of the learning outcome G3. The application does not state how this is achieved through the teaching and learning methods, in particular for online and part-time online students.

Conclusion

No, the study program's work format and teaching methodology is not suitable with respect to achieving the learning outcome according to the plan

NUC must:
- After making more specific learning outcomes, describe and explain how the chosen teaching and learning methods are appropriate for achieving the learning outcomes.
- Make explicit what they mean by "problem based learning".

3.3.5   Examination and other types of evaluation

§ 7-2 (5) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
  c)   Examination and other types of evaluation

Assessment

Most courses rely on two term papers for assessment and a reflective blog. It is positive that NUC uses non-traditional assessment methods, but some courses should also use traditional oral or written exams. Compared to NUCs general principles of assessment on page 51, choosing mainly term papers and blogs, seems too narrow for the whole degree program.

The application includes the marking and assessment criteria for blog assessments, which is a good example of how such rubrics can be used for non-traditional assessment methods, as a guide to both examiners and students.

For the term papers, the applications provide few details regarding what these term papers are covering with respect to learning outcomes. Since NUC rely so heavily on term papers, it would also be prudent to question how they intend to ensure the students do their own work, and how NUC can ensure that the term papers reflect whether the student truly achieved the expected learning outcomes.

The examinations and evaluations should also for at least a significant number of basic computer science courses, such as algorithms and data structures, test whether the students truly achieved the learning outcomes expected for a bachelor's program in computer science through written examinations. In order to perform their tasks successfully in the lines of work indicated in the application, the candidates should be able to demonstrate certain basic skills in for example mathematics, statistics and choice of methodology off-hand without consulting textbooks or other means of aid.

Basing the evaluation on term papers only and no formal final exams, is also questionable with respect to ensuring consistent quality across programs. At a minimum, there needs to be a description of how external graders are involved. There needs to be at least some external grading done for quality control.

Conclusion

No, the study program's examinations and evaluation procedures described in the plan are not suitable for achieving the learning outcomes.

NUC must:
- Show that they will provide exam and evaluation systems that ensure that the students achieve the learning outcomes.

NUC should:
- Consider written examinations with external graders (censors) for quality control.

3.3.6   Relevance of program

§ 7-2 (6) The program must have a clear academic relevance for employment and/or further studies.

Assessment

On pages 61-62, NUC refers to possible relevant master programs for further studies, none of which are national. However, statements regarding whether it has been checked that the students with degrees from NUC would satisfy (the current) requirements of these master programs is missing. The students should also qualify for regular master's program in informatics (which we believe they may), and NUC should provide examples of such. Specifically, regarding the four study programs that are mentioned:

- NUY, USA: It does not seem that NUC students would qualify for this program. According http://cds.nyu.edu/academics/admission-requirements/ requirements include Calculus 1, linear algebra and "one of calculus 2, probability, statistics, or an advanced physics, engineering, or econometrics course with heavy mathematical content".

- University of Amsterdam: The expert committee is unsure whether the students fulfill the requirement regarding "a solid quantitative background". Three years of relevant employment is also required.

- Danube University, Austria: This program does not seem to be comparable to a Norwegian master's degree program based on a data science bachelor degree, but a master's degree that is based on a bachelor's degree from any degree program with only a computer requirement of "good knowledge of the internet". For example, this master's degree program contains a Module 1 course that is called "Data Literacy" (10 ECTS). It is therefore not an applicable example of further studies.

- The MSc program in Big Data and Text Analytics at the University in Essex, UK, is a 1-year master's program. Regarding requirements, all that is listed is "Our applicants should have a 1st, 2:1 or high 2:2 degree, or equivalent, in computer science, electronic engineering or a related discipline." It is not evident from the study plan or the application that the candidates of this program would qualify for this master's degree program given the above requirements.

- The admission requirements for the integrated master/Ph.D. program in Edinburgh is not explicitly stated on the university's home page. It is therefore not possible for the expert committee to judge if NUC-candidates would be eligible for admission.

When arguing for the relevance for employment, the application provides examples from other countries, in particular USA and UK. NUC should also provide relevant examples from Norway, preferably from both public and private sector.

Conclusion

No, this study program does not have a clear relevance for employment and/or further studies.

NUC must:
- Provide a clearer case for how this Bachelor program will satisfy admissions criteria for Master programs in Data Science - both nationally and internationally.
- Provide examples of relevant Norwegian job opportunities.

3.3.7 Links to research, academic- and artistic development

§ 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

Assessment

The application contains a very short description of the program's links to research. Most of the research that the relevant faculty members have been doing is on digital forensics, a very narrow part of Data Science and linked to another study program at NUC. It is not clear that, say Big Data analytics will be satisfactory covered as a R&D field at NUC.

The application states on page 62 that "All courses will include a review of a recent journal paper to highlight the importance of remaining current in the subject area." Although this is a good idea for some of the courses, it is too categorical and unrealistic to require this for all courses, e.g. the introductory courses in programming and information security, the studio courses and the methodology courses in mathematics and statistics. NUC should select some courses where reading research is a suitable way of achieving the learning outcomes, and describe that as part of the teaching and/or assessment methods for those courses.

Conclusion

No, the study program does not have an adequate link to research or development work related to data science

NUC must:
- Provide evidence of satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

NUC should:
- Have their main educators doing active research in the central themes of data science.
- Select a subset of courses where reading research is a part of the course in order to reach the desired learning outcomes of that course and the complete program.

3.3.8 Student exchange and internationalization

§ 7-2 (8) The program must have student exchange and internationalization agreements, adapted to its level, scope and other characteristics.

Assessment

There is an agreement for one exchange student to go to Teesside University, but this agreement is not signed. Although this exchange agreement is relevant for the program, the contract is not signed by either party and is therefore not valid. It is not clear at what point of time in the study program that the students may be able to take courses at Teesside University instead of at NUC and at the same time still achieve the relevant learning outcomes.

The rest of the contracts shown are for course development and research collaborations. These MoUs are very general, and at best refer to the field of computer science as a whole. It is therefore not clear if these collaborations are of relevance to the bachelor degree program in Data Science.

Conclusion

No, the program does not have satisfactory student exchange and internationalization agreements, adapted to its level, scope and other characteristics

NUC must:
- Provide at least one valid and legally binding exchange agreement relevant for the program, including a justification for how the student(s) still achieve the relevant learning outcomes and when during the program the exchange is possible.
- Show that the program has internationalization arrangements, adapted to its level, scope and other characteristics.

3.3.9   Infrastructure

§ 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.

Assessment

The application contains a general description of the facilities offered by NUC, but it is not related to the bachelor degree program in Data Science. A contract for renting a property in Kristiansand is enclosed. How much of this property will be used by this program, and how much is allocated others needs to be addressed. In particular, the application does not address the eventuality that all five applications for accreditation that NUC has presently in the NOKUT-system will be granted. This will have a major impact on the total student number (a potential increase of almost 200 students). It is unclear whether the library facilities sufficient. The application only states that they subscribe to a "subset of ACM journals", but it is unclear which and whether they are the most relevant for this program.

Since so much of the teaching is internet bases via LMS, how much user support is provided for students that us their own laptops? In addition, what if they have general MS Windows issues, not just issues related to LMS?

Conclusion

No, the institution does not have infrastructure that is adapted to the program.

NUC must:

- Justify that the institution has facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program, and that can accommodate the potential large number of new students.

3.4 Academic environment associated with the program (§ 7-3)

3.4.1   The composition, size and competence of the academic environment

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

Assessment

The application gives a short description of the faculty staff involved in the program, and how these cover the core elements of the study program.

Overall, the expert committee finds the faculty staff involved in the teaching of this program to be oversubscribed, especially since most of the people listed in this application are also listed for several of the other application submitted by NUC and/or are heavily involved in currently running programs. For example, one of the main figures in this application is set to contribute 0,6 full time equivalent (FTEs) to this program. However, the expert committee notes that she is also set to contribute in the other four programs that NUC is applying for accreditation of: 0,4 FTEs in the Computer Science program and 0,2 FTEs in each of the three engineering programs – that is 1,0 FTEs in total before her contribution to the Data Science program is accounted for. The committee asks for a justification of how this person's time will be distributed between the five programs and the realism of this plan. In addition, as noted in section 3.3.3, given the ambitious number of new courses, we would like to see how NUC intend to offer all these courses with their current teaching resources.

In addition, a whole 1,0 FTE is allotted to a yet to be employed Associate Professor. According to the application, the recruitment process of this new staff member is dependent on NOKUT's accreditation of this study program as the contribution of this person is not essential for the *success of the program*. The expert committee does not find this satisfactory, given the very heavy workload that other staff members are already experiencing. In our experience, a recruitment process can be long and one seldom finds a perfect match. NUC therefore presently runs the risk of starting up this program without the new employee in place and/or with an employee that does not have all the desired competences to match the needed contribution to the study program.

Furthermore, we see no justification of how faculty staff is adequately equipped for conducting relevant research and academic or artistic development work, especially taking into account the fact that several of the staff members are so heavily involved in teaching several courses and programs.

Conclusion

No, the composition, size and collective competence of the relevant academic environment is not adapted to the program and not adequate for conducting relevant research and academic or artistic development work as described by the program description.

NUC must:
- Justify how the faculty staff's time is distributed between different courses and programs, and evaluate the realism of this plan
- Justify how the faculty staff is adequately equipped for conducting relevant research and academic or artistic development work relevant for the study program. Start the recruitment process of a new Associate Professor to cover 1,0 FTEs in the program

3.4.2   The academic environment's external participation

§ 7-3 (2) The academic environment must actively participate in national and international collaborations and networks relevant for the program.

Assessment

The application gives, again, a short description of the national and international collaborations and networks that the faculty staff engages in, such as GCE NODE, DIGIN IT cluster and Technology Futures Research Institute. In addition, several of the academic staff has taken their Ph.Ds. in the UK and seem to have maintained collaborations with their alma mater. The applicant very poorly describes how these collaborations and networks are relevant for the study program, but the expert committee can verify that at least some of these are relevant by examining the attached CV's and documentations – and that a minimum requirement of national and international participation is fulfilled. We would like to point out, however, that a sober approach to what is defined as active networks and collaborations relevant for the study program should be attempted in future applications. For example, that faculty staff has joined different groups on LinkedIn can hardly be seen as active collaborations/networks. It is also difficult to see how such informal networks can benefit of the study program.

Conclusion

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

NUC should:
- Expand international relations
- Have a more conscious approach as to how different collaborations and networks can contribute in enhancing the quality of a study program

3.4.3   Academic staff and employment

§ 7-3 (3) At least 50 per cent of the academic FTEs allotted to the program must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the program.

For the different cycles, the following additional requirements apply:

> a) For first cycle programs, at least 20 per cent of the collective academic environment must have competence at the level of at least associate professor.
>
> b) For second cycle programs, at least 10 per cent of the collective academic environment must be professors or docents, and an additional 40 per cent with competence at the level of at least associate professor.

Assessment

1,4 of 3 FTEs is occupied by persons who holds a Ph.D. Note that this quantification has been based on faculty staff members that have completed a Ph.D. only. For several of the staff members there is a discrepancy between the title of the positions given in the application and those given in the corresponding CV's. The CV of one staff member (contributing 0,1 FTEs to the study program) is missing. It is therefore not evident if these are hired in a position at least at the level of associate professor or not. 1,9 out of 3 FTEs is occupied by persons that has their main position at NUC. This shows that the minimum quantitative requirements are fulfilled.

NUC is an institution with already accredited study programs and NOKUT therefore presupposes that the institution follows the regulations concerning appointment and promotion to teaching and research posts (forskrift om ansettelse og opprykk i undervisnings- og forskerstillinger, FOR-2006-02-09-129), and that the procedures of the recruitment process are in accordance with this regulation.

According to the application, the core elements of the study program are Big Data Analysis, Data Visualization, Data Management, Data Quality, Machine Learning, Artificial Intelligence, Software Design and Development, Legal, Ethical and Social Issues, Professionalism and Problem Solving and Reflection Skills. We note that Problem Solving and Reflection Skills is covered by faculty staff members that according to table 3 in the application are employed as Assistant Professors, but the CVs states that these are employed as lecturers and/or researchers. It is therefore not evident to the expert committee that faculty staff members with the correct formal competence (at least at the level of associate professor) covers the core elements.

As mentioned above, 1,0 FTEs is allotted to a yet to be employed Associate Professor. This person is set to cover the core elements Artificial Intelligence, Big Data Analysis and Data Visualization. NUC has other competent staff covering these core elements, so in this respect we agree that the employment of this new person is not essential for the accreditation of the study program.

Conclusion

No, the academic staff does not satisfy the quantified requirements.

NUC must:
- Justify that faculty staff with the right formal competence cover all core elements.
- Provide CVs of all relevant faculty staff members, and quality control the content against the application.

3.4.4 The academic environment's research and development work

§ 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

For the different cycles, the following additional requirements apply:

      a) For first cycle programs, the academic environment must have documented results at a level that is satisfactory in relation to the content and level of the program.

b) For second cycle programs, the academic environment must have documented results at a high international level of quality, with satisfactory academic breadth.

Assessment

The text under this criterion in the application is much the same as the text under section 3.1. A few recent publications by the faculty staff are added, but none of these target data science in particular. For further information, the reader is referred to NUC's web pages and faculty staff publication lists provided in this application. The web pages contain very little information on research activities, and most of it seems related to music, gaming, e-learning and data forensics. In addition, the publication lists of the academic staff are not updated, and the applicant has not made a relevant selection of publications related to the Data Science program. In our opinion, there are few research articles related to the field of Data Science as such (other than in the area of forensics), but the application contains too little information under this criterion for the expert committee to make a full assessment.

Conclusion

No, the academic environment's research and development work does not appear to be at a level that is satisfactory given the study programs content and level.

NUC must:
- Provide adequate indication of how they intend to provide research-based teaching across the Data Science field

3.4.5 Supervision of professional training

§ 7-3 (5) For programs with supervised professional training, the academic environment and external mentors must have appropriate experience in the field of practice.

Assessment

Professional training is not part of this degree program.

4   Conclusion

Based on the written application with attached documentation, the expert committee concludes the following:

The committee does not recommend accreditation of the Bachelor degree in Data Science at Noroff University College.

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

The following requirements are not satisfied:

- §7-1 (1) Demands laid down in the Universities and Colleges Act must be satisfied.
- § 7-1 (2) Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.
- § 7-1 (3) The recruitment of students to the program should be large enough to enable the institution to establish and maintain a satisfactory learning environment and a stable program.
- § 7-2 (1) The program must have an appropriate name.
- § 7-2 (2) The program must be described with reference to learning outcomes, cf. National Qualification Framework for Lifelong Learning. The overall learning outcome for each program, defined in knowledge, skills and general competence, shall be described.
- § 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Content and structure of the program.
- § 7-2 (4) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Work and teaching methods.
- § 7-2 (5) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Examination and other types of evaluation.
- § 7-2 (6) The program must have a clear academic relevance for employment and/or further studies.
- § 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.
- § 7-2 (8) The program must have student exchange and internationalization agreements, adapted to its level, scope and other characteristics.
- § 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.
- § 7-3 (1) The composition, size and collective competence of the relevant academic environment must be adapted to the program as described by the program description and also adequate for conducting relevant research and academic or artistic development work.
- § 7-3 (3) At least 50 per cent of the academic FTEs allotted to the program must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the program.
- § 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

The following requirements must be satisfied in order to achieve accreditation:

- Amend NUC's bylaws according to the Act § 8-1, so that NUC's board is the highest executive body and cannot be overruled by the general assembly
- Alter NUC's bylaws paragraph 5 according to the Act § 8-1, so that student and staff representatives are full board members (with voting rights)
- Alter NUC's complaints committee regulation paragraph 3 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) and the regulation of 10 October 2005 on a national appeals body for appeals according to the Act so that the mandate is in accordance with these regulations
- Amend NUC's complaints committee regulation paragraph 2 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) so that the administrations competence to reverse previous decisions is limited to those matters where NUC's complaints committee is a second instance appeals body.
- Revise Diplomas and Diploma Supplement
- Justify how the admission requirement is in accordance with "opptaksforskriften", specifically how applicants are ranked and how the quota for first-time applicants is distributed.
- Include a description of how they will organize and structure the program for those that start in January.
- Describe and justify how the study program and study environment will remain stable enough despite possible drop-outs and especially that the drop-out rate does not become so high that they will have problems delivering what was promised to the students already admitted.
- Justify how the learning environment in year three is satisfactory given the large number of electives compared to the total student number.
- Explain how to recruit students to this Bachelor program in particular, not just NUC in general, or to certain courses.
- Explain how the part-time and/or on-line students can be guaranteed a satisfactory study environment.
- Find a better Norwegian name, or use the term "Data Science" also in Norwegian
- Justify how the name of the study program communicates the content of the program to potential students. This should be seen in context with recruitment measures for this specific study (see Section 3.2.3 of this report).
- Make the description of learning outcomes more specific with respect to Data Science. It is not about filling in more details, but start from the overall descriptions that are elsewhere in this application, and formulate them according to NKR.
- State clearly which electives are grouped together – in that students may choose one from each groups.
- Describe whether NUC count on being able to offer all the courses described, or whether it would depend on sign-up/drop-out.
- Show an example of a realistic study program for the part-time students.
- After making more specific learning outcomes, describe and explain how the study program's structure and content agrees with it so that that the learning outcomes are achieved.

- Change the course description of UC1PR1101 (PRG1 – Introduction to programming) so that there is a match between learning outcomes and course contents.
- After making more specific learning outcomes, describe and explain how the chosen teaching and learning methods are appropriate for achieving the learning outcomes.
- Make explicit what they mean by "problem based learning".
- Show that they will provide exam and evaluation systems that ensure that the students achieve the learning outcomes.
- Provide a clearer case for how this Bachelor program will satisfy admissions criteria for Master programs in Data Science - both nationally and internationally.
- Provide examples of relevant Norwegian job opportunities.
- Provide evidence of satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.
- Provide at least one valid and legally binding exchange agreement relevant for the program, including a justification for how the student(s) still achieve the relevant learning outcomes and when during the program the exchange is possible.
- Show that the program has internationalization arrangements, adapted to its level, scope and other characteristics.
- Justify that the institution has facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program, and that can accommodate the potential large number of new students.
- Justify how the faculty staff's time is distributed between different courses and programs, and evaluate the realism of this plan
- Justify how the faculty staff is adequately equipped for conducting relevant research and academic or artistic development work relevant for the study program. Start the recruitment process of a new Associate Professor to cover 1,0 FTEs in the program
- Justify that faculty staff with the right formal competence cover all core elements.
- Provide CVs of all relevant faculty staff members, and quality control the content against the application.
- Provide adequate indication of how they intend to provide research-based teaching across the Data Science field.

The committee offers the following advice to develop the study program further.

- Consider whether to offer local secondary admissions in August or not, if any students many be admitted after the SO admission.
- Consider setting a minimal limit not only for the program as a whole, but also with respect to number of on-campus students in each course, in order to ensure a satisfactory learning environment.
- Consider measures to ensure the students get a feeling of belonging and class-cohesion, especially in the common subjects that are taken across study program and/or by many part-time/single subject continuing education students.
- Consider if "Applied Data Science" is a more appropriate title of the program

- Consider if the courses societies/technologies/industries should be one common course rather than three separate, alternatively it should be considerable overlap in awarded study credits between the courses.
- Design a strategy to ensure that valuable aspects from the courses with focus on general/professional competence are integrated in the consecutive courses.
- Consider using another language than C in the first programming course; alternatively justify the choice of C.
- Consider written examinations with external graders (censors) for quality control.
- Have their main educators doing active research in the central themes of data science.
- Select a subset of courses where reading research is a part of the course in order to reach the desired learning outcomes of that course and the complete program.
- Expand international relations
- Have a more conscious approach as to how different collaborations and networks can contribute in enhancing the quality of a study program.

5   Comment from the institution

NUC received the report from Nokut in beginning of July and is responding with our comments within the extended time limit of 14 August 2015.

The committee did not recommend accreditation of the Bachelor degree in Applied Data Science at Noroff University College.

NUC has carefully gone through the report and provided justifications and made modifications.

NUC is of the opinion that conditional approval can be granted since the only major outstanding issue is the recruitment of one academic staff. The recruitment process has been started, and information will be submitted to Nokut as soon as the employment contract is signed. As agreed with Nokut in telephone meeting, the detailed response to each point raised from Nokut and the Committee in the joint "tilsynsrapport" are given in appendix 1 to this report. The main reasons for our conclusion are:

1. The comments to regulatory documents are considered and have been addressed. The NUC Board has agreed to all the required modifications. This is documented in minutes from the Board.
2. NUC comply with "opptaksforskriften" through participation in Samordna Opptak.
3. NUC have modified the general learning outcomes to make them more specific but still keeping the close relationship to NKR and the philosophy to harmonize and standardize the learning outcomes as much as possible. NUC have evaluated all detailed learning outcomes to ensure that they comply with the general learning outcomes modified according to the recommendation from the committee. As a result no modifications were required to the detailed learning outcomes. One word in a single course level outcome was modified as a result of changing of C to Python.
4. NUC have accommodated modifications to the program structure where appropriate. See appendix 1.
5. The recruitment of the missing academic member of staff has started and the present situation should allow conditional approval. Other comments regarding our staffing are considered to be minor and seem partly to be misunderstandings.

6. The Committee concerns with NUC part-time delivery are technical and have been covered in attachment 1 and 7. NUC will not introduce part-time studies until experience is gained with full-time offering.

7. The committee argues, "Several parts of the application are repetitive and also a bit cut and paste from the guideline rather than providing detailed insight regarding accomplishing the goals". NUC follow the Nokut template closely. This template is based on the use of a huge number of appendixes. Nokut has previously advised NUC that documents (in particular

   application and study plan) should be so complete that there should be no need to look up other documents while reading it. That can only be achieved with a certain repetition of content across documents.

8. The Committee require justification to many issues in our application. NUC emphasis is to give the reasons for a solution and then describe the solution. NUC has in appendix 1 further clarified, explained and given reasons to all the points where the Committee ask for justification.

We have accommodated modifications as required by the committee, provided the appropriate level of information, and given good reasons for our choices so that conditional approval can be granted.

Detailed comments

Basic Prerequisites

The Committee has highlighted issues in our regulatory documents which neither Nokut nor any previous committee has raised concerns over. It has already been decided by our Board to give staff and student representatives full rights and responsibilities and amend bylaws and complain committee documentation. (Our reason for not giving student and staff full rights before has been to protect these representatives from potential financial consequences that board members may face.) We would like an explanation from Nokut on the issue of reversing complaint decisions, which we do not understand, maybe due to that we have not encountered the need for this. We kindly ask if Nokut could provide a sample text that we can and will incorporate in the Complain Committee regulation.

Recruitment of students

NUC comply with "opptaksforskriften" trough our participation in SO. The Committee problematize our recruitment system and are concerned with NUC's capacity to address the situation where there are too many applications or there are too few students e.g. due to dropout. In educational institutions there will always be challenges related to recruitment. In accordance with Nokut requirements, we have stated our ambition to recruit 10 - 40 students. This is considered a sufficient number to create a working environment where students are able to discuss problems and engage in peer-to-peer learning in tutorial sessions. We have a robust QA system, a competent management and a qualified academic staff that will handle deviations. Up till now, NUC has always been able to offer all qualified applicants a place. Should we come into a situation where we receive more qualified applications than we can handle, the ranking will be based on MATRS (SO term for GSK + Math R1) results in combination with our impression from the interview of each candidate. In the interview we may advise the students to select other study

programs or consider our vocational school should we find them not suited or qualified.

Comments to the operation

The Committee asks us to describe and justify a number of issues. These are dropouts; learning environment, marketing, recruitment-process and a new requirement of minimal limit of students. We are aware of these important parts in running an education institution, but consider all these descriptions sufficiently given in the submitted documentation and the appendixes to this report. As part of our QA we are regularly revising and improving on our internal processes, learning environment and delivery. We can document actual dropout after 3 years of operation, which is satisfactory. We can also report from our student surveys that online students are marginally more satisfied than campus based students. NUC is focused on management by objectives (see our QA system) and believe in letting the board and management handle the operations according to laws and regulations.

Overall learning outcome

The Committee argues that the general learning outcomes are too general. NUC has revised the learning outcomes and made them more specific without changing the general intention. The learning outcomes are modified to be sufficiently general to communicate the qualifications to industry and society at large and specific enough for the students to understand the direction and content of the program. The general learning outcomes should be seen in relation to the specific learning outcomes given in each course description and the mapping given in the application. We also argue that they are similar in style to comparable courses offered at other Norwegian institutions. We also argue that we try to follow the approach given in National guidelines for engineering education developed by NRT. Here they argue that the learning outcome should as far as possible be standardized independent of institution. We support their argument and have therefore tried to be as close to description in NKR as possible. The strength of this harmonized approach is that industry will recognize them, it will make student transfer between academic institutions easier and make choice of education easier for the students.

Content and structure of program

We are pleased to see that the Committee has no severe structural comments to our program. NUC has taken note of all the comments from the committee and made changes where it is appropriate. See appendix 1.

Work and teaching methods

With our modified learning outcomes NUC are in compliance.

Examination and other types of evaluation

The answers to the committee are found in each course descriptor where the student evaluation of the courses in highlighted.

Relevance of program

NUC has provided the information that the Committee is requesting. See Appendix 1.

Infrastructure

NUC has the basic infrastructure in place with options to expand and increase capacity when needed. The infrastructure has proven its functionality over the last 3 years. See appendix 1 for

details

The composition, size and competence of the academic environment

The Committee problematize the allocation of staff time, and correctly observes that the same allocation of staff-time is repeated in several programs. The reason for this is that many courses are taught in several programs in parallel in such a way that the tutoring staff, and not the lecturing staff mainly covers the increased workload with large student groups. The committee should also note that lectures are recorded and can be viewed and reviewed at any time.
NUC has used the Nokut template in Table 3 (see appendix 7 for revised table).
NUC is continually working with the staffing issues and the recruitment process of staff is on-going. The financial reality of private institutions is that the employment of additional staff is at least partially dependent on program approval. An updated staffing table, CV and publication list is attached in appendix 7,8,9.

The academic environment's external participation

NUC takes note of good advice from the committee and will work to continually strengthen our external collaboration with international partner universities, industry clusters and individual companies. See details in appendix 1.
The academic environment's research and development work

All teaching is research based in that staff will include their recent work as examples in the lecture sessions. Guest lectures from researchers take place during the year. Current research papers are referenced and discussed in class. Students are involved in research activities and are encouraged to develop ideas and to write papers themselves.

Kristiansand 14 August 2015
Ernst Sundt, Rector NUC

6   Additional expert assessment

6.1   *Basic prerequisites for accreditation (§ 7-1)*

6.1.1   Requirements assessed by NOKUT

§ 7-1 (1) The following requirements laid down in the Universities and Colleges Act shall be assessed for accreditation:
      a) Internal regulations and governance
      b) Appeals committee
      c) Learning environment committee
      d) Education plan
      e) Diplomas and Diploma Supplement
f) Quality assurance system.

NUC must:
- Amend NUC's bylaws according to the Act § 8-1, so that Noroff's board is the highest executive body and cannot be overruled by the general assembly

- Alter NUC's bylaws paragraph 5 according to the Act § 8-1, so that student and staff representatives are full board members (with voting rights)
- Alter NUC's complaints committee regulation paragraph 3 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) and the regulation of 10 October 2005 on a national appeals body for appeals according to the Act so that the mandate is in accordance with these regulations
- Amend NUC's complaints committee regulation paragraph 2 according to the Act § 5-1 (7) cf. §§ 4-7 (3), 4-8 (10), 4-9 (5) and 4-10 (4) so that the administrations competence to reverse previous decisions is limited to those matters where NUC's complaints committee is a second instance appeals body.
- Revise Diplomas and Diploma Supplement

Assessment

a) Internal regulations and governance

NUC held an extraordinary board meeting of which the minutes are sent as Appendix 2 to NOKUT.

In this board meeting, the NUC board decided that student and staff representatives are registered as full members of the board, and that the NUC bylaws will be amended so that NUC's board is the highest executive body and cannot be overruled by the general assembly.

However, since NUC AS is a corporation, § 5-18 of the private limited companies act ("aksjeloven" in Norwegian) applies. Accordingly, only NUC's general assembly has the competency to amend NUC's bylaws, not NUC's board. The act relating to universities and university colleges ("the Act") only precedes the private limited companies act on those issues it regulates (e.g. the Act prescribes in § 8-1 that the board is the highest executive body, a stipulation which precedes the private limited companies act). The Act does not regulate the competency of a board to amend a corporation's bylaws, thus § 5-18 of the private limited companies act applies.

For the amendments to NUC's bylaws to be valid, they need to be decided upon by NUC's general assembly.

In addition, NOKUT requires to be presented the amended bylaws, as this is one of the obligatory appendices to an application for accreditation.

b) Appeals Committee

NUC's board decided to alter the complaints committee regulation in accordance with NOKUTs remarks on the legal requirements prescribed by the Act.

NOKUT requires to be presented NUC's amended complaints committee regulation, as this is one of the obligatory appendices to an application for accreditation.

NUC commented in its response to the report that it does not understand the issue of reversing complaint decisions. In the complaints committee regulations paragraph 2, it states: *"If the administration at Noroff has no doubts that a complaint should be upheld, the decision on the complaint can be made by the administration itself. The Administration must inform the Noroff Board about decisions taken in relation to complaints."*

However, on those matters where the NUC's complaints committee is the only competent body to decide as a first instance organ according to the Act, it is also the only competent body to reverse ("omgjøre" in Norwegian) its own decisions, according to § 35 of the public administration act ("forvaltningsloven" in Norwegian). Therefore, NUCs administration cannot be accorded the power to decide upon complaints or reverse decisions made by the complaints committee.

e) Diploma and Diploma Supplement

In their comment, NUC states that they have revised the diploma and diploma supplement. However, as NUC has not provided a revised version of these documents we are not able to assess these new versions.

Conclusion

No, the criterion is not fulfilled.

6.1.2   Requirements in applicable regulations and curricula

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

NUC must:
- Justify how the admission requirement is in accordance with "opptaksforskriften", specifically how applicants are ranked and how the quota for first-time applicants is distributed.
- Include a description of how they will organize and structure the program for those that start in January.

Assessment

NUC has described that they comply with "opptaksforskriften" with MATRS (mathematics R1) and that their local intake will follow the same procedure. They have adjusted the requirement of "good grades" in mathematics to a passing grade in R1 (or similar), and that the requirement will be the same for all applicants. NUC states that for the time being, they will not offer entry in January. Later, the students starting in January will follow the standard delivery model, but with 6 months delay. However, nothing else in the application or in the response indicates that all courses will be delivered both semesters. If the courses are delivered only once a year, based on students starting in August, it is hard to see that the students starting in January will get an equally good learning environment. This part of the criterion would be fulfilled if NUC *only* offer fall admission. Spring admissions needs a better plan for how to integrate the new students into the existing program, regardless of postponement of start-up.

Conclusion

No, the criterion is not fulfilled.

6.1.3   Recruitment of students

NUC must:

- Describe and justify how the study program and study environment will remain stable enough despite possible drop-outs and especially that the drop-out rate does not become so high that they will have problems delivering what was promised to the students already admitted.
- Justify how the learning environment in year three is satisfactory given the large number of electives compared to the total student number.
- Explain how to recruit students to this Bachelor program in particular, not just NUC in general, or to certain courses.
- Explain how the part-time and/or on-line students can be guaranteed a satisfactory study environment.

Assessment

NUC states that once a program is started, they are committed to offer all 3 years of education, and that sharing courses between programs helps secure a robust study environment. However, the issue of a satisfactory learning environment for the specialization courses with a low intake and possible dropouts is not addressed.

NUC has replied that the electives are grouped into two groups of three options, and there will be a maximum of three groups of students. NUC has not addressed the concern that with an initial intake of 20-25 students, if - after dropouts - the number of students in each of the three groups will be sufficient to maintain a satisfactory learning environment in each of the electives.

The bachelor program is said to have its own marketing activities as part of the general marketing plan. The committee agrees that the details of this can be left to NUC, but strongly recommends that NUC has marketing material where the similarities and differences with respect to the other programs at NUC is clearly described.

NUC states that student evaluations show that online students are marginally more satisfied than campus students. NUC do not plan to offer part-time studies until they have experience with full-time students, but provide a plan for 50% part-time studies where all courses are stretched to take twice as much calendar time as for full-time students. This means that for most of the time, part-time students will not be studying together with full-time students, and NUC states that part-time students will typically be on-line students. NUC should be clear in both the application and in marketing material if part-time means on-line or not. Further information of the study environment for part-time students is not provided. As long as NUC plan to offer part-time studies for this program, they must show that students can be guaranteed a satisfactory study environment.

Conclusion

No, the criterion is not fulfilled.

6.2   Plan for the program (§ 7-2)

6.2.1   Program name

§ 7-2 (1) The program must have an appropriate title.

NUC must:

- Find a better Norwegian name, or use the term "Data Science" also in Norwegian.
- Justify how the name of the study program communicates the content of the program to potential students. This should be seen in context with recruitment measures for this specific study (see Section 3.2.3 of this report).

Assessment

The name has been changed to "Applied Data Science" in both English and Norwegian. A short justification is provided.

Conclusion

Yes, the criterion is fulfilled.

6.2.2 Overall learning outcome

§ 7-2 (2) The program must be described with reference to learning outcomes, cf. National Qualification Framework for Lifelong Learning. The overall learning outcome for each program, defined in knowledge, skills and general competence, shall be described.

NUC must:

- Make the description of learning outcomes more specific with respect to Data Science. It is not about filling in more details, but start from the overall descriptions, which are elsewhere in this application, and formulate them according to NKR.

Assessment

The learning outcomes are improved in that they have been made more specific for data science in general and this program in particular. NUC has not revised the learning outcomes as thoroughly as recommended by the committee. There is still room for improvement, but the revised learning outcomes are found to be satisfactory.

Conclusion

Yes, the criterion is fulfilled.

6.2.3   Content and structure of program

§ 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
   d)   Content and structure of the program.

NUC must:

- State clearly which electives are grouped together – in that students may choose one from each group.
- Describe whether NUC count on being able to offer all the courses described, or whether it would depend on sign-up/drop-out.
- Show an example of a realistic study program for the part-time students.
- After making more specific learning outcomes, describe and explain how the study program's structure and content agrees with it so that that the learning outcomes are achieved.
- Change the course description of UC1PR1101 (PRG1 – Introduction to programming) so that there is a match between learning outcomes and course contents.

Assessment

NUC has described how the electives are grouped, and this is as assumed by the committee in the previous report.

In the response to this part, NUC states that "electives will be run based on the decision of number of enrolments", which we interpret to mean that they will not necessarily offer all electives each year. As long as this is clearly communicated to the students before they enroll in the first year, this committee agrees with this decision.

NUC has provided a study plan for part-time students studying 50%. The plan is essentially the same as for full-time students, only stretched out in time. To solve the issue of courses given in block-structure, part-time students are said to typically be online students. As NUC will not offer part-time studies for the first years, the committee has not evaluated this further. However, as mentioned above in the assessment of the study environment, as long as NUC plan to offer part-time studies for this program they must have a realistic study program for these students.

Although revising the overall learning outcomes, NUC has not revised the table describing how these are achieved through the structure and content of the program. NUC has not done a thorough review of all courses as recommended by the committee. As this report is only a supplement to the original report, the committee has not performed an evaluation of the complete table matched with the learning outcomes. However, a partial evaluation shows that this criterion is not fulfilled. For instance, K5 states that the student "has knowledge of the history and development of big data analytics and data science", although such a history is not present in the learning outcomes (or description) of any of the courses marked for K5 in table 3A in the application.

The PRG1 course has been changed as advised by the committee.

Conclusion

No, the criterion is not fulfilled.

6.2.4   Work and teaching methods

§ 7-2 (4) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
    e)   Work and teaching methods.

NUC must:

- After making more specific learning outcomes, describe and explain how the chosen teaching and learning methods are appropriate for achieving the learning outcomes.
- Make explicit what they mean by "problem based learning".

Assessment

NUC provides little new information under this criterion. The original conclusion therefore is unaltered.

Conclusion

No, the criterion is not fulfilled.

6.2.5 Examination and other types of evaluation

§ 7-2 (5) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:
    f)   Examination and other types of evaluation

NUC must:
- Show that they will provide exam and evaluation systems that ensure that the students achieve the learning outcomes.

Assessment

Under this criterion, NUC mainly refers to the original application previously assessed by the expert committee. The expert committee is not able to see that NUC has provided any new information and argumentation to convince the committee to change its original conclusion. The original conclusion therefore is unaltered.

Conclusion

No, the criterion is not fulfilled.

6.2.6 Relevance of program

§ 7-2 (6) The program must have a clear academic relevance for employment and/or further studies.
NUC must:
- Provide a clearer case for how this Bachelor program will satisfy admissions criteria for Master programs in Data Science both nationally and internationally.
- Provide examples of relevant Norwegian job opportunities.

Assessment

NUC has provided examples of relevant job opportunities in Norway.

NUC states that TU has approved this program for Master courses at TU and elsewhere in the UK, but has not provided any details. It is therefore not clear whether these are Master programs in data science building on their existing degree. NUC seems to believe that since they cover all learning

outcomes for NKR level 6, their candidates will satisfy admissions criteria for master programs in Norway. However, most master programs in Norway will have specific criteria with respect to the number of credits, kind and/or level in subjects such as computer science and mathematics/statistics.

Conclusion

No, the criterion is not fulfilled.

6.2.7 Links to research, academic- and artistic development

§ 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

NUC must:

- Provide evidence of satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

Assessment

The expert committee is not able to see that NUC has provided any new information and argumentation to convince the committee to change its original conclusion. The original conclusion therefore is unaltered,

Conclusion

No, the criterion is not fulfilled.

6.2.8 Student exchange and internationalization

§ 7-2 (8) The program must have student exchange and internationalization arrangements, adapted to its level, scope and other characteristics.

NUC must:

- Provide at least one valid and legally binding exchange agreement relevant for the program, including a justification for how the student(s) still achieve the relevant learning outcomes and when during the program the exchange is possible.
- Show that the program has internationalization arrangements, adapted to its level, scope and other characteristics.

Assessment

NUC describes that the exchange is planned to cover participation in seminars, conferences, summer schools etc., and that the students will still need to take all the required courses at NUC. However, the agreement is still not signed.

Conclusion

No, the criterion is not fulfilled.

6.2.9   Infrastructure

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§ 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.

</div>

NUC must:

- Justify that the institution has facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program, and that can accommodate the potential large number of new students.

Assessment

NUC has only partly addressed the concerns of the committee. In particular, the concerns with respect to library facilities for online students and laptop support are not addressed.

Conclusion

No, the criterion is not fulfilled.

6.3   Academic environment associated with the program (§ 7-3)

6.3.1   The composition, size and competence of the academic environment

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

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NUC must:
- Justify how the faculty staff's time is distributed between different courses and programs, and evaluate the realism of this plan
- Justify how the faculty staff is adequately equipped for conducting relevant research and academic or artistic development work relevant for the study program.
- Start the recruitment process of a new Associate Professor to cover 1,0 FTEs in the program.

Assessment

NUC's current faculty does have significant focus on data forensics, a topic within Data Science and hence as such is a match with the proposed Bachelor program. The research filed of current staff is a bit narrow. They promise to be hiring more faculty. However, there is still a major concern that the faculty will be oversubscribed, especially since they are cross-listed with the other application submitted to NOKUT and/or are heavily involved in currently running programs.

Furthermore, we see still do not see enough justification of how faculty staff is adequately equipped for conducting relevant research and academic or artistic development work, especially

taking into account the fact that several of the staff members are so heavily involved in teaching several courses and programs.

Conclusion

No, this criterion is not fulfilled.

6.3.2   Academic staff and employment

> § 7-3 (3) At least 50 per cent of the academic FTEs allotted to the program must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the program.
>
> For the different cycles, the following additional requirements apply:
>   a) For first cycle programs, at least 20 per cent of the collective academic environment must have competence at the level of at least associate professor.
>   b) For second cycle programs, at least 10 per cent of the collective academic environment must be professors or docents, and an additional 40 per cent with competence at the level of at least associate professor.

NUC must:
- Justify that faculty staff with the right formal competence cover all core elements.
- Provide CVs of all relevant faculty staff members, and quality control the content against the application.

Assessment

NUC states: "NUC is of the opinion that conditional approval can be granted since the only major outstanding issue is the recruitment of one academic staff. The recruitment process has been started, and information will be submitted to NOKUT as soon as the employment contract is signed."

However, they do not quantify what kind of staff is going to be recruited or whether this person will adequately cover all of the data science courses that are needed for a solid general data science degree.

Furthermore, we see that three names are missing from the updated table 3, contributing with a total of 0,7 FTAs. These three persons were in the original table 3 of the application set to cover data visualization, cryptography and steganography, software development, network security, problem solving and research methods, data management, project management, and computing and manufacturing. One new name is added to the updated table 3, contributing with 0,6 FTAs. This person is said to cover most of the above areas, except from data visualization, and computing and manufacturing. However, for the new person two of the areas are described as information security and networking, which is not necessarily the same as cryptography, steganography and network security. From the attached CV/publication list, the research profile of the new person seems to be very much focused on diagrams, and little on core aspects for data science. NUC offers no justification as to how the current staff has the right formal competence, and that they cover all core elements.The expert committee is not able to see that NUC has provided enough new relevant information and argumentation to convince the committee to change its original conclusion. The original conclusion therefore is unaltered.

Conclusion

No, the criterion is not fulfilled.

6.3.3 The academic environment's research and development work

§ 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.
For the different cycles, the following additional requirements apply:
　　　a) For first cycle programs, the academic environment must have documented results at a
　　　level that is satisfactory in relation to the content and level of the program.
b) For second cycle programs, the academic environment must have documented results at a high international level of quality, with satisfactory academic breadth.

NUC must:
* Provide adequate indication of how they intend to provide research-based teaching across the Data Science field.

Assessment

Under this criterion, NUC in their comment explains how students are exposed to relevant research in the study program. However, this is not what the expert committee asks for here. As discussed in the report, it is a justification that the faculty staff is adequately engaged in research or academic development work related to the field of Data Science as such we are asking for. We see that the *must-*point presented in the conclusion read in isolation could suggest that we were asking for a justification of the link between the study program and relevant research, but the conclusion must be understood in light of the related assessment.

The expert committee is not able to see that NUC has provided any new information and argumentation to convince the committee to change its original conclusion. The original conclusion therefore is unaltered.

Conclusion

No, the criterion is not fulfilled.

6.4 Final conclusion

Based on the written application, attached documentation and the commentary from the institution, the expert committee concludes as follows:

The committee does not recommend accreditation of a bachelor degree study in Data Science at Noroff University College (NUC)

On a final note, the expert committee would like to encourage NUC to further develop this study program and apply for accreditation at a later stage. The concept presented here, albeit not fully matured, is an interesting supplement to the current provisions in the field of data science in Norway.

7   Decision

We have assessed the criterions in NOKUT's Regulations concerning supervision of the educational quality in higher education (Academic Supervision Regulations), and have reached the following **decision**:

Bachelor Degree in Data Science (180 ECTS) at Noroff University College is not accredited.

The following requirements in NOKUT's Regulations concerning supervision of the educational quality in higher education (Academic Supervision Regulations) are not met:

- §7-1 (1) Demands laid down in the Universities and Colleges Act must be satisfied.
- § 7-1 (2) Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.
- § 7-1 (3) The recruitment of students to the program should be large enough to enable the institution to establish and maintain a satisfactory learning environment and a stable program.
- § 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Content and structure of the program.
- § 7-2 (4) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Work and teaching methods.
- § 7-2 (5) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved: Examination and other types of evaluation.
- § 7-2 (6) The program must have a clear academic relevance for employment and/or further studies.
- § 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.
- § 7-2 (8) The program must have student exchange and internationalization agreements, adapted to its level, scope and other characteristics.
- § 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.
- § 7-3 (1) The composition, size and collective competence of the relevant academic environment must be adapted to the program as described by the program description and also adequate for conducting relevant research and academic or artistic development work.
- § 7-3 (3) At least 50 per cent of the academic FTEs allotted to the program must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the program.
- § 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

8   Documentation

15/48-1, Noroff University College - søknad om akkreditering av bachelorstudiet Data Science (180 studiepoeng)

15/48-16, Tilbakemelding til sakkyndiges vurdering av Noroff University College - søknad om akkreditering av fellesgraden Bachelor in Computer Science

9 Presentation of the Expert Committee

Associate professor Ragnhild Kobro Runde, University of Oslo (UiO)

Runde is an associate professor at the Department of Informatics (IFI), UiO and head of the Study Lab at the department. The Study Lab particularly caters the freshmen at IFI with measures to create well-being, mastery and enhanced motivation for further studies. They give courses in strategy for learning and specific courses for teacher assistants, as well as continuously working with development of the teaching at the department. Runde is also central in the on-going revision of the program portfolio at the Faculty of Mathematics and Natural Sciences, UiO. Runde is Dr. Scient. in Informatics from UiO. She has worked as a post-doctor, researcher on the SARDAS-project and as a lecturer at IFI. Runde has taken several education-courses at UIO and has substantial experience as course responsible, lecturer and teacher assistant of several informatics courses. She has also been a member on the board of teaching at IFI since 2013.

Associate professor Anne Cathrine Elster, Norwegian University of Science and Technology (NTNU)

Elster is an associate professor at the Department of Computer and Information Science, NTNU. She has a PhD in Electrical Engineering from Cornell University, and is the founder and leader of the Heterogeneous and Parallel Computing Lab (HPC-Lab), IDI. Elster is also Visiting Scientist at the University of Texas in Austin. Elster has extensive experience from teaching, and has completed Pedagogisk utviklingsprogram (PEDUP). She (co-)supervises several PhD-and Master -students. Elster was previously employed at Schlumberger Austin, before she returned to academia in 1997, and has been a member of the MPI standards committees, and the Norwegian Research Counsel's HPC committee in 2003-2004. She was one of four WG leaders in EU COST Action IC0805: Open European Network for High Performance Computing on Complex Environments. Elster organized and hosted PARA 2008 in May 2008, and has organized a series of mini-symposia and international panels. She is annually part of several program committees within her field of expertise.