Molde University College

Periodic evaluation of study program – Spring 2022

Master of Science in Logistics

Final report based on external evaluation

Arild Hoff – Coordinator of study program

October 2022

1 Introduction

This is the final report in the periodic evaluation of the MSc in Logistics program 2022.

The evaluation is performed according to the regulations described in the quality system at Molde University College. It starts with a description of the process, followed by a section commenting the feedback from the industry contacts and another commenting on the report from the external expert. The next section is addressing each suggestion for potential changes or adjustments of the program and the final section with general conclusions.

This final report is written by the coordinator of the study program. A preliminary version was presented for the staff and discussed in a faculty meeting August 31, and further by email discussions in the faculty. In addition, it was presented and discussed in the Quality Team meeting October 5, involving the student representatives before the final version should be approved by the faculty board and submitted to Studieutvalget.

2 The process of periodic evaluation of the program

The evaluation process was first discussed in a faculty board meeting December 9, 2021. Then the program coordinator Arild Hoff started preparing the internal report to be used as the basis for the evaluation, assisted by Sigrid Haugros at the study office. The mandate and format of the evaluation was finally decided in a faculty board meeting March 2, 2022. Following that, a preliminary report was presented for the student representatives and the staff before discussions in the quality team and faculty meetings in early March. On March 10, logistics consultant and previous professor at BI Norwegian Business School, Stein Erik Grønland, was appointed as the external expert and he accepted the job. On March 23, two reference persons from the industry were appointed. These were Group Logistics Director in Ekornes AS, Jan Robert Lyngvær, and Logistics Director in Glamox AS, Steinar Abrahamsen. By March 28, the tentative internal report updated with comments and suggestions so far, was sent to the faculty staff, student representatives and the industry contacts for further comments and suggestions. The final internal report was completed April 25 updated with the latest feedback, before sent to the external expert with all the necessary attachments. He delivered his expert evaluation by June 21.

3 Comments from industry contacts

The Group Logistics Director in Ekornes, Jan Robert Lyngvær, was challenged to write his opinion about the program and delivered his comments April 7, 2022.

He concludes that the program in general is good when looking at the requirements for his company.

One of his suggestions is to consider changing the name to MSc in Supply Chain Management. This has to some extent been discussed earlier. We have defined the term *logistics* as a broader concept than *supply chain management* and chosen to use this name for the program. Topics like optimization, mathematical modelling and transport economics has been defined separate from pure supply chain management, even if they are related to logistics. However, these definitions are debatable, and the name of the program should continuously be discussed to determine whether it is the best suitable in the current understanding of the field.

Lyngvær also emphasizes the importance of a course in ERP-systems like the current IBE700. This course is mandatory for students in the information systems subdirection, but also a popular elective among students on other specializations.

This comment is also related to the aspect of digitalization and new concepts like Big Data, Artificial Intelligence, and Blockchain. So far few companies have been able to utilize such technology, but with the new generations with more digital experience entering the labour market, it is expected that this

will increase considerably in the future. Understanding the construction, technology and scope will be crucial for determining the cooperation between humans and machines. The importance of good quality data for automatization of processes and analyses is also highlighted. The student representatives in the Quality Team supports this view emphasizing the importance of being ahead with new technologies and teaching the most recent and updated software.

According to this industry contact, there is one specific topic he feels missing in the program, and this is related to developing sustainable transportation. This is not only connected to choosing transportation mode, but also about reducing the transportation distance. To some extent such topics are already covered in the program, but maybe not simultaneously. The new planned master in sustainable transportation and urban mobility is also expected to focus more on such aspects.

Another part considered missing is understanding what influences the working capital and in particular to understand the consequences of choices taken at different stages in the value chain.

The other industry contact, Logistics Director at Glamox, Steinar Abrahamsen, sent his comments to the program by April 20, 2022.

He agrees with Lyngvær that the program in general is good and says that the recruitment to their logistics department is mainly graduated students from Molde University College. He also states that one problem is that people do not see the whole picture, except only their small part of the chain, and this should be a responsibility by the educational institution to ensure an overall understanding by the students.

Some challenges will appear related to recent year's development. Especially how to navigate in a market rapidly changing the framework condition and how to minimize risk when similarly controlling costs.

This industry contact emphasizes the importance of getting back to physical teaching after the corona period. A hybrid teaching solution cannot replace the interaction that takes place during lectures.

He also feels there are four specific subjects missing in the current portfolio

- End to end visibility
- Sales and operations planning
- Risk in the value chain
- Business development/integration and cultural differences.

Like the other industry contact, Abrahamsen also emphasizes the importance of knowledge of ERP-systems and teaching sustainability within transportation/distribution and warehouses.

He also states that the logistics study can improve significantly by cooperating more with companies and argues that this should be a requirement within the various disciplines in the study program. In addition, he asks whether the study program could be better in preparing the student for the job searching phase after the studies.

4 Report from external expert

According to the quality system at Molde University College, the internal evaluation report of the study program should be evaluated by one or more external experts. The faculty board decided to appoint logistics consultant and previous professor at BI Norwegian Business School, Stein Erik Grønland, as this external expert. He accepted and delivered his report by June 21, 2022.

The external expert's conclusion is that the program is in well shape. All checkpoints considered seems satisfactory and the subjects taught are in line with what is offered internationally. Some smaller suggestions for further development are mentioned.

He also comments on the name of the program, concluding that the current name is adequate for the program, with subtitles covering the specializations.

For the SCM specialization he suggests looking into more quantitative subjects to get more insights into mechanism driving cost and service. Examples are inventory management models, multi-level optimization and price and discount mechanisms. For those selecting the information systems subdirection, he proposes to include something more about supply chain integration and various aspects of information exchange between actors and levels in the supply chain.

On the Logistics Analytics specialization he mentions capacity analysis as one subject that can be developed further. This includes finding bottlenecks and process capacity, also with multi-product flows, and combined with queuing models. Such applications could fit well into the course in Discrete Event Simulation.

In addition, he suggests considering a more flexible stream based on a combination of the SCM and LA specializations, which could fit well for students aiming to be generalists within the logistics field.

For the newly established specialization in sustainable freight transportation, he suggests some potential future developments in focusing even more on freight and less on passenger in the current MSc Logistics program. Another suggestion to strengthen the program is including more information on alternative systems for the various freight modes, like electric and hybrid solutions and hydrogen. This could be achieved by introducing parts of the cost management course, SCM705, focusing on cost management for freight transport including characteristics for alternative energy systems.

On a general basis he supports the student representatives' comments regarding limited feedback from the faculty to student exercises as an area that needs to be improved.

5 Comments to the suggested changes

The feedback from both industry contacts and the external expert is generally good.

Some of the suggestions should be considered to improve the program further. The bullet points below are suggestions mentioned, with comments on how we can meet each of them.

Jan Robert Lyngvær, Ekornes AS:

- *Considering changing name of the program*

  The name MSc in Logistics seems adequate and is well established. It is also reasonable to give a master in logistics since Molde University College is a specialized university in logistics. As the external expert suggests, we should keep the name combined with the subtitles covering the specializations.

- *Focusing more on new technology and digitalization*

  The program should be constantly evolved, and the logistics field should be thoroughly monitored to find new trends and developments.

  The seminar series is very suitable for introducing new subjects to the program, and new concepts like blockchain, big data and data mining have been included as seminars. Similarly, other topics could be introduced the same way, and eventually further developed into a full semester course.

- *More focus on how to create sustainable transportation chains (both choosing modes and reducing distance, frequency etc.)*

  We can consider developing the course TRA825 Multimodal Transports into a course in sustainable transport chains. Sustainability is already quite focused in the current module, but the focus could be enhanced.

- *Better understanding in what influences the working capital and knowing the consequences of decisions taken in the value chain*

  This point is treated in the course LOG711 considering decision science in the value chain. Some more emphasize could be given, and it should be considered to include this topic for students on other specializations as well.

Steinar Abrahamsen, Glamox AS:

- *Ensuring that students get an overall understanding of the whole picture of the value chain, not only the single parts of the chain*

  This is to some extent related to the previous point. The course LOG711 studies the topic of supply chain networks including the overall value chain, not only the single parts. Also here, it should be considered to include this topic for students on other specializations.

- *Industry should be involved more in the studies. Both as practicing in a company-like environment, and by solving real-life cases using theory learned in the study*

  The industrial contact mentions that seminars could be combined with practical business examples for combining theory and practical work. This could be suitable an can be considered for some seminars, while others have a more theoretical focus.

  Several staff members support the idea of involving the industry more in the teaching of courses, i.e. like providing the students with a realistic set of research questions that are actually deriving from the field experience and needs the various companies encounter in reality.

  Currently, the course LOG715 Business Cases in Logistics includes three different cases from the industry, for which the students should try to solve. This is mandatory for the Advanced SCM subdirection students and elective for the others. Other courses could probably better utilize this learning method.

  In addition master theses are often provided from the industry and students choosing these theses will get close cooperation with the company and insights on how the industry works.

  Another related point is to integrate the master students' thesis work stronger with our PhD students' projects through joint work, as well as in our own research activities. This will benefit both the master students, the PhD students and researchers. Not all thesis' topics are suitable for such cooperation, but probably a much higher share than used today. The PhD supervisors should be made better aware of this option.

- *Requirement for physical attendance should be enhanced*

After full-digital teaching during the corona-period, the study is now back to normal with physical education as the main rule. Most semester courses, however, have some kind of digital option for following lectures using online participation or video recordings. The seminar series in the third semester is still requiring physical attendance for the whole week.

Some flexibility in the teaching format seems to be necessary, although it is emphasized that the study is not meant for distance students. Some of the courses are, however, also given for the part time experience-based students, who normally are not based in Molde and need a digital option.

- *Missing subjects: End to end visibility*

  This is traditionally provided by ERP Business Intelligence software utilizing end-to-end data collected when executing the business processes. To some extent it is treated in the course IBE700 ERP systems. Business Intelligence with SAP was a previous seminar given in the third semester, and we might consider including it in the seminar series again.

- *Missing subjects: Sales and operations planning*

  This topic is to some extent included in the course SCM705 Cost Management in SCM. We will consider giving it a higher focus than today.

- *Missing subjects: Risk in the value chain*

  The program is constantly evolving, and topics like Risk Management and Supply Chain Resilience have recently been added to the program as a course or seminar. The topic is of increasing relevance, and should also be emphasized in other courses

- *Missing subjects: Business development/integration and cultural differences*

  We have previously had a seminar in cross cultural management. We should consider including something similar again. This topic should also be emphasized more in general in other courses as well.

Stein Erik Grønland, External expert:

- *More quantitative elements in the SCM specialization to show competitiveness and efficiency of supply chains and what can be achieved through integration. Potentially in a separate course in the third semester.*

  Examples can be inventory management models, multi-level optimization and the use of price and discount mechanisms.

  The course SCM703 Applied Supply Chain Management is supposed to cover some of the quantitative methods for the SCM-students. This might be extended with some more content regarding the topics mentioned above.

  A separate course in the third semester seems inconvenient in parallel with the seminar series.

- *Supply chain integration and various aspects of information exchange for information systems students.*

This subject is related to the content of the course IBE700 ERP systems and should be integrated in that course.

- *Capacity analysis, in particular for production management, and combined with queuing models for students on the LA specialization:*

  The theory can be included more in the current LOG713 Models for production management. As suggested by the expert, practical applications can be used in IDA715 Discrete Event Simulation.

- *A more flexible stream as a combination of SCM and LA for students aiming to be generalists within the logistics field*

  We will consider opening up for more electives across the specializations. Another separate stream is not considered appropriate at this stage.

- *Even more focus on freight and less on passenger transport on the SFT specialization.*

  The SFT specialization from the first semester was introduced this year. It might still be a discussion about the exact focus of the specialization and also how to separate it from the MSc in Sustainable Transport and Urban Mobility program.

- *More information on alternative systems for the various freight modes, like electric and hybrid solutions and hydrogen, on the SFT specialization.*

  As the expert suggests, we can include this topic in the cost management course for SCM-students, focusing only on freight transport using alternative energy systems.

- *Feedback from faculty to students needs to be improved.*

  This is mentioned on the comments from the student representatives and highlighted by the external expert.

  This is obviously a point where we can get better. Most courses do not have any other feedback than a final grade on the exam. More feedback during the course should be encouraged even if requires some more work for the course responsible.

  On master theses, the final oral exam will give some extra feedback on the written thesis where the graders will give their opinion about the different parts of the thesis.

  The supervision process on theses is, however, very individual and dependent on the relations between supervisor and student. Most students state that they are satisfied with the supervision, but there are still many examples of the opposite. There are different habits on supervision and students will also have different need for follow-up during the thesis work.

  In any case, this point should be emphasized for staff members at all levels, and the feedback to students should be improved both on regular courses, seminars and on thesis work.

In addition to the points above mentioned by the evaluators, there are some aspects that has come up in the discussions and should be considered when modifying the study program.

- *Course in scientific research/writing.*

There has been suggested to include a separate course in scientific research. This is to some extent now included in the seminar in Research Design, which is mandatory before starting to write the master thesis, but some more extensive teaching might be desirable. A crash-course in Latex for scientific writing has also been proposed.

- *Unpredictable number of students on the different specializations.*

  In the later years, we have had a high predominance on the SCM specialization. Within this specialization again, the Advanced SCM subdirection is dominating over the other alternatives. Historically, however, we have had years where both transportation, information systems and the quantitative direction (currently Logistics Analytics) have had the largest number of students. This unpredictable number of students makes problems with respect to the planning of courses and seminars.

  Even if the students should indicate their specialization in the application, they will have the opportunity to change this after starting in the first semester. Some kind of binding preregistration has been discussed, although it is desirable to have some flexibility for students starting in the first semester.

- *Unpredictable number of students on the different seminars.*

  This is partly related to the previous point. The same seminar can have a very high variation with respect to the number of students from one year to the next, which makes the planning difficult for the seminar holder. The reason relates to some extent to the number of students on the subdirections, but there are other factors influencing the students' choices as well. This could be which seminars taking place in parallel in the same week, and more subjective opinions on which topics that are popular at the time will matter.

  The students' free choice of seminars has been highly valued so far. However, it has been discussed to include some more guidance on the choices, like a certain number of seminars within their chosen specialization.

- *The evaluations were performed based on data up to 2021. Many parameters do not look so good when looking at the latest year.*

  There were considerably less applicants and number of students starting in 2022 than previous years. The new MSc in Sustainable Transport and Urban Mobility can explain some of it, but not all. We have also registered a higher number of withdrawals from the class started in 2021, and a group of students trying to study part time from distance having low study progression.

  The current labour market in Norway can explain the decline of Norwegian applicants, as it is now very easy to get a good job without a master's degree. The closing of societies and travel restrictions during the corona pandemic is probably some of the reason for the reduced number of international students.

6 Final conclusion

This is the first time a periodic evaluation of the MSc in Logistics program has been performed. The evaluation has taken place during most of the year 2022, and staff members and students have been involved and given valuable input to the process.

The evaluations of the program are in general positive, and hence, no substantial changes seem necessary at this stage.

Some suggestions for adjustments have been discussed in the previous section. Some of them could be easily introduced within the current course portfolio, while others are things to consider within a longer time frame. The program should be evaluated internally every year independent of the formal periodic evaluations.

Changes and adjustments to the program have in the latest years been discussed by email and on a faculty meeting in the start of the fall semester. This is a routine that should be continued making all staff members continuously reflecting over the content of the program.

Stein Erik Grønland, 21.6.2022

External expert evaluation for periodic evaluation of program for Master of Science in logistics

1. Introduction and scope

According to the internal report, the external expert should look at:

- The study program's relevance for society and labour market
- Whether the program provides a good learning environment
- Whether the program has a high enough degree of accomplishment
- Whether the program's learning outcome descriptions are updated and relevant
- Whether the program's content, learning activities and evaluation formats supports the general learning objectives

The external evaluation report should suggest how to improve the quality of the study program. It should point out good and weak sides of the program and suggest actions for potential improvement.
Externally, the most important factor might be to what extent the program is relevant for the labour market as well as for research. We should investigate if there are subjects that are missing or superfluous, and whether the program meets the current and expected future requirement for competence in the society.
Some other topics relevant to consider are:

- Is the name of the study program adequate?
- How is the profile of the study program compared to similar programs at other institutions?
- Does the composition of subjects give a good progress in the study?
- Is the program satisfactory linked with research and professional development?
- Are the graduated students qualified for an international career?
- Are the students satisfied with the quality on teaching, feedback, and evaluation in the program?
- To what extent do the students contribute to the development of the teaching activities and evaluation forms in the program?

The internal report with some of the underlying material, is the main basis for this evaluation. The external expert finds the internal report comprehensive, covering many of these questions in a reliable way. In this external report, we will build on the internal report, and focus on main conclusions.

For the questions in the second list of bullet points, comments are also based on own assessments, based among others on more than 20 years as professor (II) in logistics at BI with what was in practice a 50-60 % engagement in that period, 16 years as professor (II) at NHH and 3 years as professor (II) at Molde in logistics. As part of the engagement at BI I was several years associate Dean for the logistics specialisation in Porsgrunn, a 3-year specialised logistics specialisation at Batchelor level. All teaching in all these schools was mainly at master level

2. The program's relevance for society and labour market

On a general level, there is a large need for good competence in logistics in the society. This goes both for the private and the public sector. With increasing demands on supply chains given by the present situation, and with disruptive changes in many supply chain, the need is not reduced.

The Master of Science program in logistics is relevant both for the society and labour marked. The background material with interviews of industry leaders supports this.

3. Learning environment

The learning environment is well described in the internal report. It is good and is further strengthened by the close contact between students and faculty. The seminar series with leading experts from other school further strengthen this.

As for most Universities after the concentration on digital learning during the pandemic, there are still some challenges in getting students back to school and thereby strengthen the learning environment on campus, and a hybrid environment with both digital and campus-based solutions may be required for a longer period.

4. Degree of accomplishment

The degree of accomplishment in terms of students finishing the program is fair and can be improved. This may be more related to other factors than the program, for example recruitment, labour market and financing for foreign students. The distribution of grades indicates the learning for the students are good.

5. Learning outcome descriptions, Content, learning activities and evaluation format related to general learning objectives

The expected learning outcomes are well described in internal report. They are as should be expected for a logistics master program, and the content of the study as a whole is well in line with the expected learning outcomes.

The teaching and evaluation formats are traditionally built up and support the learning objectives.

6. Name of program

The name of the program, Master of Science in Logistics, is well established, and is describing the content. One may argue that several parts of the content could also be included in its own right, like Supply Chain Management, and quantitative methods for analysis of logistics operations. Since the students chooses different emphasis on these directions, I would suggest that the overriding name Logistics is still used for the program. This could be combined with subtitles covering SCM and logistics analysis.

7. Profile of program

The profile of the program is as it should be for a Logistics Master Program. As it is today, there are two main lines of specialisation, Supply Chain Management and Logistics Analysis. Within these two main lines, there are further concentration areas like advanced SCM, Information Systems, Logistics Analysis and Operations Research. Offering these different paths to the students, gives the program a higher degree of flexibility than other logistics programs in Norwegian Schools, which is a good element in the program's profile.

8. Composition of subjects

I will comment the composition of subjects for each program. When making suggestions for additional subjects, these suggestions are based on the descriptions in the internal document, so some of the suggestions may already be in place but not commented explicitly in the internal report.

Supply Chain Management

The composition of subjects for the first year is relevant. What I am missing is that also students choosing SCM should have a subject looking at some more quantitative aspects of SCM. As an example, the competitiveness and efficiency of Supply Chains, and what can be achieved through integration, can often be partly explained by models for inventory management and multi-level optimisation of inventory structure. Another example is the use of price and discount mechanisms for achieving supply chain optimisation. These are just examples, but some insight into mechanism driving cost and service and their quantitative justifications, can be useful. This goes both for those

choosing advanced SCM and Information Systems. One might consider if there are some possibilities for putting in a course the second year, together with the seminar series.

In the stream for Information systems, there could be more about supply chain integration by interorganisational information and control systems, and the various aspects of information exchange between the actors and levels in the supply chains.

Logistics analysis

The composition of subjects for the first year is relevant. There is always a choice of what should be included the first year and covered by seminars or additional classes second year.

One subject that could be developed further, is capacity analysis. In particular for Production Management that is an important issue. This includes finding bottlenecks and process capacity, also with multiproduct flows. The capacity analysis could be combined with queuing models[1]. The themes could be combined with applications in the course Discrete Event Simulation.

In line with what was suggested for the SCM specialisations, one should also consider including a supply chain management course, giving key concepts and theory about SCM.

A more flexible stream

One might also consider a stream based on a combination of both SCM and Logistics Analyses, giving a balanced program between quantitative and qualitative concepts. This could be a good program for students aiming to be generalists within the logistics field.

Sustainable freight transportation

The suggested new specialisation starting in the fall 2022 addresses some important issues for society and companies. When starting a new program, there is the challenge of combining new and existing courses. It seems like a good balance is suggested, so the comments for further developments are more for future developments of the program.

A general comment for future development goes for several subjects where there are coverage of both freight transport and passenger traffic. A future development could be to focus even more on freight, and less on passenger (in this program). It would also strengthen the program with more information on alternative systems for the various freight modes, like electric solution, hybrid solutions, and hydrogen. One way could be to introduce parts of the cost management course from SCM, but focus only on cost management for freight transport and include cost characteristics for transport units using alternative energy systems.

[1] Examples of what is suggested can be found in Cachon & Terrewich “Matching supply and demand.”

9. Link with research and professional development

The main link to research is through the faculty's research activities. It is a little bit unclear to what extent the master thesises are used as contribution to research projects as well. A large proportion of PhDs students are former graduates from Molde, which indicates a strong link between research and the master program. The experience-based master also gives an additional contribution to professional development.

10. Qualifications for international careers

The program should give good qualifications for an international career, depending on which subjects and activities the student chooses to follow. The industries that many candidates work for are international, and some candidates also participate in PhD programs abroad.

11. Quality of teaching, student contributions

The different measures to ensure quality, like the quality team, new evaluation procedures for master thesis, and use of student feedback, are well described in the internal report. Quality is also supported by recruitment procedures, and various more informal activities through the year. The measures seem sufficient to secure the quality.

The students' main contributions to quality are through feed-back surveys. There is one area that has been pointed out from the students in the internal report, and that is improved feed-back from faculty to students on exercises handed in.

12. Short conclusion

The Master Science in Logistics program is in well shape. The external expert has gone through the various checkpoints in the mandate, and everything seems satisfactory. The subjects taught are in line with what are offered internationally. The previous comments made about new subjects are to be seen as suggestions for further development.

Arild Hoff
P.O.Box 2110
6402, Molde

Sykkylven, 7. April 2022

Studieprogramevaluering Logistikk

The study handbook describes the MSc in Logistics program as follows:

Logistics entails organizing the flow of products, services and information from raw materials to the end-user. Jeg tenker definisjonen av logistikk har endret seg mye siste årene og at vi nå er mye mer over på å tenke hele verdikjeden, noe jeg synes også teksten ovenfor beskriver. Kan det være programmet skulle hett MSc in Supply Chain Management? Det er kanskje et stort steg å endre navn på programmet, men bare et forslag fra min side. Jeg husker selv fra da jeg tok en Bachelor på Handelshøyskolen BI hvor jeg tok fordjupning i logistikkledelse, dette var da direkte oversatt fra Supply Chain Management.

Det at programmet har som mål å gi kandidatene mulighet for å forstå komplekse problemstillinger gjennom analyse for alle parter i verdikjeden støtter igjen mitt forslag ovenfor. Jeg tenker også for min egen del som jobber som logistikkdirektør i Ekornes så er det veldig viktig å forstå mye mer enn vareflyten fra A til B, hvor spesielt forståelsen på hva som påvirker arbeidskapital er et viktig område i Ekornes, også i andre bedrifter.

Kurset IBE700 ERP systems tenker jeg er et veldig viktig kurs for at studentene lettere skal kunne tre inn i arbeidslivet. Med noe basiskunnskap rundt parameterne som kan styres i et ERP system og hvordan de forskjellige parameterne påvirker hverandre, så vel som hvilke informasjon som er tilgjengelig i et ERP system er veldig viktig for å lettere kunne forstå problemstillinger, kunne gjøre analyse etc. Det har lenge vært skrevet mye rundt digitalisering, Buzz Words som Big Data, AI, Blockchain etc, men veldig få bedrifter som faktisk har tatt denne typen teknologi i stor grad i bruk. Generasjonene som kommer inn i arbeidslivet nå, som er vokst opp med smarttelefoner og som vi nærmest kan kalle heldigitale i privatlivet. Vi trenger at de også tar dette med seg ut i arbeidslivet og bidrar til å bringe mer digitaliserte

prosesser inn i tungrodde bedrifter med kommentarer som «Sånn har vi alltid gjort det». Det er estimert at 29% av alle dagens arbeidsoppgaver blir gjort av maskiner og dette er forventet å øke til 52% i 2025. Å forstå oppbyggingen, teknologien og omfanget vil være nøkkelen til den riktige samarbeidsresponsen mellom mennesker og maskiner.

Jeg ser programmet fokuserer mye på analyse og det å forstå data, med tanke på all den data som er og blir tilgjengelig tenker jeg dette bare blir viktigere. Som nevnt tidligere skjer det bare mer og mer på teknologisiden og tilgjengelige applikasjoner for automatisering av prosesser. Utfordringen for mange bedrifter er at teknologien og applikasjonene er avhengige av en god datakvalitet, jeg tenker derfor at dette blir veldig viktig fremover, det å kunne forstå datasett og vaske dem til en kvalitet som gjør at vi faktisk kan automatisere prosesser og analyser.

Det jeg kanskje savner, i hvert fall ut ifra hva jeg kan lese så mangler programmet en del rundt det å sette opp bærekraftige transporter, da tenker jeg ikke bare på valg av transportform som jeg ser dere har inkludert, men jeg tenker mer på det å kunne frakte varene minst mulig kilometer for å nå målet. Vi i Ekornes har hatt mye fokus på det å flytte våre varer over mer miljøvennlige løsninger, som for eksempel sjø. Det jeg tenker vil være neste steg for oss er å gjøre analyse på hvor går varene våre og eventuelt kunne vi med hjelp av en større grad av ruteplanlegging, optimalisert lastbærere for mer direktetransporter, ved evt sjeldnere avganger etc.

Også ut ifra hva jeg leser meg frem til så mangler programmet som nevnt det å kunne forstå hva som påvirker arbeidskapital, selv om programmet inneholder mange temaer som påvirker dette tenker jeg det er viktig å spesifikt skjønne konsekvensene av valg en tar i verdikjeden.

Ellers tenker jeg programmet er veldig bra og jeg kunne selv tenkt meg å tatt dette på deltid!

Med vennlig hilsen,
Jan Robert Lyngvær
Group Logistics Director

Evaluation of the study program for Logistics

Introduction/reflections

Refers to a request for evaluation of the study program for Logistics.
I have not studied Logistics myself but have a Diploma in Economics from BI Norwegian School of Management.
Hence, I myself have no references to the study I am going to comment on. My comments are based on the professional experience I have and are therefore also based on what expectations and advice I have with a target to having the most relevant education and content in the teaching.

I have 30 years of experience from various parts of the logistics and primarily within the "Order to Cash" processes. The focus is on warehousing and distribution + production logistics.

I also hope and expect that I can contribute a little about what knowledge we as a company seek and what we look for when we recruit for various positions.
Personal qualities / suitability - which may be as important as knowledge / competence - will not be commented on.

What I also experience from my own background is that we want to recruit people that have a desire to develop within the company – meaning that we as a company must also be able to develop our talents to be able to see the whole of our value chain - and have knowledge of the "exchanges" that are made between different stakeholders in this chain.
Unfortunately, we have far too few people who see the whole picture - but only their part of the chain. This is of course a responsibility that lies on us as an employer - but it also requires that you as an educational institution ensure the overall understanding of the students.

I have been reading through the various study programs within Logistics, and they basically seem well structured and well thought out in terms of relevance for students and companies that will recruit from the University College.
The challenges are probably the recent years' shifts towards areas that perhaps the study programs do not fully cover - I think especially how to navigate in a market that have rapidly changes in the framework conditions and how to minimize risk and control the cost development (and to what extent this is possible?)
The requirements for rapid changes and more flexible value chains as well as ensuring a robust supplier structure is an example of areas that the studies should cover more deeply.

The most important strategic focus areas for Glamox are;

- Sustainibility/ESG
- Digitization
- New Business Models
- "One Glamox" - Similar business-systems and processes within the Group

Which basic subjects do you consider important that the students have knowledge of?

- Overall Understanding of the "Order to Cash" process and sub processes.
    - Order Handling
    - Procurement

- Production Planning
- Warehouse/Inventory Management
- Shipments/Delivery Terms/Distribution cost

What general knowledge do you consider important when hiring graduate students?

This is of course job specific. But pretty much everyone we have employed in Glamox Logistics has their education at HiMolde - so personal qualities are of course very important. Need also to fit into our Corporate profile and values/ethics;
The student needs to be able to refer to an assignment – references within business cooperation during studies and / or logistics expertise that are important for our company.

The study program should inspire and give the students possibilities to practicing in a company-like environment and facilitating environments where students can be allowed to try and / or test different theories.
This can also provide a break from everyday studies. Ex. day assignments where you will test theories against practice through surveys and / or interviews. This will also be able to give students a broader practical approach than today.

There have been some special years - and I see also myself how difficult it is to get back to normal in terms of getting students into the lecture hall and involve the businesses into the study program. I think this is necessary to keep the study interesting and keep the quality stamp that HiMolde has within Logistics. A Hybrid teaching solution is working well, but it cannot replace the interaction that takes place during lectures. The requirement for attendance physically needs to be improved.

The choice of assignment should harmonize with the area of interest the student has - It is therefore in my view very important to have teachers who are good mentors and who have time to guide and correct their students.

It is important that the student also is able to sell his/her competence and describe how this can support the company in the further logistics work. This should probably be a part of the last preparations in the studies before the students graduate.

Which current subjects are of particular interest to your business?

§ LOG711 Supply Chain Management
§ SCM702 Purchasing and Supply Theory
§ SCM705 Cost Management in SCM
§ IBE700 Enterprise Resource Planning (ERP) systems
§ IDA720 Applied Data Analytics
§ IDA740 Digitalization Strategy and Governance
§ LOG713 Models for Production Management
§ LOG722 Inventory Management
§ LOG725 Transportation and Distribution
§ TRA825 Intermodal Freight Transport
§ LOG767 Supply Chain Risk Management
§ LOG735 The Anatomy of Transport Networks
§ TRA825 Intermodal Freight Transport
§ TRA705 Sustainable and Digitalized Urban Freight Logistics

§ LOG767 Supply Chain Risk Management
§ Seminars
- Blockchain in supply chain
- Integrated logistics and operations: Learning through games
- Robotic process automation
- Network flow models in logistics
- Measuring and managing performance in shipping, logistics and supply ch.
- Information technology (IT) strategy and governance
- Quality management
- Cases in Transport Economics
- A circular economy for business and supply chains
- Productivity analysis
- Models in dynamic lot sizing
- Transport law, insurance and incoterms
- Supply chain visibility with RFID and IoT technologies
- Complex network analysis with R
- Transportation infrastructure and economic development

Comments Seminar Series

- Combine Seminar with practical business example to combine theory and practical work – Invite the business in to the seminars to provide good examples

Which subjects / topics that you find relevant are missing in the portfolio?

§ End to end visibility - Systems/BI/KPI
§ S&O Planning
§ Risk in the value chain - Pandemic/War - Planning
§ Business Development/Business Integration/Culture Differences - Logistics

Which subjects / subjects do you find not necessary?

I have no comments considering that the subjects may be of great interest to other companies and or business areas.

Which topics do you consider important in the future?

Specialization that Glamox now sees as important beyond general Logistics expertise is;

- Sustainibility within Logistics
  - To lower the ecological footprint of its tasks, such as CO2 emissions, noise pollution, and accidents within:
    - Transportation/Distribution
    - Sustainibility within Warehouses- Breem Certification
- End to end visibility in the value chain
- ERP - Importance to maintain and control the Master Data/Basic data
    - Supporting the processes

        - Too many companies have too little control over master data and hence the area of opportunity within ERP decreases
        - ERP - (Utilization and automation of ERP) incl. Support programs - WMS/TA other tools?
            - Integration between ERP and Business specific systems
    - S&O Planning
    - The future Warehouse/Distribution HUB setup - Methods and implementation

Are the students satisfied with the quality on teaching, feedback and evaluation in the program?

To what extent do the students contribute to the development of the teaching activities and evaluation forms in the program?

My reflections;

- Few answers – why?
- This is probably the best channel for improvement
- How to follow up the questionnaires/report for improvements?
    - Who is responsible for the improvements?
    - What is done after last year's questionnaires?
- Some courses scores very low - should these be removed or adjusted?
    - Research and development
    - Innovative thinking
- What is the skills among the teachers using digital tools - digital discussions and ability to involve the class in a digital platform
    - Is there need for an internal training?
- Use of business cooperation in the learning is low - why?

Early involving Companies with Logistics focus into the studies will ensure an interesting study time/guest lecture.
The Logistics studies can improve significantly cooperating with Companies - There should be a requirement for this within the various disciplines in the study program. The theory must have an ambassador in the business world who confirms and exemplifies.

In the final year, the students should also be prepared as best as possible for the phase they are entering starting to apply for future jobs etc. Could the study program cover this stage?

I Hope that some of my reflections can contribute to the improvement of the Logistics study program to the best for the students.
I am available for comments and discussions.

Vennlig hilsen/Best regards

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Molde University College

Periodic evaluation of study program – Spring 2022

Master of Science in Logistics

Internal evaluation report

Arild Hoff – Coordinator of study program

April 2022

Contents

1 Introduction

The regulation about quality ensurance and development in higher education given by The Norwegian Ministry of Education and Research (Kunnskapsdepartementet) states in §2.1 point 2 (translated from Norwegian)

The institutions should carry out periodic evaluations of their study programs. Representatives from industry or social life, students, and external experts, relevant to the study program, should contribute to the evaluations. The evaluation results should be public.

The quality system at Molde University College states that the periodic evaluation should be carried out every sixth year and emphasizes that the purpose of the evaluation is continuous improvement of the study programs. The evaluation should ensure that the program's learning objectives are updated and relevant, and that the subjects included in the program are designed with activities and evaluations contributing to student's achievement of the learning objectives. The evaluations should also contribute to the program's inclusion in the University College's mission and relevance for the labour market and society in general.

The periodic evaluation should complement the annual quality work and contribute with a general and external view on the program's form and content. It should be a tool for the work on developing the program.

This document is the internal evaluation report written by the program coordinator. It is presented for and discussed with the staff contributing to the program and the student representatives for the program. All parties have contributed with suggestions and comments when finalizing the report. This report should be the basis for an evaluation performed by one or more external experts, and a final report should be written summarizing the work and suggesting actions and further development of the program.

1.1 Topics to be addressed

The quality system states the following mandate for the external evaluation.

The evaluation should consider:

- The study program's relevance for society and labour market
- Whether the program provides a good learning environment
- Whether the program has a high enough degree of accomplishment
- Whether the program's learning outcome descriptions are updated and relevant
- Whether the program's content, learning activities and evaluation formats supports the general learning objectives

The external evaluation report should suggest how to improve the quality of the study program. It should point out good and weak sides of the program and suggest actions for potential improvement.

Externally, the most important factor might be to what extent the program is relevant for the labour market as well as for research. We should investigate if there are subjects that are missing or superfluous, and whether the program meets the current and expected future requirement for competence in the society.

Some other topics relevant to consider are:

- Is the name of the study program adequate?
- How is the profile of the study program compared to similar programs at other institutions?
- Does the composition of subjects give a good progress in the study?

- Is the program satisfactory linked with research and professional development?
- Are the graduated students well qualified for an international career?
- Are the students satisfied with the quality on teaching, feedback and evaluation in the program?
- To what extent do the students contribute to the development of the teaching activities and evaluation forms in the program?

2 Description of the study program

The Master of Science in Logistics at Molde University College was started in year 2000. In addition the faculty offers a MSc in Sustainable Energy Logistics and a planned MSc in Sustainable Transport and Urban Mobility, which both are closely related to the program with the same structure and several common courses. A subset of the MSc in Logistics program is given as an Experienced Master in logistics, which is offered as a part time study for students normally working full time.

The MSc in Logistics program consists of 120 ECTS over four semesters. The admission requirement is a relevant bachelor's degree with average grade of C or higher. Each class normally consists of between 50 and 60 students.

Students should choose between three different specializations when starting on the study. The first semester contains four mandatory courses related to the chosen specialization. After finalizing the first semester, the students should choose between different subvariants within their specialization. These subvariants will again define three courses as mandatory, while the students should select a fourth course as an elective among the other master courses. The number of mandatory courses within the subvariants were increased from two to three from the study year 2022-2023.

The study handbook describes the MSc in Logistics program as follows:

Logistics entails organizing the flow of products, services and information from raw materials to the end-user. For a large number of industrial and business companies, achieving high quality logistics operations will be the key competitive factor for future success. There is, therefore, a considerable focus on logistics in the business world. The knowledge can be used in all sorts of industries /organizations, which means that the job market for the finished candidates is large. Accordingly, the job market for students with a master's degree in logistics is generally quite good.

The program aims to give a thorough analysis and understanding of problems, challenges and solutions associated with all parts of the value chains: purchasing and supply, production planning, inventory management and distribution planning, including the management of transport services. Understanding the relations between different value chains, (Supply Chain Management) is also a major focus in the program.

The approaches to problem-solving in logistics require a broad understanding of the subject matter in order to arrive at satisfactory solutions on the basis of an analysis of alternatives. Logistics as a scientific discipline thus rests on a broad spectrum of disciplines, such as economics, information/communication technology, business administration, organization and management, as well as quantitative methods based on mathematics, operations research and statistics. The involvement of all these topics in logistics makes it exciting and challenging to study logistics at this level.

Students in the program will choose one of the three main specializations, called Supply Chain Management (SCM), Logistics Analytics (LA) and Sustainable Freight Transport (SFT). Students

choosing the SCM-variant must – before the second semester starts – choose between two different sub-variants: Advanced SCM or Information systems in SCM. Students choosing the LA-variant must, before the second semester, starts choosing between the sub-variants: Logistics Analytics or Operations Research.

The program is taught entirely in English and currently includes students from more than 10 different countries, many outside Europe. This means that those participating in the program will have the benefit of belonging to a truly international group of students and to enhance their language skills, making them ready for logistics careers in an ever more globalized economy.

The website describing the study program is found at
https://www.himolde.no/english/studies/programmes/msc-in-logistics/index.html

2.1 Learning outcomes

The learning outcomes are specified as follows:

After completing the program, the successful candidate is expected to:

Knowledge

- have advanced knowledge about supply chains and logistics in general
- have specialized knowledge about selected topics when dealing with different types of supply chains
- have extensive knowledge of scientific theories and methods relevant to managing supply chains and operations within such chains
- have advanced knowledge of the relations between supply chains and relevant theories within economics and business administration
- have advanced knowledge about logistics, operations research and operations management in general

Skills

- be able to use advanced theory and methods to identify inefficiencies in supply chains
- be able to propose improving organizational/structural changes and suggest ways of implementing such changes in a supply chain.
- be capable of performing a limited supervised research project within a supply chain in line with ruling academic standards of the field
- be able to identify operational challenges/problems in supply chains and logistics systems and to assert the relevance of models and methods to resolve these
- be able to select relevant models and methods for approaching a given logistical problem.
- be able to choose and use relevant software and technology in implementing computer-assisted solution methods

General Competence

- be able to present and communicate professional issues relevant to SCM and logistics, on an expert- as well as a common level
- be able to apply acquired knowledge and skills within new areas of research and applications
- be able to read scientific papers and other academic work with a critical view

2.2 Specialization in Supply Chain Management (SCM)

This specialization is described as follows in the study handbook:

Supply Chain Management is suited for students with an interest in organization, business and to some extent social science. Although mathematics and statistics are used, the focus is more on the qualitative aspects involved in the management of the value chain. Suitable backgrounds include supply chain management, economics, business administration, among others.

Figure 1 shows an overview of the first year for students choosing this specialization.

Supply Chain Management		
First semester	LOG708 Applied Statistics	
	LOG711 Supply Chain Management	
	SCM702 Purchasing and Supply Theory	
	LOG745 Industrial Organization	
Second semester	**Advanced SCM**	**Information Systems**
	LOG715 Business Cases in SCM	IBE700 Enterprise Resource Planning Systems
	SCM703 Applied SCM	IDA720 Applied Data Analytics
	SCM705 Cost Management in SCM	IDA740 Digitalization Strategy and Governance
	One elective course	*One elective course*

Figure 1. First year for students on the SCM Specialization

The specialization consists of the following four mandatory courses in the first semester

- LOG708 Applied Statistics

  Introduction to descriptive statistics. Presenting topics like probability distributions, samples and populations, estimation and inference, confidence intervals, testing of statistical hypotheses, significance levels and P-values. Gaining familiarity of the statistical package *R* is central in the course.

  A one-week preparatory course in basic statistics (LOG718) for students without statistical background is given before the semester starts to make sure that students have the necessary skills for starting on LOG708.

- LOG711 Supply Chain Management

  The course presents a broad scope of issues within supply chain management. Standard principles/models/theories form the basis of the course, discussing how those principles/models/theories can be adopted/extended for the use in a supply-chain setting. The focus of the course is on inter-organizational aspects of SCM and its management approaches.

- LOG745 Industrial Organization and Competition Policy

The purpose of this course is to provide approaches for economic analysis of strategic interactions between firms operating in imperfectly competitive markets. It concerns different social economic topics such as market structures, non-cooperative game theory, product differentiation, price discrimination and public regulations

- SCM702 Purchasing and Supply Theory

  The course aims to provide knowledge about relevant theories that explain phenomena within the purchasing and supply field and practical insights related to the execution of the purchasing function.

2.2.1 Subvariant Advanced SCM

The Advanced SCM subvariant defines the following three courses as mandatory in the second semester:

- LOG715 Business Cases in SCM

  The course consists of three different cases taken from specific companies or public organizations. The students write an assignment for each case with an analysis of the logistical problem and indicating a potential solution for the problem.

- SCM703 Applied SCM

  This is a course presenting simple quantitative models for the SCM-students. It focuses on lot-sizing in production, integrated models for production, distribution and purchase planning in addition to demand based and revenue management. Mathematical modelling of simple logistical problems is also presented.

- SCM705 Cost Management in SCM

  This course addresses methods or concepts allowing analysis and control of all costs within a supply chain, by using exiting approaches to cost management. The course covers costs which are not only created by material and information flows along the supply chain, but also by the relationships with the supply chain itself.

In addition, the students should select one elective course this semester. This could be a mandatory course in another subvariant, or another master course not directly connected to a specialization.

2.2.2 Subvariant Information Systems in SCM

The Information Systems in SCM subvariant defines the following three courses as mandatory in the second semester:

- IBE700 Enterprise Resource Planning (ERP) systems

  An ERP-system supports and automates business processes across functional areas by integrating the organization's functional areas and sharing information across the organization in real time. This course is a practical hands-on course introducing how business processes are executed with the support of an ERP system. Students will use a commercially available ERP-system (SAP) to build an understanding of the functional capabilities of such systems.

- IDA720 Applied Data Analytics

  Data analytics is the process of examining data sets in order to draw conclusions regarding the information they contain with the aid of specialized systems and software. A significant challenge arises when working with *big data* in many real-life settings, where data of various nature is collected in huge volumes. To achieve benefits, the data sets examination is conducted with a specified goal, or in other words, with a properly formulated practical question. When the question is determined,

the steps of data analysis include capturing the needed data from various sources, cleaning, preparing, and aligning it before further formal analysis may be conducted and its results may be interpreted and finally, communicated to the appropriate audience to determine the best course of action.

- IDA740 Digitalization Strategy and Governance

  The objective of this course is to cover aspects of establishing, growing, and sustaining digitalization transformation and execution within a governance model. The students will get an understanding of the reasons and directions in digital transformation and learn how to formulate a digital organizational strategy.

In addition, the students should select one elective course this semester. This could be a mandatory course in another subvariant, or another master course not directly connected to a specialization.

2.3 Specialization in Logistics Analytics

This specialization is described as follows in the study handbook:

Logistics Analytics is meant for students interested in quantitative methods for analysing, planning and management of activities involved in production, inventory, transportation and distribution within and across companies. Modern topics as big data, visual analytics and robotization will be covered.

Figure 2 shows an overview of the first year for students choosing this specialization.

	Logistics Analytics	
First semester	LOG708 Applied Statistics	
	LOG713 Models for Production Management	
	LOG722 Inventory Management	
	LOG725 Transportation and Distribution	
Second semester	**Logistics Analytics**	**Operations Reserach**
	IDA715 Discrete Event Simulation	IDA715 Discrete Event Simulation
	IDA720 Applied Data Analytics Logistics	LOG733 Exact Optimization Methods in Logistics
	LOG820 Vehicle Routing	LOG820 Vehicle Routing
	One elective course	*One elective course*

Figure 2. First year for students on the LA Specialization

This specialization consists of the following four mandatory courses in the first semester

- LOG708 Applied Statistics

Introduction to descriptive statistics. Presenting topics like probability distributions, samples and populations, estimation and inference, confidence intervals, testing of statistical hypotheses, significance levels and P-values. Gaining familiarity of the statistical package *R* is central in the course.

A one-week preparatory course in basic statistics (LOG718) for students without statistical background is given before the semester starts to make sure that students have the necessary skills for starting on LOG708.

- LOG713 Models for Production Management

  The course treats different topics concerning production planning such as Little's law, scheduling problems with different objectives, line balancing and lot sizing. In a more general setting production philosophies like MRP, OPT/TOC, Lean /JIT and agile production are discussed.

- LOG722 Inventory Management

  The course discusses inventory management principles and models both for fixed rate (deterministic) and uncertain (stochastic) demand. The models aim to develop ordering policies which balance the different types of costs such as ordering, holding and stock-out costs in various situations.

- LOG725 Transportation and Distribution

  The course focuses on logistic problems appearing in transportation and distribution planning. To deal with these problems, the course introduces mathematical programming to formulate the problems, and the use of standard software for solving the resulting formulations.

2.3.1 Subvariant Logistics Analytics

The Logistics Analytics subvariant defines the following three courses as mandatory in the second semester:

- IDA715 Discrete Event Simulation

  The course focuses on discrete events scheduling and handling. It presents queue scheduling and queueing networks, input analysis/calibration and output analysis, performance metrics and flow management. The students learn implementation using simulation software, as well as model verification and validation.

- IDA720 Applied Data Analytics

  Data analytics is the process of examining data sets in order to draw conclusions regarding the information they contain with the aid of specialized systems and software. A significant challenge arises when working with *big data* in many real-life settings, where data of various nature is collected in huge volumes. To achieve benefits, the data sets examination is conducted with a specified goal, or in other words, with a properly formulated practical question. When the question is determined, the steps of data analysis include capturing the needed data from various sources, cleaning, preparing, and aligning it before further formal analysis may be conducted and its results may be interpreted and finally, communicated to the appropriate audience to determine the best course of action.

- LOG820 Vehicle Routing

  The course covers aspects of routing such as arc routing, the travelling salesman problem and many variants of the vehicle routing problem. Emphasis is placed on solving the problems with classical construction heuristics and using mathematical modelling.

In addition, the students should select one elective course this semester. This could be a mandatory course in another subvariant, or another master course not directly connected to a specialization.

2.3.2 Subvariant Operations Research

The Logistics Analytics subvariant defines the following three courses as mandatory in the second semester:

- IDA715 Discrete Event Simulation

  The course focuses on discrete events scheduling and handling. It presents queue scheduling and queueing networks, input analysis/calibration and output analysis, performance metrics and flow management. The students learn implementation using simulation software, as well as model verification and validation.

- LOG733 Exact Optimization Methods in Logistics

  The course focuses on solving problems from logistics formulated as deterministic optimization models. Examples of problems include production problems, shortest path and knapsack problems. Modelling will be covered only briefly, as this is supposed to be known in advance. Problems treated include Linear Programming problems and Discrete Optimization problems. Emphasis will be put on the Simplex algorithm for Linear Programming and Branch and Bound search for discrete problems. Dynamic programming and other solution methods are also treated.

- LOG820 Vehicle Routing

  The course covers aspects of routing such as arc routing, the travelling salesman problem and many variants of the vehicle routing problem. Emphasis is placed on solving the problems with classical construction heuristics and using mathematical modelling.

In addition, the students should select one elective course this semester. This could be a mandatory course in another subvariant, or another master course not directly connected to a specialization.

2.4 Specialization in Sustainable Freight Transportation

This is a new specialization introduced from the Fall 2022. Transportation has earlier been a subvariant on the SCM specialization with a common first semester, and more specialized transportation courses in the second semester.

The study handbook describes the specialization as follows:

The specialization in Sustainable Freight Transport focuses on analysis and understanding of strategic and operative aspects related to in- and outbound freight flows in a supply chain. The analysis of freight transport's key role in climate actions is also central in this track.

Figure 3 shows an overview of the first year for students choosing this specialization.

	Sustainable Freight Transport
First semester	LOG708 Applied Statistics
	LOG711 Supply Chain Management
	LOG730 Transport Economics
	LOG735 The Anatomy of Transport Networks
Second semester	
	TRA705 Sustainable and Digitalized Urban Freight Logistics
	TRA820 Air Passenger and Freight Transport
	TRA825 Intermodal Freight Transport
	One elective course

Figure 3. First year for students on the SFT Specialization

The specialization consists of the following four mandatory courses in the first semester

- LOG708 Applied Statistics

  Introduction to descriptive statistics. Presenting topics like probability distributions, samples and populations, estimation and inference, confidence intervals, testing of statistical hypotheses, significance levels and P-values. Gaining familiarity of the statistical package *R* is central in the course.

  A one-week preparatory course in basic statistics (LOG718) for students without statistical background is given before the semester starts to make sure that students have the necessary skills for starting on LOG708.

- LOG711 Supply Chain Management

  The course presents a broad scope of issues within supply chain management. Standard principles/models/theories form the basis of the course, discussing how those principles/models/ theories can be adopted/extended for the use in a supply-chain setting. The focus of the course is on inter-organizational aspects of SCM and its management approaches.

- TRA730 Transport Economics

  This course focuses on the use of resources in the transport sector, how transport costs effect travel behaviour and transport choices and how transport costs and the design of the transport system affects the rest of society. The course aims at giving advanced knowledge of models that can be used in the analysis of demand and supply of different transport modes for passenger- as well as freight transport.

- LOG735 The Anatomy of Transport Networks

This course introduces students to Transportation Network Analysis and related graph theoretical concepts. Based on real-world networks sourced for different transport modes, students learn to obtain and interpret the fundamental properties of the underlying transportation networks.

This specialization does not have any subvariants in the second semester, but defines the following three courses as mandatory:

- TRA705 Sustainable and Digitalized Urban Freight Logistics

  The course aims to give advanced knowledge about urban freight logistics, with main emphasis on the urban freight market characteristics, planning and regulatory issues. It describes the relevance, persistence and main characteristics of urban freight logistic problems, analysis of the different players involved, and discussion of the implications the stakeholders' interaction has on urban freight logistic functioning and efficiency.

- TRA820 Air Passenger and Freight Transport

  The course concerns the area of air transport. It covers concepts such as law, policy and regulations, supply and demand in air transport in addition to acquisition and financing of aircrafts. It also focuses on air traffic management, the economy of airlines and airport and the environmental aspects of air transport.

- TRA825 Intermodal Freight Transport

  This course focuses on intercontinental and intra-continental transports, with a main emphasis on international trade flows and the role played by sea, rail and road transports. The relationship between the modes both take on a form of competition and co-operation. The comparative picture is analyzed both from a market perspective and also from a socio-economic perspective, with main emphasis on sustainability.

In addition, the students should select one elective course this semester. This could be a mandatory course in another subvariant, or another master course not directly connected to a specialization.

2.5 Elective courses not mandatory in any of the subvariants

Some courses are not mandatory in any of the subvariants but can be used as elective courses.

- LOG734 Heuristics in Analytics

  The course focuses on using heuristic optimization methods to solve computationally challenging optimization problems. An understanding of heuristics is built from the ground up, starting from classical construction and improvement heuristics. The course then proceeds with a thorough treatment of metaheuristics. Attention is drawn towards the implementation of heuristics using a suitable programming language. Examples of using heuristics in prescriptive analytics (solving hard combinatorial optimization problems) and in predictive analytics (using metaheuristics for classification and prediction problems in data mining) are discussed at the end of the course.

- LOG767 Supply Chain Risk Management

  In this subject the students will learn theoretical models for how to manage risk in a supply chain. This includes principles, concepts and practice of risk and risk management as well as international standards for management. The need of effective risk management is important for businesses to avoid or reduce consequences when an unexpected event occurs. Supply Chain Risk Management (SCRM) is implementation of strategies to manage both every day and exceptional risks along the

supply chain based on continuous risk assessment with the objective of reducing vulnerability and ensuring continuity.

- TRA830 Urban Public Transport

  The course aims at giving a thorough introduction to models that can be used in the analysis of demand for and supply of public transport as well as providing tools for planning an efficient public transport system. The course will give an understanding of the costs of providing public transport and how that affects the market situation. The course will also provide knowledge of the principles of optimal prizing and supply determination of public transport services under different conditions including pricing of externalities. Furthermore, the course will address how Cost-Benefit analysis can be used to improve the public transport system.

- TRA835 Smart Mobility and Future Transport Solutions

  This course links technological innovation with mobility solutions and governance practices. Smart mobility and newer mobility solutions demands a need for reshaping regulation, working practices and business models. The course investigates multifaceted and competitive forces that affect the construction of future transport systems and smart mobilities. The course has an interdisciplinary approach, based on different social science perspectives. Students are introduced to concepts and perspectives such as smart city, smart mobility, digitalization, urban living lab, regulating- and planning under uncertainty etc.

2.6 Seminar series in the third semester

The third semester is structurally the same for all specializations and subvariants. The semester consists of 14 weeks containing a series of one-week seminars on a huge variety of different topics. The seminars are classified according to the specialization or subvariant best suited for the topic. Normally there are two or three seminars every week, and each seminar gives 2.5 ECTS. The students can only take one seminar per week, but apart from that they choose freely at least 9 of the seminars given in the semester. One seminar in Research Design, is mandatory for all students and should prepare the student for the final master thesis work in the last semester. Seminar holders are mostly internationally recognized professors from universities abroad, but to some extent the staff at Molde University College also gives seminars on topics within their expertise. Some examples of seminar holders from the industry exist as well.

Students are encouraged to sign up for the seminars they expect to take at the start of the semester. The actual due date for signing up is still Thursday in the week before the seminar is going to be held. This gives the students much flexibility to change their mind during the semester and choose seminars relevant for their master thesis when the topic is decided. The negative side of this practice is however, the uncertainty for the seminar holders, who in many cases gets a different number of students than planned for.

At the end of the semester, students should write a proposal, i.e. a description and starting point for the master thesis. This proposal should be defended orally and gives 5 ECTS when approved.

Evaluation forms in the seminars are presented in chapter 5.

2.7 Master thesis in the fourth semester

The last semester in the study is devoted to writing a master thesis. The thesis is an independent extensive work done under the supervision of an advisor/professor within the discipline. A thesis can be written by a single student or two students together. Candidates are relatively free to choose topics, as long as it is approved by the supervisor and program manager. A thesis can be applied and related to a company or governmental body, or it can be in the form of a theoretical research project.

Evaluation procedure for the theses is presented in chapter 5.

3 Recruitment and student progress

The tables and figures presented in this section is taken from the *Tableau* data visualization system providing statistical information based on data provided by Molde University College.

Table 1 shows the development in applications for the last five years. The number of applicants has been increasing considerably since 2018. The reason for the very high figures in 2021 is partly due to the fact that international applicants has been allowed to apply with electronic documents, making it easier than previously when paper copies had to be sent. The normed number of 30 study places is set many years ago and should have been increased. Around 100 students are offered a place in the program each year, and between 53 and 74 started each of the last five years.

Table 1. Applications and acceptance 2017 – 2021 (Tableau)

Søkning og opptak

Studieprog..	Årstall	Termin	Studieplasser	1.prioritet	1. pri søker per studieplass	Fått tilbud	Svart ja	Registrert	Andel registrert av tilbud
80 Master of Science in Logistics	2017	HØST	30	215	7.2	122	90	74	60.7%
	2018	HØST	30	196	6.5	112	79	60	53.6%
	2019	HØST	30	343	11.4	92	65	55	59.8%
	2020	HØST	30	361	12.0	102	66	60	58.8%
	2021	HØST	30	513	17.1	99	65	53	53.5%

Figure 4 shows an overview of the gender of students starting in the last five years. As we can see, apart from 2018, there is approximately 2/3 male students in each class.

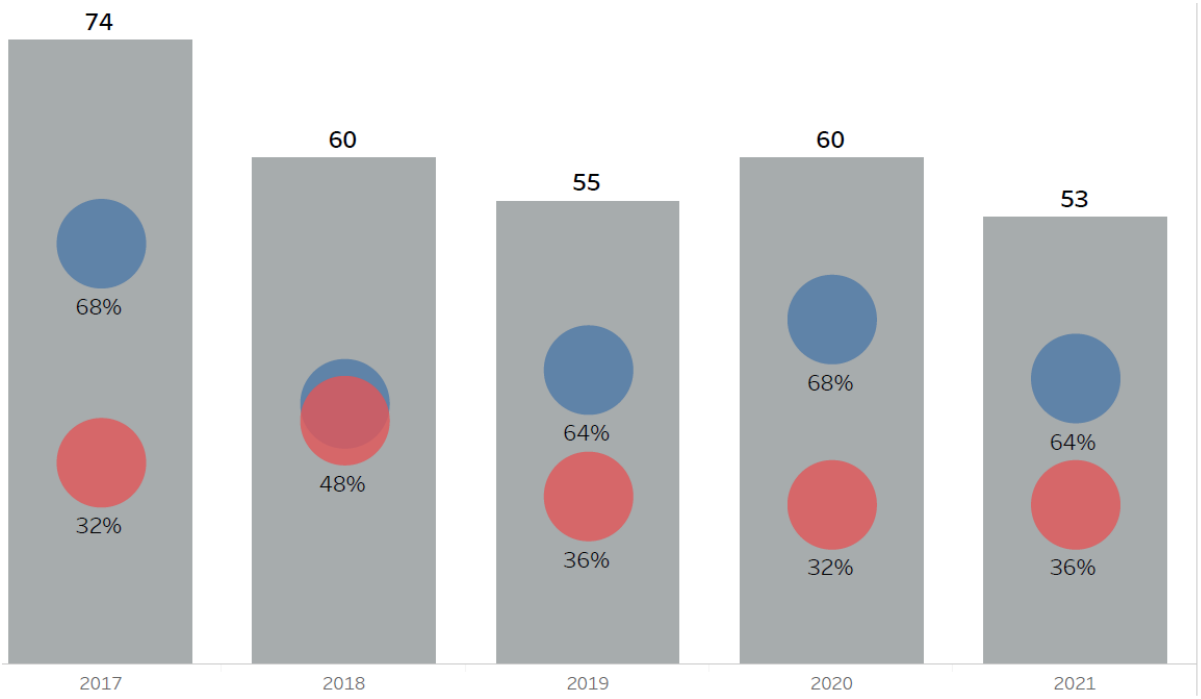

Figure 4. Gender of students 2017 – 2021 (Tableau)

Table 2 shows the number of ECTS taken by the students in the program in each of the semesters from 2017.

The table shows both the total number and the average among the active students the given semesters. With the normed progression, each student should take 30 ECTS every semester.

Table 2. ECTS taken by students in the program 2018 – 2021 (Tableau)

Bestått studiepoeng

	Termin / Studieprogram					
	VÅR			HØST		
	80 Master of Science in Logistics			80 Master of Science in Logistics		
Årstall	Studiepoeng	Aktive	Bestått studiepoeng per stu..	Studiepoeng	Aktive	Bestått studiepoeng per st..
2017	2,645	99	26.72	3,518	128	27.48
2018	3,224	124	26.00	3,708	146	25.39
2019	3,550	133	26.69	3,108	125	24.86
2020	3,158	109	28.97	3,380	125	27.04
2021	3,233	118	27.39	3,048	113	26.97

In Figure 5, we can see the percentage of students finalizing the MSc degree in normed time (2 years) and with one, two or more semesters additional time.

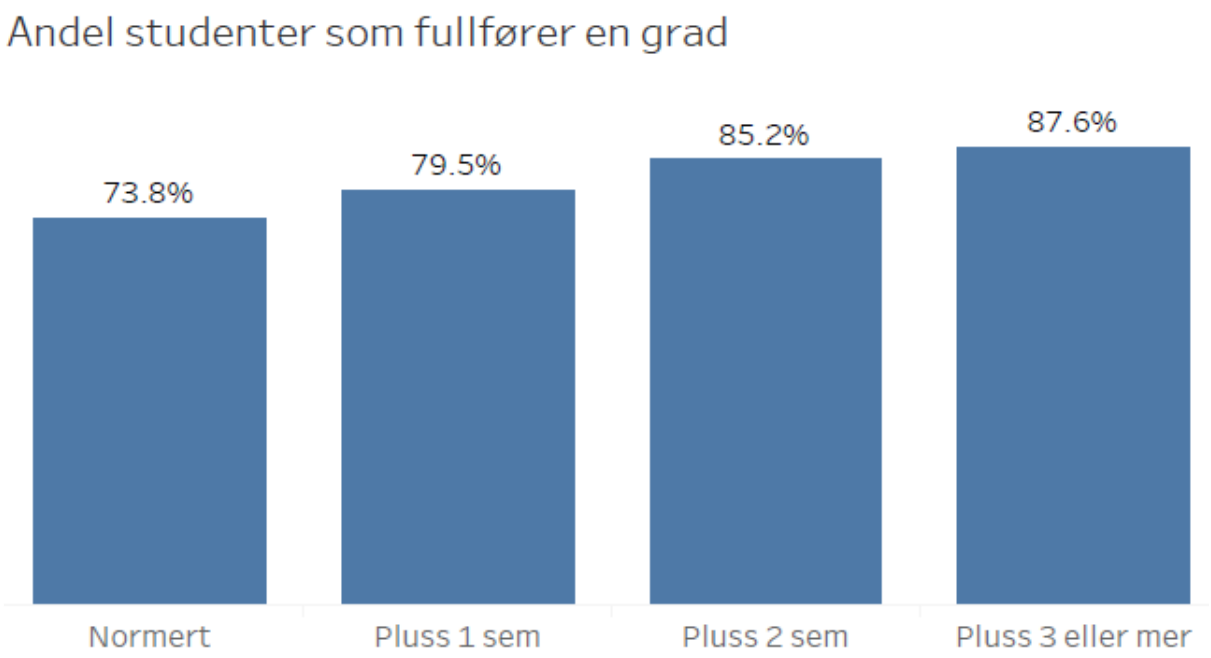

Figure 5. Percentage of students finalizing the MSc degree 2017 – 2021 (Tableau)

4 Quality assurance

4.1 Class meetings

Class meetings are planned approximately 1-2 times per semester. The last years, they have been a combination of physical presence and digital participation on Zoom.

The classes are defined together with the MSc Sustainable Energy Logistics. The Experience-based part time students are usually invited as well. Early in the first semester, an introductory meeting is arranged, and class representatives are elected. Later in the semester another meeting is held mainly for information about the possible subvariants and elective courses in the second semester.

At the end of the second semester a meeting presenting the seminar series in the fall will normally be held. In the third semester there are not planned specific class meetings, but the seminar in Research Design in early October is mandatory for all students and giving them information about research and the thesis writing.

Early in the fourth semester, a class meeting with focus on the theses, due dates, evaluation process and similar can be arranged.

Class meetings do usually not take any formal decisions but are used for information and answering questions from students.

After the first meeting electing class representatives, these are invited to arrange a get-together party paid by the faculty, for first-year students after approximately 1.5 month of the semester. This party consists of several activities like quizzes, plays and more physical games, with the purpose of enhancing the interaction between students coming from own bachelor studies well familiar with Molde and the students just arrived in the city. The student representatives will appoint an arrangement committee responsible for planning this party, while the program coordinator is providing assistance in the planning process and purchasing food, snacks and necessary equipment.

The party was cancelled in 2020 due to Corona restrictions but was arranged again in 2021 with the necessary precautions.

4.2 Quality Team

The Quality Team represents the programs MSc Logistics, MSc Sustainable Energy Logistics and the Experience-based Master in Logistics. It consists of the class representatives for both years together with the program coordinator and another staff member teaching in the master programs. One representative from the study office is normally attending the meetings as well.

The Quality Team will usually have two meetings per semester. One in the middle of the semester to summarize the semester so far, and another at the end of the semester discussing the course evaluations and possible improvements for next year.

Other topics of actual interest are included in the agenda when necessary, and the team members are invited to bring up their own matters.

The mandate of the Quality Team is defined in the University College's Quality System. The purpose is to secure good contact and information exchange between the students and the academic staff, and to be an arena for discussing the structure and development of the study program. The minutes of the meetings are sent to the Dean and Faculty Administration and the Director of Studies and Academic Affairs. Special actions based on discussions in the Quality Team meetings are followed up by the program coordinator. The minutes and follow-up actions are discussed in the next meeting of the team.

4.3 Faculty meetings

Faculty meetings are held irregularly often as a faculty lunch with light food combined with specific topics to be discussed. Topics for these meetings can vary a great deal, but changes to the study plan for the program are typically discussed in such meetings. The formal decisions are still left to the Dean and the Faculty Board.

4.4 Course evaluations

The University College's quality system states that all courses should be evaluated at least every third year. In addition, new courses, courses with new teachers and courses where the content is substantially changed should be evaluated formally the first time.

The evaluations are typically done by a standard form with some questions where students should set the grade (1 - 5) according to their opinion on different aspects of the course, and some free text giving them the opportunity to comment further details. The evaluations are accomplished in the student administrative system Canvas at the end of the semester, and the summary together with an evaluation report from the teacher is sent to the program coordinator before discussed in the Quality Team. Since no evaluations were performed in the Spring 2020 due to the closedown and change of teaching format during the semester, a high number of courses had a formal evaluation in the Spring 2021 instead.

Student representatives will often perform their own survey for courses independent of the formal evaluations. These results are also discussed in the Quality Team and the comments are sent to the teachers as feedback and for considering eventual suggestions for adjustments to the teaching.

4.5 Study barometer / Other evaluations

The study barometer is an annual survey taken in the fall semester among second year program students on all educational institutions in Norway. Students are asked to give their feedback on a scale 1 – 5 showing their satisfaction about different part of the study program. Figure 6 shows the answer to the question about overall satisfaction for the last five years. The result shows a relatively high score for all these years. The percentage of the students answering the survey is, however, not very high. In the Fall 2021, 19 students answered, which corresponds to 36% of the whole student group (Norwegian and international students). One reason is that the third semester is the semester where students take the intensive one-week seminars, and it is difficult to reach out to them urging them to answer the survey.

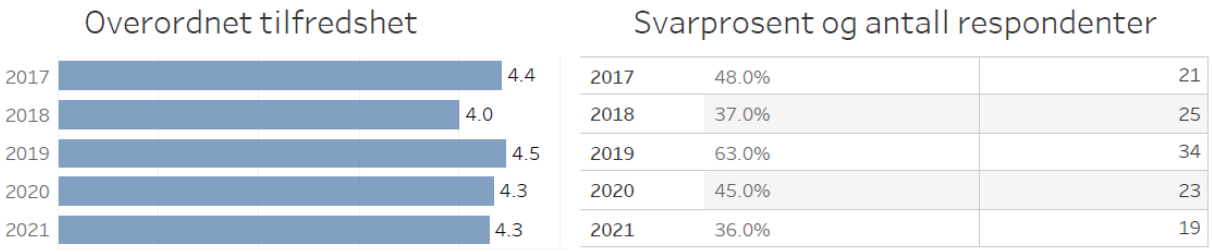

Figure 6. Students overall satisfaction 2017 – 2021 (Studiebarometeret)

Details for the result in 2021 can be found on:
https://www.studiebarometeret.no/en/student/studieprogram/232_80/detaljer

Some selected results are shown below. Table 3 shows the students opinion on their own learning outcome. All averages are on the positive half, but lowest score is found on experience with research and development work. Since this survey is taken in the third semesters, it is expected that the students will get more such experience towards the end of the study. Discipline or profession specific skills are not so relevant in the MSc Logistics study but included in the survey since the form is general for all study programs.

Table 3. Students opinion on their own learning outcome (Studiebarometeret)

Own learning outcome

How satisfied are you with your own learning outcomes so far, concerning:

Scale (1-5): 1 = Not satisfied and 5 = Very satisfied

	Average	Standard deviation	Total number of responses	Response distribution					
				1	2	3	4	5	Do not know
Experience with research and development work	3,4	1,09	18	-	28	22	33	17	-
Discipline- or profession-specific skills	3,4	1,14	18	6	17	28	33	17	-
Knowledge of scientific work methods and research	3,5	1,07	17	6	12	18	53	12	-
Oral communication skills	3,9	0,83	18	-	6	22	50	22	-
Critical thinking and reflection	3,8	0,94	18	-	11	22	44	22	-
Cooperative skills	4,2	0,81	17	-	6	6	53	35	-
Ability to work independently	4,2	0,79	18	-	-	22	39	39	-
Written communication skills	4,2	0,62	18	-	-	11	61	28	-
Innovative thinking	3,6	0,92	18	-	11	39	33	17	-
Theoretical knowledge	4,2	0,62	18	-	-	11	61	28	-

Due to the Covid19 pandemic, the last years have had a high degree of digital teaching. Table 4 shows the students opinions in these matters. The average score is still relatively high, although we can see a high deviation among the alternatives, indicating that not all aspects are considered satisfactory for all students.

Table 4. Students opinion on use of digital tools in the teaching (Studiebarometeret)

Use of digital tools

To what extent do you experience the following:

Scale (1-5): 1 = To a low degree and 5 = To a high degree

	Average	Standard deviation	Total number of responses	Response distribution					
				1	2	3	4	5	Do not know
Digital tools are used in such a way that I am actively involved in class	3,6	1,31	17	12	6	12	41	24	6
The academic staff have the necessary knowledge and skills to use digital tools in their teaching	3,3	1,44	17	18	12	12	35	18	6
The use of digital learning platforms works well in my study programme	4,1	1,05	17	-	12	12	29	47	-
I am trained in using digital tools/programmes that are relevant to my subject field	3,9	1,45	17	12	6	12	18	47	6

Table 5 shows the students response on questions regarding teaching and feedback in the study. Here, we can see that the general opinion on teaching is quite high, but there are significant lower scores on

the feedback from the academic staff. This is an interesting aspect and might be an area where it is possible to improve.

Table 5. Students opinion on teaching and feedback (Studiebarometeret)

Teaching	–								
Scale: 1-5 (1= D not agree - 5= Completely Agree) To what extent do you agree with the following statements?									
The teaching is organised so as to facilitate active student participation	3.7	0,95	19	-	11	32	37	21	-
The academic staff make lectures and seminars engaging	3.8	0,85	19	-	11	16	58	16	-
The academic staff convey the curriculum in an easy-tounderstand manner	4.1	0,85	19	-	5	16	47	32	-
The teaching covers central parts of the curriculum well	4.1	0,76	19	-	-	21	42	32	5
Feedback	–								
NB! The question on feedback from other students is not included when calculating index values. Scale 1-5 (1 = Not satisfied and 5 = Very satisfied) How satisfied are you with:									
The number of times you have received feedback from academic staff on your work	3.4	1,21	19	11	11	26	37	16	-
Academic discussions with and councelling from academic	4.0	1,08	19	5	5	11	47	32	-
The academic staff's ability to give constructive feedback on your work	3.2	1,47	19	21	11	11	37	16	5
Your fellow students' ability to give constructive feedback on your work	3.7	1,14	19	5	11	16	42	21	5

The Candidate survey (Kandidatundersøkensen) is a bi-annual survey performed by staff members at Molde University College among students finalizing an academic degree the previous year. The purpose is to get information about the job situation for the graduated students approximately six months after completion. The survey is limited to Norwegian students. Where the study barometer is based on answers from students currently enrolled to the program, the candidate survey is based on answers from the graduated students.

In the survey from 2021, 23 out of 24 students gave their feedback. Table 6 shows that 22 of these (96%) were in paid work, while one was still unemployed. The approximate same level has been reported both in 2019 and 2017.

Table 6. Main activity among graduated students in 2021 (Kandidatundersøkelsen)

T 4a: Hva er din hovedaktivitet i dag? Kandidatundersøkelsen 2021

	Bachelor								Master				
	SP	VP	LOG	PET	MAR	ØKO	POL	SPM	LOG	SOL	ØKO	SPM	Alle
Lønnet arbeid	97	100	64	44	44	48	76	80	96	100	100	100	81
Studier	0	0	32	44	44	44	19	10	0	0	0	0	14
Arbeidssøkende	0	0	4	11	13	4	5	10	4	0	0	0	3
Annet	3	0	0	0	0	4	0	0	0	0	0	0	1
(N=)	100% (63)	100% (33)	100% (28)	100% (9)	100% (16)	100% (27)	100% (21)	100% (20)	100% (23)	100% (14)	100% (7)	100% (5)	100% (266)

Table 7 shows the results when the graduates were asked about the relevance of their studies in their current job. In a scale from 1 to 5, the average was 4.1, which is 0.3 points lower than in 2019 but 0.3 points higher than in 2017.

Table 7. Relevance of studies in the current job (Kandidatundersøkelsen)

T 6: Hvor relevant er studiene dine fra HiMolde for jobben du har i dag? Rangert etter Mean.

	Kand2021				Kand2021		Kand2019		Kand2017	
	Ikke relevant 0, 1	2, 3	Svært relevant 4, 5		Mean	N=	Mean	N=	Mean	N=
SP	0	10	90	100%	4,5	61	4,9	63	4,9	54
ØKO	8	0	92	100%	4,5	13	3,6	18	4,3	11
VP	0	9	91	100%	4,4	33	4,8	29	4,6	16
Master LOG	0	27	73	100%	4,1	22	4,4	34	3,8	17
LOG	6	39	56	100%	3,7	18	3,3	12	3,4	10
POL	13	38	50	100%	3,6	16	2,2	14	2,3	8
Master ØKO	0	57	43	100%	3,6	7	3,7	6	4,6	5
Master SOL	7	21	71	100%	3,5	14	3,9	9	3,1	10
MAR	29	43	29	100%	2,7	7	-	-	-	-
PET	25	50	25	100%	2,5	4	4,0	4	2,2	9
SPM	38	25	38	100%	2,4	16	3,3	8	2,1	12
Master SPM	80	20	0	100%	1,0	5	-	-	-	-
Alle	8	21	71	100%	3,9	216	4,2	209	4,0	165

Vurdert på en tallskala fra 0=Ikke relevant til 5=Svært relevant.

From Table 8, we can see that 19 (86%) of the graduates worked in a private company, while the remaining three were employed by the government.

Table 8. Type of business the graduates work in (Kandidatundersøkelsen)

T 9: Type virksomhet kandidatene jobber i.

	Bachelor								Master				2021	2019
	SP	VP	LOG	PET	MAR	ØKO	POL	SPM	LOG	SOL	ØKO	SPM	Alle	Alle
Privat firma	0	3	72	100	86	75	27	7	86	43	86	60	34	40
Organisasjon/stiftelse	0	0	6	0	0	0	7	53	0	14	0	0	6	5
Kommunal	34	90	0	0	14	8	7	13	0	0	0	0	25	33
Fylkeskommunal	0	0	0	0	0	0	7	7	0	7	0	0	1	0
Statlig virksomhet	59	3	11	0	0	17	47	13	14	36	14	20	29	20
Annet	7	3	11	0	0	0	7	7	0	0	0	20	2	3
(N=)	100% (61)	100% (29)	100% (18)	100% (3)	100% (7)	100% (12)	100% (15)	100% (15)	100% (22)	100% (14)	100% (7)	100% (5)	100% (208)	100% (201)

Table 9 shows the students opinion on different aspects of the study. The scale used is from -3 (very dissatisfied to +3 (very satisfied), where 0 is neutral. All aspects end up with a positive average, but the lowest values are found on the quality of the supervision on the master thesis and on other subjects/courses.

Table 9. Student satisfaction on different parts of the study (Kandidatundersøkelsen)

T19: Hvor fornøyd er du med følgende fra tiden som student ved HiMolde? *Vurdert på tallskala fra -3=Svært misfornøyd til +3=Svært fornøyd. Snittskår*

	Bachelor								Master				2021	2019
	SP	VP	LOG	PET	MAR	ØKO	POL	SPM	LOG	SOL	ØKO	SPM	Alle	Alle
Faglig innhold i studiet	1,5	1,7	1,6	0,6	0,7	1,8	1,8	0,8	1,8	1,5	1,1	-0,2	1,4	1,4
Kvaliteten på undervisningen	1,1	1,6	1,4	0,4	0,1	1,3	1,4	0,6	1,4	0,9	1,0	0,6	1,1	1,0
Kvaliteten på den faglige veiledningen til bachelor- /masteroppgaven	*	*	1,8	0,9	-0,4	-	2,1	0,7	1,2	1,4	2,0	1,8	1,3	-
Kvaliteten på den faglige veiledningen i andre emner/kurs	*	*	1,2	1,0	0,9	1,6	1,7	1,0	0,7	1,5	1,0	1,0	1,2	-
Eksamens- /vurderingsformer	1,3	1,5	1,5	1,5	1,2	1,6	1,9	1,3	1,6	1,9	1,9	0,8	0,8	1,4
Studentmiljøet (sosiale)	1,4	2,1	0,9	1,4	2,2	1,5	0,0	2,1	2,3	2,5	1,0	1,8	1,8	1,3
Egen tidsbruk/innsats på studiene	1,6	1,6	1,6	1,4	1,1	1,0	1,2	0,3	1,9	1,4	1,4	1,0	1,0	1,8
Egne karakterer	1,4	1,9	2,1	1,3	1,6	1,5	1,2	1,4	2,4	1,9	2,4	2,0	2,0	1,7
(N=)	100% (63)	100% (33)	100% (28)	100% (8)	100% (16)	100% (26)	100% (21)	100% (20)	100% (23)	100% (14)	100% (7)	100% (5)	100% (264)	100% (270)

The survey includes some free text as well where students can write details on how they experienced the studies and change to a work situation. These answers might be very individual but could still give some valuable feedback. A few of the comments are listed below, while all can be found in the attached survey document.

- Wants more practical experience.
- Should get more training in use of Excel.
- Should give more subjects/seminars within the field of purchasing.
- Needs more knowledge of computer programming, like C++.
- Many courses have limited feedback except for the final grade.
- Most lecturers were good, but there were some exceptions.
- The seminar series in the third semester is both pointed out as positive and negative. Some students find it exciting with international experts within different fields, while others feel that the topics get too little time and should have been set into a more general context.

4.6 Internationalization

The MSc in Logistics is an international study program where all courses are taught in English. In the admission process, it is aimed for approximately the same number of Norwegian students as students

from other countries. Currently 10 different nationalities are represented in the program. In the second semester there is an option for exchange studies at cooperative universities mainly in Europe through the Erasmus exchange program. Similarly, master students from other universities can have one or two semesters visit in Molde taking master courses. The seminar series in the third semester is a popular option for external exchange students, while first and second semester courses receives a number of students as well. Some students can also get the opportunity to write their master thesis at a foreign university. This is more irregular and depends on a suitable topic and supervision available at the receiving university.

Typically 3-4 students take the opportunity of a semester abroad, while 15-20 students from other countries take master courses in Molde each year. The option of exchange visits for shorter periods is available for the staff members as well, and several of these take a week of teaching usually with combined research cooperation at foreign universities. The closing of society during the pandemic has naturally affected these types of visits to a high degree.

The academic staff in Molde includes many professor's with origin from different parts of the world, and in particular the seminar series in the third semester will include well-recognized researchers from other countries. Many of these seminar holders are involved in research cooperation with the staff at HiMolde, making their teaching in the seminars and common research a synergy benefiting both activities.

5 Teaching and evaluation

The program courses use a wide range of teaching and study methods. Standard courses run over one semester with classes once or twice per week. Students have homework in terms of exercises, computer lab work, case studies and essays, both individually and in groups. A few courses are taught intensively over a few selected weeks instead of more regularly over the semester. This is in exceptional cases where teachers are not able to give lectures every week.

The traditional teaching method is classroom lectures. However, even before the pandemic many classes have had the opportunity to follow the lectures digitally either live online or by video recordings. During the pandemic digital teaching has been the main rule, and several courses has replaced the traditional lecture format with online meetings. Even after the pandemic, some digital alternatives are expected to continue on most semester courses.

Looking at the student opinions both in the Study barometer and the Candidate survey, there were some concerns on the academic staff's ability to give constructive feedback on the students work. One staff member with experience from several European universities states the same concern *"…the level of guidance and feedback provided to students about what they are expected to do, how they will be marked, and how they will know why they gained the mark that they did, is lower than I have experienced elsewhere*". This is probably something that could have been more emphasized both in regular courses, but also when writing the final master theses.

5.1 Grading procedures regular courses

Semester courses are graded in the scale (A – F) where F is a fail, and other grades are passing on different quality levels. Some courses have a final exam counting 100% of the grade, while others have partial exams or essay writing during the semester counting for a certain percentage of the

grade in addition to a final exam counting for the rest. The most common exam form is a one-day written school exam, which has been organized as a home exam the last two years, but in most cases will return to a school exam when the pandemic is over.

The course responsible is also responsible for the grading. Courses selected for a formal evaluation (ref. chapter 4.4) are also required to have an additional external grader the same year. Graders are suggested by the course responsible and approved by the program coordinator and the study office.

Figure 7 shows the distribution of grades on all subjects taught in the program in the last five years. These are only passing grades, and the failed exams comes in addition with approximately 1.5% of the total number. The statistics count exams independent of the size of the course and show a very high degree of top grades (A's and B's). One reason for this skewed distribution is the high number of small 2.5 ECTS seminars in the third semester where top grades are more common than on the normal semester courses. Grading of master theses is commented specifically in section 5.3.

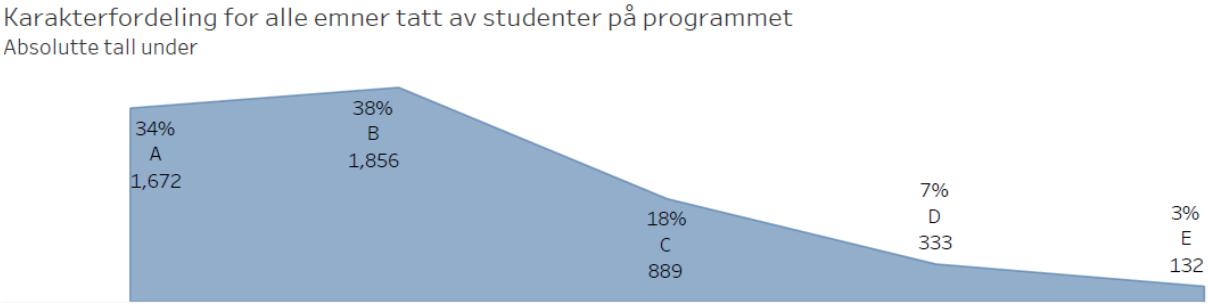

Figure 7. Distribution of grades on all subjects 2017 – 2021 (Tableau)

5.2 Seminar series

The one-week seminars in the third semester are intensive courses with a mix of lectures, homework, discussions and student presentations. The most common format is lectures before noon and exercises/group work after noon, with an oral or written exam or a final report with due date on Friday, even if variants exist. Most seminars are evaluated by the same letter grade (A – F) as the regular courses. A few exceptions with pass/fail grading exists. Exact format of the exams varies a great deal. Some have a final written or oral exam. Others have several partial exams to be delivered during the seminar week, while others again are evaluated by an essay or final task to be delivered at the end of the seminar week.

5.3 Master theses

The master theses are graded with the same letter scale as ordinary courses with the quality description for the grades as follows

Grade	Description
A	Excellent
B	Very Good
C	Good
D	Satisfactory
E	Sufficient
F	Fail

Starting from 2021, the supervisors will not grade their own students. Hence, an evaluation committee consisting of one internal staff member and one external grader is appointed for each thesis. Internal and external graders for the theses are appointed by the program coordinator after suggestions from the supervisors. External graders are usually chosen from another Norwegian university, but some come from other European universities as well.

The supervisor will organize the oral presentation and find a suitable time. Previously the oral presentation has been held as a physical meeting, but also from 2021, digital presentations has been the general rule. The supervisor and both graders should be present together with the students involved. The format of the oral presentation is as follows:

1. The student(s) present their main findings for approximately 20 minutes. If two students have written a thesis together, both should contribute equally during the presentation.
2. After the presentation, the graders and the supervisor initiate a discussion around the thesis, points out weaknesses and strong points and ask the students to clarify any indistinctness. This session should last up to 30 minutes.
3. When the discussion is finished, the students log out and the supervisor stays in the meeting to answer questions before he/she leaves the meeting, and the two graders agree about a final grade.

Delivery of master thesis is due at the end of May in the fourth semester of the study, and the oral presentation around two weeks later. Students not able to finalize the thesis within this date, will be given a new chance at the end of the fall semester. The exception is if students have special reasons like sick or maternity/paternity leave in the period around the due date. If so, they might apply for the option of delivering at the end of August.

Figure 8 shows an overview of the grades given for master theses in 2020 (when the supervisor was a part of the evaluation committee deciding the grade) and 2021 (when the supervisor was replaced by another staff member). There is a significantly lower degree of A-grades, while there is still a great majority on the A and B level. This might not be very surprising as most students work hard for one semester and will deliver a thesis considered good or very good in most respects. Students in risk of failing or getting a poor grade, will also usually be advised by their supervisor to postpone delivery until the next semester.

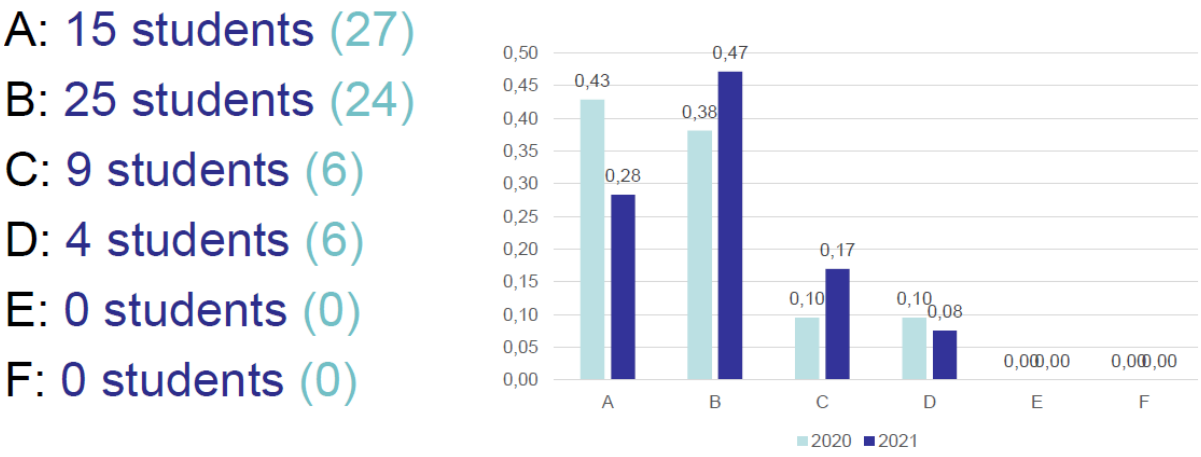

Figure 8. Grade distribution of master theses 2020 - 2021.

5.4 Teachers competence

Table 10 below, gives and overview of the formal competence of the staff teaching in the program in the study year 2021/2022. In addition comes the seminar holders in the third semester.

The staff is also teaching courses for the programs BSc in Logistics and Supply Chain Management, the BSc in IT and Digitalization and in the MSc in Sustainable Energy Logistics. The exact allocation of teachers to courses can vary from one year to the next.

Table 10. Competence for teachers on the MSc Logistics program 2021/2022.

Name	Permanent / Temporary	Percentage of position	Number of courses
Lecturer/Research Fellow			
Terje Bach	Permanent	100%	0.5
Erik Langelo	Temporary	100%	1
Yauhen Maisiuk	Permanent	100%	2
Falko Müller	Temporary	100% (Fall semester)	1.33
Benjamin Mosses Sakita	Temporary	100%	1
Associate Professor			
Halvard Arntzen	Permanent	100%	1
Berit Irene Helgheim	Permanent	100%	1
Deodat Edvard Mwesiumo	Permanent	100%	1
Johan Oppen	Permanent	100%	3
Katerina Shaton	Permanent	100%	1
Sergei Teryokhin	Permanent	100%	2
Eivind Tveter	Permanent	100%	0.33
Professor			
Svein Bråthen	Permanent	100%	0.33
Irina Gribkovskaia	Permanent	100%	2
Lisa Hansson	Permanent	100%	1
Harald Martin Hjelle	Permanent	100%	1
Arild Hoff	Permanent	100%	0*
Lars Magnus Hvattum	Permanent	100%	1
Bjørn Jæger	Permanent	100%	0.5
Edoardo Marcucci	Permanent	50%	1
Alok Mishra	Permanent	100%	1
Tom Rye	Permanent	70 %	1
Sebastian Alberto Urrutia	Permanent	100%	1

* Program coordinator

6 Relevance for industry and society

The Candidate survey indicates that the master program is relevant for the industry and society. As shown in Tables 6 and 8 above, last year 22 out of 23 students had a job six months after graduation. 19 of these were employed by a private company, while the remining three got a job in the public

sector. The survey lists the business areas the candidates are working in, and these includes a wide range of different industries such as offshore, petroleum, seafood, transportation, consultancy, chemical industry, Norwegian Armed Forces, research/teaching among others.

The survey is limited to Norwegian students, but there is no indication that the situation is very different for international students. Although, we do not have exact data for these, we know that some of them get a job in Norway, while others travel back and get good jobs in their home country. A relatively high degree of the graduated students will also continue their studies towards a PhD. Currently 13 out of 29 active students in the PhD program in Logistics at Molde University College, are recruited from our own MSc Logistic study, and there are also several examples of graduated students starting PhD studies in other universities, both in Norway and abroad.

The responses in the Study barometer from the current students of the program, is however a bit lower on questions related to the business life compared to other aspects of the study. Table 11 shows the response on five relevant questions.

Table 11. Student responses on questions related to the business life (Studiebarometeret)

Representanter fra arbeidslivet bidrar i undervisningen (f.eks. som gjesteforelesere/kursholdere)	3,5	1,18	17	6	12	35	24	24	-
Jeg får god informasjon om hvilke yrker/bransjer som er relevante for meg	3,7	0,86	17	-	12	24	53	12	-
Jeg får god informasjon om hvordan min kompetanse kan brukes i arbeidslivet	3,5	1,18	17	12	-	35	35	18	-
Jeg får innføring i hvordan jeg kan formidle min egen kompetanse til potensielle arbeidsgivere	2,4	1,02	16	19	44	19	19	-	-
Det er muligheter for å jobbe med prosjekter/oppgaver i samarbeid med arbeidslivet	2,7	1,40	17	29	12	29	18	12	-

In particular, the questions regarding training on how to communicate own skills to potential employers and the possibilities to work on projects in cooperation with businesses, show a relatively low average score among the respondents.

Even the responses to the other questions indicates that there could be some potential for improvement within these matters. Still there are both courses and seminars in the study with direct relevance to industry and commerce. One example is a mandatory course on the Advanced SCM specialization, LOG715 Business Cases in SCM, which concerns real life cases taken from different companies, where the students should try to solve them by using relevant theory they have learned during the study.

Topics for master theses are also to a high degree chosen as real life problems in different companies. Hence, since the Study barometer survey is taken among the third semester students, before many of them have chosen their thesis topic, it is expected that they will see more industry relevance towards the end of their study.

Still, this seems to be an area with a potential for improvement. Perhaps some more could be done to involve lecturers from the industry, both to talk about specific topics, but also about jobs?

7 Summary

In general, the MSc Logistics program gets good score on most of the parameters considered in the evaluation.

There are still aspects of the study with a potential of improvement. Student surveys indicate that the feedback on student's work is considered insufficient. Students also comment that there is a lack of actual training for writing scientific texts. These matters should be emphasized when planning adjustments to courses and the study program.

One staff member points out the need for an international accreditation of the program to confirm that the professional level meets international standards and for making it more attractive among foreign students. Another aspect to consider is an evaluation on how we market our programs. These matters are important and should be focused but will go beyond the scope of this periodic evaluation.

A suggestion from one of the industrial contacts is to consider changing the name of the program to supply chain management (SCM). In the current definition, logistics is a broader field than SCM and covers more quantitative topics such as optimization, mathematical modelling transport economics. Hence, using the name SCM could to some extent be seen as too narrow for the whole field of subjects taught in the program.

Both industrial contacts emphasize the importance of teaching ERP systems. The course on this topic is mandatory for students taking the information systems specialization, but it is also a popular elective course for students on other specializations.

The importance of digitalization and new concepts like Big Data, Artificial Intelligence and Blockchain is also mentioned. Although these matters so far have a limited importance in most of the industry, they are expected to be more important in the future. To some degree they are covered as topics of seminars but should probably be given higher priority in the future study plans.

Another aspect which is commented by both industrial contacts is a lack of focus on sustainable transport, i.e. considering both reduction of the transportation distance and selection of transportation mode. To some extent both these aspects are covered in the program, but maybe not simultaneously. The new planned master in sustainable transportation and urban mobility is also expected to focus more on these matters.

One industrial contact mentions the influence of working capital and consequences of choices taken in the value chain, as a point not considered enough in the program, while the other industrial contact mentions the need for graduates with the ability to see the whole picture, not only their specific part of the supply chain. He emphasizes in addition the requirements for flexible value chains and a robust supplier structure as example of areas that should be covered more deeply.

The same industrial contact lists four specific topics which he finds missing in the portfolio:

- End to end visibility
- Sales and operations planning
- Risk in the value chain
- Business development/Integration and cultural differences

In addition he emphasizes the need for physical attendance in the lectures. The last year's close-down of society has lead to hybrid teaching solutions where it has been possible to attend lectures and take exams online. The discussion about giving a full digital master program even when the society is opened, is ongoing and very important. This can attract new student groups with a life situation which

makes them unable to move physically to Molde. Still, we have seen negative consequences with the digital solutions. Teachers report that it is hard to engage students who participate online in class discussions, and even if they are logged in, it is hard to know to what extent they are actively following the teaching. In addition, there is limited control on the exams with a high potential for cheating and cooperation between students. We have also seen in the current semester that it is difficult to get the students back to campus even after physical presence on the lectures have been allowed, and this is problematic for maintaining the student life on campus.

From the fall semester 2022, most regular courses will be given with a digital alternative like recordings or live transfer, while most of the exams, however, will probably go back to physical presence on school. The seminar series is also planned with physical attendance both from student and seminar holder from next semester.

The industrial contacts both state the need for more business examples in the program. This is something that should be emphasized higher in more courses as the practical examples are always much more complex than the theory.

8 Attachments

- Kandidatundersøkelsen (2021)
- Studiebarometeret (2021); https://www.studiebarometeret.no/no/student/studieprogram/232_80/detaljer
- Minutes from meetings in the Quality Team (2021)
- Internal accreditation document for program (2019)
- Annual study program reports (2020 + 2021)
- Course evaluations and teacher's reports (Spring + Fall 2021)
- Overview of seminar series 2021
- Seminar evaluations 2021
- List of master theses 2017 - 2021 (students, supervisor, title)
- Comments to the tentative internal report from two industry contacts and student representative

9 Timeline

2021

December 9: Initial discussion in Faculty Board.

Program coordinator starts preparing the internal report.

2022

March 2: Faculty Board decides mandate and format of evaluation

March 2: Discussion in Quality Team involving student representatives

March 7: Email to Faculty requesting feedback to preliminary report

March 9: Discussion in Faculty Meeting

March 10: Appointing external expert (Stein Erik Grønland)

March 23: Appointing reference persons from the industry: Logistic managers at Glamox (Steinar Abrahamsen) and Ekornes (Jan Robert Lyngvær)

March 28: Finalizing tentative internal report. Sending it to the faculty, students and industry representatives for comments.

April 25: Completing internal report and submitting it to the external expert with all the necessary attachments.