

# PHD LOGISTIKK

## SLUTTRAPPORT PERIODISK EVALUERING

11. APRIL 2021

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Ifølge høgskolens rutiner skal det skrives en sluttrapport fra periodiske studieprogram-evalueringer. Her skal prosessen beskrives, med vekt på involvering av studenter, arbeids-/samfunnsniv og eksterne sakkyndige. Den sakkyndige rapporten skal også vurderes, og det skal pekes på hvilke tiltak som skal gjennomføres.

## Om prosessen

Prosesen startet tidlig i 2020 med utarbeidelsen av et eget mandat for den periodiske evalueringen av doktorprogrammet i logistikk (vedlagt). Mandatet tok utgangspunkt i Avdeling for logistikk sine rutiner for periodisk studieprogramevaluering, men inneholder nødvendige tilpasninger som gjør prosessen egnet for et doktorprogram, som skiller seg vesentlig fra andre studieprogrammer på flere måter. Sentralt i mandatet er sammensetningen av en evalueringskomité bestående av to eksterne professorer, en intern professor, og en representant for doktorgradsstudentene. Siden et doktorprogram i stor grad «leverer» kandidater til academia, vurderte man at professorene i utvalget også representerte arbeidsmarkedet for programmet, i tillegg til at de var sakkyndige.

Etter at mandatet var utarbeidet, ble det arbeidet administrativt med å samle all nødvendig informasjon som kunne oversendes evalueringskomitéen våren 2020. Evalueringskomitéen fikk følgende sammensetning:

- Professor em. Siri Pettersen Strandenes, Norges Handelshøyskole (leder)
- Professor Rickard Bergqvist, Gøteborgs Universitet
- Professor Arild Hoff, Høgskolen i Molde
- Doktorstudent Falko Müller, Høgskolen i Molde
- Sekretær: Doktorstudent Karoline Hoff, Høgskolen i Molde

Evalueringskomitéen arbeidet høsten 2020 og leverte sin rapport 26. november 2020.

Doktorgradsutvalget for logistikk har så behandlet rapporten i to møter våren 2021.

Doktorstudentene har vært representert i alle trinn i denne prosessen, både i utarbeidelsen av mandatet, i komitéarbeidet – og i oppfølgingen av rapporten. I tillegg danner en større survey gjennomført blant tidligere og nåværende studenter en viktig input til evalueringen.

## Om vurderingskomitéens rapport

Vurderingskomitéen har levert en grundig og god rapport som har gitt mange gode innspill til videre kvalitetsutvikling av studieprogrammet. Selv om den inneholder en god del forslag til tiltak for forbedringer, er den generelle vurderingen av programmet og fagmiljøet positiv. Rapporten er strukturert etter temaene som er gitt i evalueringsmandatet. Her følger en forsøksvis oppsummering av de viktigste kommentarene gitt under hvert av disse temaene.

1. **Om programmet.** Komitéen finner navnet på programmet dekkende, men påpeker at det faktum at temaområdet spenner såpass vidt, gjør det krevende å tilby nok

etterspørsel etter egne doktorgradskurs, med unntak av metodekurs. Programmet vurderes som faglig oppdatert, men at kursporteføljen er utilstrekkelig. Det påpekes at det er uvanlig at kun ett kurs er obligatorisk, og at det ikke kreves obligatoriske metodekurs. Det bør ikke forventes at kandidater selv finner veiledere, og man bør sikre at studentene får mulighet til å besøke et sterkt forskningsmiljø i utlandet. Komitéen har også forslag til forbedret informasjon på web-sidene, spesielt knyttet til punktet «Why choose this program».

2. **Læringsutbytte, læringsmiljø og progresjon.** Samlokaliseringen av de fleste doktorstudentene vurderes som positivt, da dette legger til rette for uformelle læringsarenaer. Studenter på 4-årskontrakter får ofte undervisningsoppgaver uten at de får spesiell trening eller oppfølging. Avdelingen bør sørge for at også doktorgradsstudenter får tilgang til pedagogisk kursing og veiledning fra erfarne undervisere. Komitéen viser til at man kan få opptil 20 studiepoeng i form av masterkurs (samt selvstudier eller konferansepresentasjoner), og antyder at om man beholder denne ordningen, så bør doktorgradsstudenter ha et tilleggs-pensum for å få disse godkjent. Det vises til at doktorgraden ved avdeling HS har krav om 30 studiepoeng, men hvor alle er på PhD-nivå. Dette bør også vurderes for denne doktorgraden, og at man da tar bort mulighetene for studiepoeng for konferansepresentasjoner, masterkurs og selvstudier. Konkret foreslår komitéen at man gjør ett metodekurs obligatorisk. For øvrig bør områder som forskningsdesign, akademisk skriving og pedagogikk vurderes som del av kursporteføljen. Komitéen foreslår også at det opprettes en database med relevante eksterne kurs, og at man systematisk innhenter erfaringer med disse. Videre foreslås det at det opprettes en individuell studieplan (ISP) for hver student, som en kontrakt mellom student, veileder og avdelingen. Denne bør evalueres hvert år sammen med veileder og leder av doktorgradsutvalget.
3. **Forskningsaktivitet og støtte.** Generelt virker forskningen under doktorgradsprogrammet å være på godt vitenskapelig nivå, og kvalifikasjonene til forskerne knyttet til programmet å være godt. De fleste doktorstudentene er knyttet opp mot forskningsgrupper, men aktivitetsnivået innad i gruppene kan være varierende. Avdelingen bør sikre at alle doktorstudenter er tilknyttet en forskningsgruppe og at man er sikret invitasjon til 3-4 arrangementer hvor studenten kan delta. Det foreslås at man på det årlige doktorseminaret også oppnevner en «opponent» - enten blant de andre studentene eller blant fagpersonalet (men ikke veilederen).
4. **Organisering og drift av programmet.** Generelt virker programmet godt organisert og ledet. Som nevnt under punkt 1 ovenfor, anbefales det ikke at studentene selv finner fram til egnede veiledere. Komitéen mener at midtveiseevalueringen bør skje tidligere enn 2/3 ut i programmet (som er dagens ordning). Komitéen påpeker at det virker merkelig at doktorprogrammet ikke er nevnt i høgskolens strategi (Strategi 2025).
5. **Internasjonalisering.** Komitéen påpeker at det faktum at seminarrekka for masterstudenter bringer inn mange topp kvalifiserte professorer fra utenlandske

forskningsmiljøer er en styrke som kunne vært utnyttet enda bedre for doktorstudentene. Noen av kursene som gis, kunne med noen få grep ha vært hevet til doktorgradsnivå. Ikke alle studenter tar kurs i utlandet, og relativt få har et forskningsopphold i utlandet. Dette bør man legge bedre til rette for, blant annet gjennom ovennevnte database med utenlandske doktorgradskurs som kan anbefales.

## Kommentarer og vurderinger knyttet til rapporten

Summen av forslag og råd som gis er temmelig omfattende, og om vi skulle følge opp alle forslagene med det samme, kan det kunne kreve relativt store ressurser. Doktorgradsutvalget har derfor lagt opp til en prioritering av tiltak som bør gjennomføres.

Det største og mest omfattende forslaget som gis er vel knyttet til **kursporteføljen** og tilbudet av kurs, og krav til sammensetning av kurs. Ett forslag går i retning av at man kun godkjenner PhD-kurs i porteføljen, men at man reduserer omfanget til 30 studiepoeng (etter modell fra avdeling HS sitt doktorprogram). Det anbefales også at man gjør ett metodekurs obligatorisk i tillegg til dagens Philosophy of Science. Endelig etterlyses det et større utvalg av valgbare doktorgradskurs tilbudt under programmet.

Noe av bakgrunnen for at vi har valgt å ha 45 sp portefølje, og å åpne for masterkurs som en del av dette, er at vi tar opp kandidater med svært ulik bakgrunn. Noen trenger ikke å ha hatt spesifikke logistikk-kurs fra før i det hele tatt (de kan ha en generell økonomi, eller ingeniør-bakgrunn for eksempel). Da vil de ha behov for et innhold tilsvarende det som gis i våre masterstudier. For å gi rom for dette, uten å senke kravet til doktorgradskurs vesentlig, har vi hittil valgt å holde på 45 sp-modellen.

Dernest er det foreslått å innføre en **kontrakt (individuell studieplan)** for studentene, og tilhørende rutiner rundt dette. Her legges det opp til en relativt grundig detaljering av milepæler og oppfølging av disse, både fra student, veileder og utvalgsleder. Forslaget om innføring av en juridisk bindende individuell studieplan har en hoved-referanse i det svenske regelverket. Her er det krav om en slik plan, hjemlet i den svenske høgskoleforordningen (tilsvarende en forskrift under den svenske høgskoleloven). Innholdet i planen er ikke ulikt det som ligger inne i den kontrakten som allerede skrives med studenter som tas opp på programmet (og som er basert på UHR sin mal). Imidlertid ligger det strengere juridiske føringer i den svenske lovgivningen – som både forplikter kandidaten og institusjonen. Det legges det opp til en relativt grundig detaljering av milepæler og oppfølging av disse, med minimum årlig oppfølging.

Komiteens begrunnelse for å innføre en slik kontrakt er knyttet til en vurdering av at den årlige fremdriftsrapporteringen ikke blir brukt aktivt. Selv om disse rapportene blir lagt fram

for doktorutvalget, skjer det sjelden noen aktiv oppfølging av dem. I behandlingen av disse har det også blitt påpekt at detaljeringsgraden i rapporteringen er svært ulik.

Den svenske individuelle planen/kontrakten inngår i den svenske lovgivningen og passer ikke nødvendigvis inn i det norske systemet. Imidlertid deler vi vurderingen av at det er behov for forbedring av den årlige framdriftsrapporteringen. Derfor foreslås det at det innføres et krav om at det skal ligge inne konkrete milepæler i den kontrakten studentene skriver ved opptak, og et krav om at framdrift i forhold til disse milepælene skal kommenteres eksplisitt i rapporteringen fra kandidaten og veiledere.

Antydningen om at vi bør **stramme inn tidsrammen for gjennomføringen av midtveis-evalueringen** ut over 2/3 løp kan virke fornuftig i utgangspunktet. Imidlertid har erfaringen så langt vært at vi har slitt med å forholde oss til nåværende grense. Spesielt gjelder dette for 3-årige løp. Utfordringen er ofte at man må være kommet så lang at det er noe skriftlig produksjon for komitéen å vurdere. Prosessen tar også litt tid, gjerne 2-3 måneder. Om vi skulle innføre en deadline som var på halvgått løp, betyr det at prosessen må starte litt etter at det første året er gjennomført for de på 3-årige løp. De fleste fyller mye av det første året med kurs, og det kan være lite å evaluere av skriftlig materiale så tidlig i løpet. Hensyn tatt til at det meste av forskningsarbeidet skjer i de 2-3 siste årene av løpet, synes nåværende grense kanskje å være hensiktsmessig.

Forslaget om en **database av anbefalte kurs** fra andre institusjoner virker i og for seg fornuftig. Spørsmålet er om det finnes kurs som gjentas med jevne mellomrom og som er aktuelle for mange nok av våre studenter til at det er fornuftig å gjøre denne jobben, og vil en evaluering av et kurs være gyldig/nyttig etter tre år? Det vil i alle fall være krevende å følge opp om kursene har endret seg, eller om de fortsatt gis.

Det foreslås også at vi i **større grad legger til rette for utenlandsopphold**, evt. klarere formidler en forventning om at dette skjer. Dette er vel noe som veileder i så fall bør forsøke å legge til rette for, i alle fall i form av akademiske kontakter og avtaler med forskningsmiljøene. Det er likevel vanskelig å anbefale at dette gjøres obligatorisk, da det kan være praktisk vanskelig å få til for en del kandidater.

Så anbefales det at avdelingen følger opp at kandidater som gis undervisningsoppgaver får nødvendig pedagogisk oppfølging. De færreste av kandidatene vil ha pedagogisk erfaring fra før, og det er viktig at de får nødvendig støtte knyttet til undervisningsoppgavene. Som et minimum bør det oppnevnes en mentor for undervisningen, men aller helst bør kandidatene tilbys et pedagogisk kurs på linje med det andre ansatte tilbys. Det er naturlig at arbeidet med dette tas med i vurderingen av omfanget av studentenes arbeidsplikt.

## Doktorutvalgets oppfølging av evalueringsrapporten

Doktorgradsutvalgets konkrete oppfølging av evalueringsrapporten framgår av vedtaket gjort i sak 24/21 den 23. mars 2021.

1. *Doktorgradsutvalget for logistikk (DU LOG) takker vurderingskomitéen for et grundig og godt arbeid som gir et verdifullt bidrag til videre utvikling av doktorgradsprogrammet i logistikk.*
2. *DU LOG har i de to siste utvalgsmøtene diskutert oppfølging av anbefalingene som gis i komitéens sluttrapport av 26. november 2020, og har vedtatt følgende*
  - a. *Forslag som DU LOG vil følge opp umiddelbart*
    - i. *Gjennomføre eget engelskspråklig kurs i «Philosophy of Science» som obligatorisk for alle våre studenter (Kurset settes opp høsten 2021 første gang)*
    - i. *Gjør det klart at vi ikke forventer at studentene på egen hånd skal finne sin veileder, men at dette håndteres av doktorgradsutvalget.*
    - ii. *At vi sikrer at alle doktorstudenter knyttes opp mot en aktiv forskningsgruppe. Det er hovedveilederens ansvar at dette skjer.*
    - iii. *At vi forbedrer beskrivelsen av programmet på web-sidene slik komitéen foreslår*
  - b. *Forslag og anbefalinger som DU LOG oversender til avdelingen /Forskningsutvalget*
    - i. *DU LOG ber avdelingen sørge for at doktorkandidater som tillegges undervisningsoppgaver som del av sin arbeidsplikt også tilbydes pedagogisk utdanning og/eller veiledning fra erfarne undervisere. Tiden som dette tar, bør regnes med i kandidatens arbeidsplikt.*
    - ii. *DU LOG oppfordrer avdelingen/Forskningsutvalget til å sørge for at forskningsgruppene fungerer godt for doktorgradsstudenter*
  - c. *Forslag som DU LOG vil følge opp videre*
    - i. *DU LOG vil i forbindelse med den ordinære studieplanrevisjonsprosessen høsten 2021 vurdere om kursinnholdet i studiet skal endres, herunder*
      1. *Om totalt omfang skal reduseres fra 45 til 30 sp*
      2. *Om man kun skal få godkjent rene doktorkurs i kursporteføljen*
      3. *Om det skal legges inn ett obligatorisk metodekurs, evt. krav om minimum ett metodekurs i kursporteføljen.*
      4. *Om det skal legges inn et kurs i akademisk skriving i obligatorisk eller frivillig kursportefølje.*
    - ii. *Innføre et krav om tydelige og tidfestede milepæler i kontrakten som skrives ved opptak. I den årlige rapporteringen fra kandidat og veileder skal framdriften i forhold til disse milepælene kommenteres, og milepælene eventuelt revideres.*
    - iii. *Når begrensningene som pandemien gir er over, vil det legges større vekt på å motivere kandidatene og tilrettelegge for forskningsopphold ved ekstern institusjon. Forskningsoppholdet bør legges inn i*

*milepælsplanen. Det er i dag for få som har dette som en del av sitt doktorgradsløp.*

- d. Forslag fra komitéen som DU LOG ikke vil følge opp nå
  - i. Innføringen av en juridisk bindende individuell studieplan for doktorstudenter. Her vises det i stedet til tydeliggjøringen av milepæler i kontrakt og årsrapportering.*
  - ii. Dagens angivelse av tidspunktet for midtveisevalueringen beholdes.**

## Periodic evaluation of the PhD Logistics program

### Introduction

The evaluation committee has worked for three months after receiving the mandate and the necessary information before submitting this report. By mandate, the report should contain an assessment of strengths and weaknesses of the PhD program in Logistics, based on the following five elements:

1. The relevancy of the program vs. the needs of work-life and society
2. If the content of the program and the stated learning outcomes are up-to-date and relevant
3. If the program provides a good learning environment for the students
4. If the academic quality of the faculty and the qualifications of the tutors are relevant and meet an appropriate international level for PhD education
5. If students have a satisfactory progress and completion rate, and that the PhD theses represent independent pieces of work at a high international level

The evaluation committee could make minor delimitations/expansions of the mandate if needed, but have not seen the need for this.

Professor em. Siri Pettersen Strandenes, Department of Economics at NHH Norwegian School of Economics, is appointed committee chair. Professor of Logistics and Transport Economics Richard Bergqvist, from the University of Gothenburg, is the second external member. The representative from the Faculty of Logistics at Molde University College is Professor in quantitative Logistics Arild Hoff. PhD-student in Logistics Falko Müller represents the students. He is also the students' representative in the PhD Logistics program committee at MUC. His contributions to this report are based on a meeting with 14 presently enrolled students and represent the PhD students' overall and summarized views.

PhD-student Karoline L. Hoff is the secretary of the committee. Tove Orheim is responsible for providing necessary documentation and ensuring that the committee members sign a confidentiality agreement related to the person-sensitive information received.

The committee has had 5 Zoom meetings. Even though we would prefer to visit MUC and meet with faculty and students we found the information provided by the MUC sufficient for us to assess the PhD program in logistic in this situation where covid-19 restricts travelling. The committee notes that the two internal members of the committee has contributed with additional information when needed.

Our evaluation report is structured in line with the mandate's five topics: About the program; Learning outcomes learning environment and student progress; Research activities and support; Organization and management of the program and Internationalization. We discuss each of these below and sum up in the concluding remarks and suggestions section.

### 1. About the program

Logistics is a well-known concept and cover several research areas. The name of the program, PhD in Logistics, seems appropriate for the program with its three strands; Logistics, Supply Chain Management and Transport Economics. The specialization in Supply Chain Management falls well within the field of Logistics, whereas Transport Economics also incorporates additional, but related topics. The wider field of the Logistics program should be advantageous for the students since this



opens up for choosing a wide range of research areas. On the other hand, the wide scope may reduce MUC's ability to generate substantial student demand for specialized, in-house PhD-courses except for methodology courses.

Overall, we find the program's scope, and profile contemporary and up-to-date. However, the program's course portfolio seems inadequate with few and irregular in-house PhD courses and seemingly little information on relevant PhD courses offered elsewhere. Currently, students are required to acquire 45 ECTS. By itself this is a normal course work-load requirement seen in many other programs. MUC, however, accepts ECTS points gained by conference presentations, tutored self-study courses, and master courses. Further, the program defines only one PhD-course as compulsory for all students, which is less than what is required in most other programs. Especially the lack of mandatory courses in methodology appears striking.

To ensure that the program is up to date and meet market needs, the program needs to stay in line with international standards. This means, e.g., offering mandatory courses in methodology, removing the expectation that applicants find the potential supervisor themselves, and make sure that the students get the opportunity to visit a strong research group for their stay abroad.

In 2018, the Faculty asked former students to provide feedback on several aspects, such as for instance, their own employment history after completing the PhD-program. The answers indicate that 62% of the 34 graduates work within the academia, 24% in private companies, 7% in the public sector outside academia and that only 2% do not have paid work. This suggests that the program is relevant to the needs of work-life, society and the labor market. Also, the committee assesses the three PhD-thesis presented to the committee as relevant. Furthermore, PhD students with a 4-year contract have work obligations that involve teaching, which in the view of the committee increases the candidates' appeal to potential (academic) employers.

Information on the MUC web page is well organized and easy to navigate, but additions and adjustments are needed. The web page specifies one mandatory course, "Philosophy of Science", and even though the program is in English, the course description found on the link to Volda University College is in Norwegian only. The Norwegian-speaking students will also learn that the course is designed for PhD students in Health and Social Science. The English-speaking students are encouraged to find a similar course in English at other universities, but with the course description being in Norwegian, this might be problematic.

Information in the rubric "Why choose this program" is rather deficient. More detailed information about the program, and on being a PhD student in Molde, should be provided on the web page. This could include (but not limited to):

- A typical syllabus and suggestions for a "Philosophy of Science" course in English
- Former students experience from the PhD-program
- Information on courses offered internally and externally
- A section on how life is in Molde.

Overall the committee is impressed by the level of ambition and the number of students MUC has attracted to the specialized PhD program in Logistic. We found some weaknesses that should be remedied, however, especially regarding the in-house course portfolio and the lack of PhD courses on methodologies, as discussed above.

## 2. Learning outcomes, learning environment and student progress

The learning outcomes as published e.g. in the MUC PhD web pages are well described. Occasionally, the formulations appears a bit general. The committee thinks this a minor issue,

however, considering that the program allows for specializing in the three different strands: logistics, supply chain management and transport economics.

Most of the PhD students in Logistics have their office space located together with other PhD students in Logistics. It appears that the everyday learning environment benefits from this, as the students tend to arrange informal group meetings to discuss their work and general practical issues. The average age of 34 for candidates starting the program is quite high but is explained by a few persons above 55 years enrolled in the program.

Students are encouraged to actively participate in research activities organized by the Faculty and their associated research groups. The activity-level of staff meetings and seminars seems to vary among the different research groups. The committee encourages MUC to ensure active seminar series, as this will benefit the PhD students greatly. Staff seminars provide insight into the college's research and give students an arena to present and discuss their work with more experienced researchers.

The requirements for supervisors at MUC seems not formalized as anyone with a PhD can be a supervisor. From the list of co-supervisor for the students currently in the program it is clear that several of the co-supervisors are local MUC faculty. Starting as co-supervisor gives young faculty the chance to tutor a PhD student together with a senior supervisor, which function as training for the co-supervisor. MUC might consider formalizing such training for young faculty.

PhD students at the Faculty of Logistics at MUC with a 4-year contract have 25% working obligations. In general, students are asked to fulfil their working obligations by teaching courses on the BSc- or MSc-level. The committee understands that the PhD students can lecture without any formal training and without having a more experienced lecturer to supervise them and provide feedback. Some pedagogical courses or training should be prioritized, and also, the students should be followed up by some more experienced lecturers to get feedback and guidelines for improvement. Any faculty arranged courses on pedagogical skills and methods could potentially be offered as PhD courses also. This would further improve the skills and employability of the PhD students upon completion of their studies. At many universities, a mandatory introductory course in pedagogy is compulsory before taking on any teaching assignments even for PhD students when teaching.

The PhD module and courses offered in-house needs strengthening. The 45 ECTS that is required today seems inflated, as only 25 ECTS is required at PhD-level. The other 20 ECTS can consist of master courses, self-study courses, and presentations at international conferences. A maximum of 15 ECTS may come from self-study and conference presentations, and of these, a maximum of three presentations à 3 ECTS. There are no additional requirements for the PhD students attending master courses but they need minimum the grade B for the master level course to be accepted in the PhD course portfolio. Some additional requirements for the courses at master's degree, e.g., a bigger syllabus, additional hand-ins, additional / more difficult questions for the exam, should be put in place. The self-study courses should be verifiable. Students are encouraged and expected to attend international conferences, but should not receive ECTS from that. Besides, the other program at MUC, in Health and Social Science, requires 30 ECTS (all at PhD-level). It can be difficult to require 45 ECTS at a small institution that offers few in-house courses. Overall, the committee suggests that MUC remove all these specialized alternatives and have a requirement of 30 ECTS at PhD-level.

Only one course is compulsory, "Philosophy of Science", and this course is not offered at MUC, but by Volda University College and in Norwegian. Some PhD courses, such as "Cost-Benefit analysis",

and “Supply Chain Performance Management”, are offered on an irregular basis and are open to external students. The 5-day intensive seminars offered at master level cover a wide range of research areas, and there are many external (and international) lecturers. Internal members of the faculty have good experience with PhD students attending these seminars. The requirements set for PhD students taking this seminars should be more demanding than for the master students, as suggested above.

Previous student evaluations signal and the committee also thinks that there are too few credits allocated to methodology, research design, academic writing, pedagogy, etc. The lack of in-house courses may reflect that courses on narrow topics will fit only a few of the PhD students at MUC. Methodology courses, on the other hand, will also be relevant to most PhD students irrespective of their chosen research topic within the PhD program. The committee finds that in-house course-portfolio needs to be strengthened and should consist of a compulsory methodology course.

As a consequence, PhD students have to take most of their courses at other universities and university colleges. From the description of the program in the input to the periodic evaluation, external courses are required to be at PhD-level and have to be approved by the PhD committee. From this, the quality of external courses seems to be assured. MUC should consider to established a database where relevant courses, with an assessment of the quality (based on previous attendance), are recorded. This would give the students information about courses in addition to the information they gather from their own searches and tips from fellow students and/or supervisors. This database can also help the PhD committee assure the quality of courses from applicants when approving changes in the course plan for enrolled students.

With a completion rate of 61% in under 5 years, and with 3-5 students graduating each year for the last eight years, student progress seems good compared to other programs. The average time to submission is 3.73 years<sup>1</sup> for a 3 years program, which is satisfactory compared to the “industry standard”. The committee supposes that the increased time used partly may reflect that several students have to attend almost all of their courses at other universities and university colleges.

The students’ progress is followed up via the annual progress report sent to the PhD committee. From what the committee experiences, this annual report is noted by the PhD committee but not actively used. A contract between the student, supervisor, and the Faculty specifying the plans, and milestones, would give the parties something concrete to follow up. This will help clarify tasks and expectations. The contract should be evaluated each year together with the supervisor and the chair of the PhD committee. This contract could also serve as documentation if justification is needed, e.g., to change the supervisor. In 2018, MUC made changes in the program to enhance the completion rate and removed students that have been inactive for many years. A contract, could also aid MUC in these types of issues if e.g. specifying the maximum time period that the student has the right to supervision. We suggest that MUC consider introducing an Individual Study Plan (ISP) for each PhD student. An ISP would act as a continuous and dynamic contract between the student and the supervisor that clearly states the progress and more importantly the plan for the coming semester(s). The ISP should be updated annually and be noted by the PhD committee.

Overall, the learning goals appear up-to-date and in line with what can expect from a comparable PhD-program. In general, the learning environment appears to be good. The committee finds that the ECTS requirements and the course portfolio of in-house courses needs improvement for the PhD in logistic to be at par with most PhD programs.

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<sup>1</sup> The figure is net of 25% working contracts and sickness leave

### 3. Research activities and support

Research by the PhD students in the program meets the established academic standards, as it seems that 2-3 papers from the thesis typically are published before the defense. In addition, the students present their work at international conferences with peer-reviewed abstracts. The few students who write a “monograph” are evaluated by the adjudication committee upon submitting the thesis. This should secure the quality.

Employees at the Faculty of Logistics have high competence in several fields and an impressive number of faculty are full professors. Several national and international researchers are engaged in Professor II positions and some also act as co-supervisors. In some cases, experts from other universities or the industry function as co-supervisors.

Most of the students are well integrated into research groups, but their integration might depend on the supervisor’s role in the group. Also, as stated in section 2, the activity level of the research groups vary. The Faculty should make sure that every student is integrated into an active research group, or, e.g., set up 3-4 events per year where the students are called in to participate.

MUC arranges an annual seminar, where the students present their research to the other PhD students and supervisors. At the end of the presentation, there is room for questions and discussions, but no organized discussion. The committee suggests including a discussant, a senior (who is not the supervisor), or another PhD student, in these seminars.

The mid-way and final evaluation committees are well qualified. The mid-way committee consists of one internal independent member and one external member. The final evaluation committee consists of at least one international member. An opponent cannot be a part of both the mid-way evaluation and the adjudication committee. The adjudication committee has to be approved by the PhD-committee.

As commented above, the research produced by the Ph.D.-students meet required standard. This is ensured by the high number of thesis papers published before the dissertation, and by the mid-way evaluation and adjudication committees, which include external members in the field. There is an impressive high share of full professor within the Faculty. The committee recommends that the faculty ensures a good amount of research seminars and that the Ph.D.-students are better integrated into the research groups.

### 4. Organization and management of the PhD Logistics program

Overall it is our impression that the PhD Logistics program is well organized and managed. From reading the minutes from the PhD committee meetings in later years, we find that the committee functions well and focuses on relevant issues in the management of the PhD Program in Logistics. The committee seems to co-operate well with the Faculty of Logistics as for example on the division of work and in recruiting students for PhD scholarships.

PhD students are represented in the committee together with members of the faculty. Stakeholders, both faculty and students may bring up issues for discussions. Thus, students may address issues via their representative in the committee or by contacting the chair. For a small institution like MUC it may be challenging if problems arise between a student and a supervisor who also is a member of the PhD committee. It is our understanding that MUC is aware of such weaknesses and that they are in the process of introducing procedures for handling such cases should they arise.

The recruitment procedure seems adequately organized. The program furthermore appears to be generously funded via MUC scholarships. This should increase the attractiveness of the program to potential students.

Matching students and supervisors is an important task for the PhD committee and of utmost importance for a candidate's success. It could be difficult to find an experienced supervisor with a background in the student's research topic and secure that the student and supervisor have good chemistry. To put together a team of supervisors may be a good solution. We find it strange that applicants are assumed to contact a potential supervisor before sending in the application. It is unclear to us, however, to what degree this requirement is binding. Requiring students to find a supervisor may pose several problems; This requirement could favor internal applicants and be an obstacle for external applicants without contacts at MUC; An attractive applicant may find this difficult and decide not to apply to MUC; A candidate may be discouraged if receiving a negative or indifferent answer when contacting a potential supervisor; Applicants, also internal applicants, usually will not have sufficient oversight of the research interest and the work load of the supervisor approached. Faculty might also find this uncomfortable if several potential PhD students' approach them regarding supervision, but their current work load do not allow for supervising all of them. Students should be able to express their wishes, but it should not be required to have an agreement with a supervisor when applying.

The recently introduced mid-way evaluation replaced a public pre-defense that usually took place around a year prior to the defense. This mid-way evaluation when scheduled early, may be more effective by offering early feedback to the students on their research and progress. The requirement that one external member with relevant competence joins the mid-way evaluation committee is a strength and should be adhered to. The PhD program regulation, however, states that "ME must be conducted before the candidate has reached 2/3 of the planned duration of the doctoral work" ("Guidelines for the mid-way evaluation (ME) PhD Logistics", 2019). This seems too late to give the sought for effect. This mid-way evaluation is a good initiative, and the evaluation committee encourages MUC to continue this.

Routines around the public defense seem to work well. The internal MUC member is a full member of the adjudication committee and participate in the opposition on an equal footing with the external members. Routines are said to be in place to handle the rare situations of non-unanimous adjudication committees.

We find it strange that the PhD program does not appear as a specific strategic focus point in MUC's written strategy ("Strategi 2025, 2019). This omission may send a wrong signal to potential students and faculty.

The Ph.D. Logistics program appears well organized and to our understanding potential problems are well handled. The recruitment procedure seems adequately organized, but we find it strange that the applicants are assumed to contact a potential supervisor before applying. The mid-way evaluation and disputation process seems to work well. However, as suggest above MUC should consider introducing an Individual Study Plan.

## 5. Internationalization

There is a broad representation of nationality among the student body. This creates a genuine international context for the PhD students studying at the MUC campus.

Students currently may include master courses in their curriculum. The master courses at MUC include a series of one-week intensive seminars on special topics, taught by international

professors. Most of these professors are also engaged in research collaborations with the staff at MUC. This represents a good opportunity for PhD Students to meet and connect with international research partners. It seems that most of these seminars easily might be raised to a PhD level by introducing extra requirements for the PhD students attending the courses as suggested above.

In addition to MUC based courses offered by adjunct international faculty, PhD students may follow PhD courses offered by other institutions; Norwegian and foreign. From the material i.e. the PhD committee's approval of students' course plans reported in the PhD committee minutes, the impression is, however, that not all students follow courses abroad. As suggested above, MUC might supply a list of relevant courses offered abroad to facilitate students' information gathering. This may induce more students to consider attending one or two courses offered in international settings, where they will meet with foreign faculty and also acquaint themselves with foreign PhD students and thus may establish a long lasting international network. As a first step MUC might offer PhD students a list of the courses former students followed abroad adding some comments on the experience former students gained by attending those courses.

Adding to these opportunities, PhD students may relate to the many international faculty visiting MUC. Especially, the PhD regulation's requirement that the adjudication committees have at least one international member, seem to bring many international professors to Molde.

We understand that the Norwegian PhD students are required to stay abroad for at least one semester. Foreign students are encouraged to do so, but this is not a requirement. When applying, each applicant is asked to disclose his or her plan for a research stay abroad. The minutes confirming the PhD committee's acceptance of the student's study plan indicates, however, that this is not a strict or binding requirement. Typically the stay abroad remains unspecified at this stage. It is a responsibility of the supervisors to advise and support the student in obtaining an invitation to a foreign university and thus to suggest where the student should go to secure a valuable and relevant output from the stay abroad. A common solution is for the student to visit the co-supervisors university. MUC may consider evaluating the possibilities for agreeing on a stay when inviting foreign faculty to co-supervise a student.

It seems that only a few students go abroad for a semester or more as part of their PhD studies. Several practical challenges arise that can explain why so few PhD students get this experience, especially so for students with spouses and children. Stays abroad require long planning. Hence, one should secure early planning of the stay abroad. This is a natural part of the Individual Study Plan. MUC may also consider supporting students with the practical issues related to a longer stay abroad, e.g. social insurance, visas etc.

PhD students at MUC receive generous annum intended for paying for external courses, conference participation and for example for acquiring data from external sources. This financial support facilitates and encourages international networking. Research stays trigger extra support beyond the funds used for conferences and external course participation. This support is considered to be sufficient for decent living conditions and to cover the extra expenses related to the stay abroad.

Summing up we find that internationalization is well catered for in the PhD program except for the low share of the PhD students that take the opportunity for a longer stay abroad. Hence, we suggest that MUC strongly encourage PhD students to go for a stay abroad and search for ways to support students both in finding a place to go and by giving advice on practicalities arising. How going abroad will be affected long-term by the current COVID-19 situation is yet to be seen for MUC as for all universities and university colleges.

## Concluding remarks and suggestions

Overall we are impressed by the level of ambition and the number of students in the PhD program in logistics at MUC. It is remarkable what MUC has achieved within their given framework.

Below we link our concluding remarks to the 5 tasks specified by the mandate (indicated in italics).

We find the PhD program in logistics with its three strands logistics, supply chain management and transport economics *relevant* versus the needs of work-life and society. Both logistics and transport economics pose challenges to the functioning of the society and to economic and environmental development. Where candidates work after graduation represents a test on such relevance. The Quest back results referred to above, documents that close to 100 per cent of the PhDs work in relevant positions after graduating.

The scope, focus and profile of the program are contemporary and up-to-date. The formulation of the *learning outcome* is general, however. This is a common feature of many PhD programs, and we consider this a minor issue since the program allows for specialization in three different strands.

We find that the MUC PhD course module needs strengthening along several dimensions.

- There is a striking lack of courses that bring students up to a required competence level in methodologies in the MUC PhD course program. We strongly recommend to offer mandatory training in relevant methodologies and to expand the electives offered PhD students on a regular basis.
- The current mandatory course in Philosophy and Science is offered in Norwegian only and is designed for students of Health and Social Sciences. Furthermore, there seems to be no information about English language replacement courses guiding international students on where to take this mandatory course.
- MUC offers several master courses on relevant topics and currently accepts master courses as part of PhD students' course portfolio. We recommend to impose additional requirements to PhD students that bring the course up at a PhD level and to discontinue accepting master level course fulfilments for PhD students.
- Currently 20 of the required 45 ECTS may be obtained from conference presentations, tutored self-study courses and master courses. Hence, 25 ECTS are currently the required points at PhD level. The committee suggests that MUC removes all these special alternatives and requires 30 ECTS at PhD level.

The PhD program web is well organized and easy to navigate, but lacks important information for potential applicants for the program as noted above. Information on courses offered by other institutions, courses that MUC accepts as part of a student's course portfolio, is essential for applicants' specification of their planned syllabus.

The everyday *learning environment* benefits from PhD students' having their office space located together. Participation in active research groups with junior and senior faculty offers valuable insights and contacts for the PhD students. MUC should consider to accept applicants whose research plan fits one of the active research groups. The committee encourages MUC to ensure active seminar series, as this will benefit the PhD students greatly.

The PhD program requirements state that Norwegian nationals should stay abroad for at least one semester. This specific requirement does not seem binding, though. Firstly, we find it strange that this requirement is limited to Norwegian nationals. Both the research experience and the network building possibilities differ markedly for PhD students visiting a foreign university from those

experiences foreign national's gained by following a master program abroad. Secondly, we recommend that MUC increases the practical support to students who go abroad. MUC may also consider evaluating the possibilities for agreeing on a stay for the student when inviting foreign faculty to co-supervise a PhD student.

The committee notes the high number of full professors among the faculty (15 out of 20 in permanent positions) specializing in the main strands of the program; logistics, supply chain management and transport economics. This underpins the *academic quality* of the faculty and the strong research and learning environment in logistics at MUC. On this background, the committee is surprised by the deficiencies we have registered in the course portfolio. On the other hand, the strong in-house competence base facilitates the necessary upgrading of the course portfolio to a combination of PhD courses and master courses with additional requirements for PhD students.

The supervisor allocation process needs clarification. Students should be able to express their wishes, but it should not be required that they have obtained a consent from a supervisor when applying to the PhD program. The number of internationally based co-supervisors is low for the students currently in the program. A positive effect when appointing local supervisors, however, is that young faculty have a better chance at supervising together with senior faculty. Even so, we think that the number of internationally based supervisors could be strengthened. The list of members in the adjudication committees however, includes an impressive number of international faculty.

Both the *students' progress and completion rate* are satisfactory. The annual PhD seminar gives students experience from presenting their work at an early stage and typically before presenting in an international research conference. The committee suggests including a discussant, a senior (who is not the supervisor), or other PhD students in these seminars to enhance students' learning outcome. The newly introduced mid-way evaluation by independent advisors should detect eventual problems at an early stage.

We furthermore suggest that MUC considers upgrading the current PhD contract to an Individual Study Plan (ISP). An ISP is a continuous and dynamic contract between the student and the main supervisor, a contract that clearly states the progress and as important, the plan for the coming semester(s). The ISP should be updated annually and changes be noted by the PhD committee.

The examples of PhD theses made available to the committee leaves a good impression and we find that they represent independent pieces of work at a high international level. The 2 paper based theses sent us contain single authored papers and papers published in well rated international topic journals.

Siri Pettersen Strandenes (sign.)

Rickard Bergqvist (sign.)

Arild Hoff (sign.)

Falko Müller (sign.)





# PHD LOGISTICS

*Periodic evaluation 2020*

*Input to the evaluation committee*

*28. august 2020*



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# INTRODUCTION

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This document contains textual elements of the input to the periodic evaluation of Molde University College's (MUC) PhD Logistics program. The input is organized according to the mandate for the committee, and according to the table below.

*Table 1 Overview over information elements in this document*

	<b>Information element</b>
1	A description of the PhD Logistics program: Name, level, content and stated learning outcomes.
2	Quantitative information about completion rates and student progress.
3	An overview over all PhD theses defended under the PhD Logistics program.
4	An overview over current students registered to the program, specified with age, gender, nationality and type of financing.
5	A description of the recruitment processes related to the program, including an assessment of the recruitment base (recent number and composition of applicants to scholarships).
6	A description of the qualifications of the faculty, with respect to educational level, areas of expertise, research activities and scientific publication activities.
7	A description of PhD courses that have been offered under the program over the last 5 years, including course evaluation documentation and procedures.
8	A description of the involved tutors, co-tutors, members of mid-term evaluation committees, and PhD committees.
9	A description of the international dimensions of the program, including the international dimension in scholarly work, the involvement of international scholars/research environments in the teaching and tutoring of students, as well as the nationality of the students.
10	A description of the available study aids, library resources, computer recourses and physical working environment for the PhD Logistics students.
11	Internal accreditation documentation for the PhD program
12	Strategy documents for MUC and FL
13	Study program and module descriptions
14	Protocols of the PhD Logistics committee for the last 3 years
15	Procedures related to mid-way evaluation and disputations
16	Procedures related to how the quality of the external PhD modules is assessed
17	An overview of changes made in order to enhance the student progress and completion rate
18	A description of how the students are participating in the research groups
19	Three selected PhD theses from the last 10 years of the program, with committee reports. There should be one thesis belonging to each of the main strands of the program: Optimization, SCM/OR and Transport Economics.

# 1 A description of the PhD Logistics program

---

## 1.1 Philosophiae Doctor in Logistics (PhD) - description from the Student Handbook:

### 1.1.1 *Facts about the program*

Study points: 180

Study duration: 3 years

Organisation: Full-time

Campus: Molde

Start of Studies: Flexible

Teaching language: English

Study level: Doctoral degree with nom length of study

Application opens: Flexible

Application deadline: Flexible

The PhD Program in Logistics at Molde University College (MUC) is a 3-4 year full-time program leading to a doctoral degree (PhD) in logistics. Candidates are usually funded by PhD scholarships provided by MUC or The Research Council of Norway. More than 50 candidates have completed the PhD Logistics program since the start-up in 2002, and their research projects cover a wide range of topics and methodological approaches. In addition to work on their thesis, candidates must also complete 45 ECTS of courses. The thesis is either based on publishable academic papers, or written as a monography.

### 1.1.2 *Programme content*

Logistics deals with the organization of the flow of products, services and information from raw materials to the end user in a supply chain. The analysis

of such supply chains may be built on a broad spectrum of academic disciplines, such as economics, business administration, industrial organization, engineering, management science, information science and computer science. Quantitative techniques and models based on mathematics, statistics, engineering, and operations research are also useful tools in such analyses.

The PhD logistics program is organized as a three year full-time program, or – if the candidate has 25% work-load related to e.g. teaching and tutoring, - a four year program.

The main part of the program is related to the doctoral project, which is defined on an individual bases where the candidate pursues a given research task under guidance from well qualified tutors. The project is defined as part of the admission procedure, and the project plan must be approved by the PhD Logistics committee. The end product of the research project is the doctoral thesis, which may be in the form of a scientific monography or a collection of academic papers of a quality that would make them acceptable for publication in peer-reviewed academic journals.

The candidate must also complete courses according to an approved course plan, comprising a total workload equivalent to 45 ECTS. One PhD module is compulsory, DRL002 Philosophy of Science. In addition at least 5 ECTS must be PhD courses with an explicit content related to logistics, supply chain management or transport economics. The remaining 35 credits may comprise a mix of PhD courses offered under the PhD Logistics program, approved PhD courses from other institutions, a limited number of Master's modules and approved presentations at international conferences.

### ***1.1.3 The Doctoral degree committee for PhD Logistics***

Serves as the administrative and scientific body for all aspects of the PhD Logistics program.

### ***1.1.4 Study information***

The doctoral program at HiMolde is a three-year full-time program leading to a doctoral degree (PhD) in Logistics. If you have 25% working duties, the planned duration of the program is extended to four years.

The conferral of the doctoral degree in Logistics signifies that the candidate has attained expert competence in a major field of study. You will normally have

one supervisor at HiMolde, plus one or more co-supervisors from other institutions. Suggesting co-supervisors is the duty of your main supervisor, and the Doctoral Degree Committee must approve them.

When you are approximately half-way through your doctoral program period, you will have to pass a midway evaluation process, where two evaluators (one internal and one external) will give you feedback and advice on your progression. The evaluators may also make recommendations to your tutors and the university if any adjustments should be made.

Towards the end of your PhD studies, your adjudication committee will be appointed. The committee has three members, including one member from HiMolde and at least one international member. The committee has two major duties: To evaluate if your thesis is accepted for its final defense, and to evaluate your trial lecture and public defense.

### ***1.1.5 Content and structure of the programme***

The general structure is as follows: The total workload of the program is 180 ECTS. 45 ECTS is allocated to the course plan, and the rest to the thesis work. There is one obligatory course: DRL002 Philosophy of Science (5 ECTS). Holders of Norwegian scholarships will in addition normally have one year workload of required duties for HiMolde. Doctoral students may spend one or two semesters abroad, for both courses and thesis work.

In co-operation with the supervisor, candidates should propose a list of suggested courses to the Doctoral Degree Committee. The composition of the list should take into account both the suggested topic for the thesis and the background of the candidate. For example, if the candidate does not have a solid background in logistics, the course plan should contain a necessary amount of courses in logistics. In addition, The Doctoral Degree Committee may require that the candidate takes courses without credit if this is necessary to bring the candidate up to an acceptable level for starting the doctoral study.

### ***1.1.6 The course plan may comprise elements belonging to:***

- The MSc Logistics program at HiMolde
- Doctoral courses provided by HiMolde
- Courses at master's or preferably doctoral level at other (foreign or Norwegian) universities
- Presentations of papers at international academic conferences, which each will count 3 ECTS each (maximum 9 ECTS in total)



- Tutored self-study courses.

Courses at PhD level must total a minimum of 25 ECTS and DRL002 Philosophy of Science is obligatory.

At least 5 ECTS must be doctoral courses explicitly related to logistics, supply chain management or transport economics. A minimum of 30 ECTS must be exam-based courses, meaning that the sum of credits of conference papers and tutored self-study courses could not exceed 15 ECTS.

### **1.1.7 PhD Courses**

Obligatory PhD Course:

#### **Philosophy of Science (min. 5 ECTS)**

This course is given in Norwegian by Volda University College, and developed for the joint PhD programme in Health sciences offered by Molde University College and Volda University College (<https://www.hivolda.no/studietilbod/vitenskapsteori-og-etikk-phd-emne/var>)

You may choose a similar course from other institutions, but this must be approved as substitutes by the PhD Logistics committee.

Elective courses:

Several elective courses are offered by MUC, see examples in section 6.

### **1.1.8 Learning outcomes**

A candidate who has completed the PhD programme should obtain the following learning outcomes defined in terms of knowledge, skills and general competence:

#### **Knowledge**

The candidate

- is at the forefront of logistics, mastering scientific theories and methods of logistics research;
- has demonstrated expert knowledge of the chosen focal area of logistics.

- can evaluate and assess various theories, methods and processes in Logistics research and in applied research and development (R&D) projects in an international perspective;
- can contribute to the development of new knowledge, new theories, and methods in Logistics.

## **Skills**

The candidate

- can formulate research questions for academic research and applied research and development at a recognized international level in Logistics;
- can contribute to new knowledge in logistics through scientific research that can be published in peer-reviewed national and international scientific journals;
- can handle complexity, create an overview and synthesize established scientific knowledge and practice;
- can critically evaluate and constructively criticize scientific research in Logistics.
- is able to plan, structure and present a lecture.

## **General competencies**

The candidate

- can identify relevant ethical issues and conduct research with academic integrity;
- can disseminate research and development through highly ranked national and international channels and participate in debates;
- can identify their own research in logistics within a wider research area and social context;
- can evaluate the need for renewal, and can initiate and be engaged in innovation.

## **1.2 Admission and financing**

To be eligible for admission to a PhD programme, certain educational and financial requirements must be met. If you have not applied to a PhD programme before, we recommend that you read this before you proceed to the programme pages.

To be eligible for admittance, you must have an excellent academic record with at least a five-year master-level degree in a relevant field, or equivalent educational qualifications. For applicants with ECTS-grades, an average mark of B or better from the master-level study is required. For students with grades from other grading scales an equivalent level of grades will be necessary. Please note that this is the minimum entry requirement to the program, normally one would need a better average grade than this to obtain a scholarship.

In addition to a master's degree or equivalent, and a strong academic record, appropriate financing is an absolute requirement for admission to a PhD program. Funding can be both through Molde University College or other sources, but the funding must be equivalent to a Norwegian PhD scholarship to be approved. Applicants with funding from employers/funders abroad may be accepted only if Molde University College has made a special written agreement with that employer/funder. The doctoral committee will only evaluate applications for admission to the program if one of the funding schemes mentioned above can be documented by the applicant. Available PhD scholarships will be posted online at irregular intervals.

With financing in order, the next step is to send an application for admission to the PhD program. If you have already written a good application for funding (scholarships), most of the work is already done, and can be used for this application as well.

When you have determined your research topic, you must locate a member of the academic staff of Molde University College who is interested in your topic, qualified as a supervisor and willing to help you. You can do that in several ways. One possibility is to contact the leader of the Doctoral Degree Committee, who will try to help you. If you already know whom you would like as a supervisor, you should get in touch with that person. When you have found a potential supervisor, you and the supervisor should write an application, with emphasis on the research topic and methodology, plus a package of courses and

a plan for a stay abroad. This is the major part of your application for admittance.

The Doctoral Degree Committee for the PhD Logistics program at Molde University College will make the final decision about accepting you as a PhD student. Applications will could be submitted at any time of year, but should be sent as soon as possible after the funding issue is resolved.

## **2 Quantitative information about completion rates and student progress**

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### **2.1 Candidates registered to the program**

A total of 93 students have been admitted to the PhD Logistics program from the start in 2002. 55 of these have successfully defended their thesis since then, 17 students are currently registered on the program as active students. The remaining 21 students have left the program at various stages without defending their thesis. Successfully completing a doctoral program is not self-evident. Some candidates have left early, e.g due to other job offerings or because they found out that an academic career was not what they wanted. Some candidates have left at a later stage because they were not able to make the necessary progress. The statistics for each year are illustrated in Figure 1. The number of students leaving the program was exceptionally high in 2018. This is due to a particular process that year initiated with students who had spent a long time on the program without the necessary progress.

### **2.2 Student progress**

Based on an analysis made for the internal accreditation in 2018, average net time from start-up to submission of the thesis is 1363 days, equivalent to 3,73 years. The average time from submission to the public defence is 5 months.

19 (35%) of the new doctors from the program are Norwegian citizens. 15 other nationalities are represented, and the biggest groups come from Belarus (11%), China (9%), Tanzania (7%), and Pakistan (7%). The share of Norwegian students is somewhat higher among the current PhD students registered to the program (53%).

47% of the new doctors had their financing from a scholarship provided by Molde University College. 18% have had financing from the so-called Quota-program for developing countries. This possibility does no longer exist, but was typical in the early years of the program. Other funding sources are e.g. the Research Council of Norway and other universities.

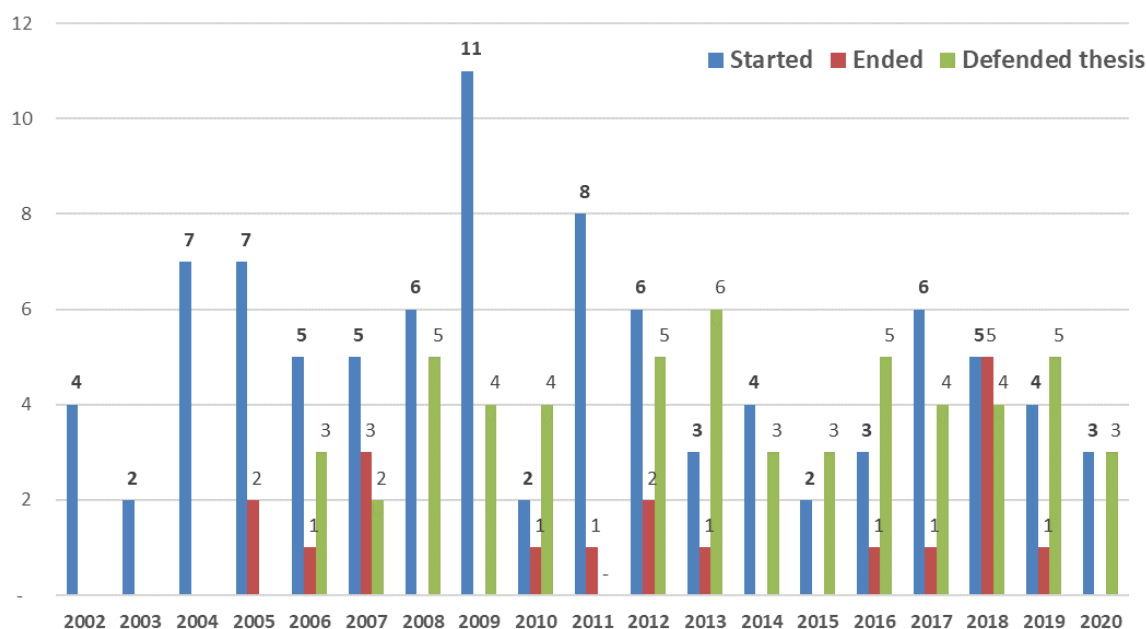


Figure 1 Candidates started, ended without finishing and successfully defended their thesis 2002-2020\*. \*2020-figures are only for the first half of the year.

### Average progress seems better than in most Norwegian PhD programs

In a recent report evaluating the Norwegian research schools<sup>1</sup>, NIFU found that the average completion rate after 5 years of study for programs within Business Economics and Administration was 45%, - for all programs 41.1%. The equivalent figure for our PhD Logistics program is 61%.<sup>2</sup> Only one of the 13 national research schools evaluated has achieved a higher number ("Climate dynamics" with 69%).

<sup>1</sup> <https://brage.bibsys.no/xmlui/bitstream/handle/11250/2558931/NIFU-report2018-13.pdf?sequence=1&isAllowed=y>

<sup>2</sup> 47 out of the 56 who have finished, have defended their thesis within 5 years. In addition, 21 students have left the program and not finished. The percentage is calculated as 47/(56+21).

### 3 Current students registered to the program

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Surname	Name	Age at startup	Gender	Nationality	Financing
Kjersem	Kristina	41	F	Norwegian	External scholarship
Müller	Falko	40	M	German	MUC scholarship
Slyngstad	Line	31	F	Norwegian	MUC scholarship
Kvadsheim	Nina Pereira	34	F	Norwegian	External scholarship
Bach	Terje	52	M	Norwegian	External scholarship
Bentsen	Håkon	38	M	Norwegian	MUC scholarship
Tolcha	Tassew Dufera	30	M	Ethiopian	MUC scholarship
Ben Ahmed	Mohamed	29	M	Tunisian	Research council
Aravazhi	Agaraoli	28	M	Indian	MUC scholarship
Andersen	Terje Lauvaas	53	M	Norwegian	Research council
Langelo	Erik	29	M	Norwegian	MUC scholarship
Klymenko	Olena	29	F	Ukrainian	MUC scholarship
Harun	Magoti Daniel	33	M	Tanzanian	MUC scholarship
Shaabani	Homayoun	28	M	Iranian	MUC scholarship
Konovalenko	Anna	23	F	Ukrainian	MUC scholarship
Hauger	Hans Otto	67	M	Norwegian	Own financing
Hoff	Karoline Louise	31	F	Norwegian	MUC scholarship

### 4 The recruitment process related to the program,

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#### 4.1 Description of related study programs at HiMolde

HiMolde has currently some 500 students on programs related to logistics. These programs are

- Bachelor in Logistics and Supply Chain Management (180 ECTS)
- Bachelor in Petroleum Logistics (180 ECTS)
- Bachelor in Marine Logistics and Economics (180 ECTS)
- Bachelor in Sustainable Logistics and Circular Economics (180 ECTS)
- MSc Logistics (120 ECTS)
- Experience-based Master's programme in Health Logistics and Digital Systems (90 ECTS)

- MSc Sustainable Energy Logistics (120 ECTS)
- Experience-based Master's programme in Logistics (90 ECTS)
- PhD Logistics (180 ECTS)

With the exception of the Experience-based master's programmes, all of these master's programs would qualify for the PhD logistics program. Historically, we have recruited 49 of the 93 admitted students come from our own Master's programs. This means that we have a solid recruitment base for the program, but also that our program seems attractive to students from other institutions.

#### **4.2 Procedures for the evaluation of applicants to PhD scholarships**

This section describes HiMolde procedures for the evaluation of applicants to PhD LOG scholarships, with main emphasis on the role of the Assessment Committee (AC) (Vurderingsutvalget). We have chosen to appoint an AC for each announcement of scholarships.

These procedures were approved by the Faculty of logistics (FL) in 2018, and has been applied since.

The AC comprises two standing external members, appointed by the Faculty board (FBL) (Avdelingsstyret) of The Faculty of Logistics (FL), normally for a two year period. These members should be able to cover a wide area of relevant topics within logistics, and must hold a PhD and be an active researcher within logistics or supply chain management.

The third member should normally be an employee of HiMolde, and will be the administrator of the AC. This person is appointed by DU LOG for each round of applications. If the announcement contains a specific focal area within logistics, this internal member should cover this area well. With project-related positions, the project leader would normally be appointed administrator of the AC.

The external members should write a contract with the Faculty of Logistics for the appointment period.

#### **4.2.1 Working procedure of the AC**

The total appointment procedure is described in the attached table. This procedure involves a number of persons and bodies at the university. *This document focuses mainly on the bits relevant to the AC.* The internal member/administrator is appointed when the text of the announcement is defined (item 1). This internal member also works with the Chair of DU LOG to eliminate from the list of candidates persons that obviously do not meet basic criteria for the position (item 7). After the papers of the subset of potentially qualified candidates have been quality checked by the Office of student affairs (SK), the list of applicants and submitted applications with documentation is passed on to the AC (item 9). The AC is then given 4 working weeks to perform its task. Extra time may be given if the period covers holiday seasons, or under other special circumstances.

The administrator of the AC calls for an initial meeting (typically via phone/Skype) to agree upon the distribution of work among the AC members. The AC distributes the work as they wish, but the administrator is responsible for compiling a report from the AC, which should comprise a justified assessment and ranking of the applicants. If possible, the AC should end up with a unified conclusion. If this is not possible, the document should comprise the conclusion of each member. The final report should be signed and submitted to the chair of DU LOG and the F.

The AC should base its assessment on the candidates' academic qualifications as documented via submitted diplomas, transcripts of records, master's thesis, the PhD project outline, plus any other submitted academic work (conference papers, published papers etc.).

The subsequent procedure, especially the role played by the FL, will also consider other elements related to aptness (e.g. based on interviews, references etc.), availability of tutors and strategic considerations related to e.g. the composition of the faculty, but these elements should not be considered by the AC.

#### **4.2.2 Attachment: Procedure for PhD LOG scholarships**



Item	Actor	Activity
1	PhD LOG committee (DU LOG)	Formulation of the announcement text, to be submitted to the Faculty of Logistics (FL). Appointment of the Assessment Committee (AC) administrator.
2	FL	Formulation of the announcement text
3	Appointments committee (TU)	Approval of the announcement text
4	HR department (ØP)	Announcement
5	ØP	Passes on applicant information to the dean for information
6	ØP	Passes on applicant information to DU LOG and AC administrator
7	Chair DU LOG and AC administrator	Deletes clearly non-qualified applications from the list and submits the short-list to the Office of Student Affairs (SK). The dean also receives the short-list, and may change it.
8	SK	Assesses the quality and level of education of persons on the short-list
9	Chair DU LOG	Passes on applicant information and documentation – along with comments from SK to AC
10	AC	Makes a justified ranking and assessment of the applicants, and submits its report to Chair DU LOG and the dean.
11	DU LOG	Based on the AC report, submits an (amended) assessment of the candidates and submits this one to the FL.
12	FL	Based on the AC report, the DU LOG recommendation and other criteria, a proposition for appointment(s) is submitted to the appointments committee (TU)
13	TU	Makes a final decision on who will be offered the position

After almost 2 years applying this arrangement, we find it to be working well. This ensures that the same principles and procedures are applied over time, and the involvement of externals, ensures that the appointments are made based on general principles and not only based on the view of individual faculty members.

Increasingly, the Faculty has also applied interviews with the candidates in the final stages of the process. This is important for the quality assurance of the process, and will also to some degree ensure that we get motivated candidates.

### **4.3 Experiences with the last recruitment processes**

All PhD scholarships provided by MUC are publicly announced, and disseminated through our own web-pages, the NAV-database, and international databases for academic positions. In addition we ask faculty members to promote the advertisements through their own networks. Some positions have a rather open perspective, others are more specific and may be related to ongoing research projects. Two examples of current announcements could be found in the appendix.

The number of applications for the positions announced over the last two years has varied between 15 and 50. Typically the more specific announcements pertaining to a narrow field of logistics gets fewer applications. Most of the applications have shortcomings, which means that the applicants are left out of the evaluation process at an early stage. We have reduced this problem somewhat by making the announcement texts more explicit with regards to necessary qualifications and documentation, but still between 50 and 90% of the applicants have not made it to the short-list. The most prominent shortcomings are lack of proper documentation of previous educational background and also applications without a proper project description. We do have very few applications from European nationals, typically only 5-10% are Europeans. Most applicants come from Asia and Africa, with countries like China, Turkey, Iran, Tanzania, Ghana often being well represented. Quite a lot of these applicants have a European 2<sup>nd</sup> cycle degree.

The overall average age PhD-students at start-up is 34 years.

# 5 Qualifications of the faculty

## 5.1 Description of the faculty staff involved in the study program

Most of the associate and full professors of the Faculty of Logistics are eligible as tutors for students of this program. In addition some of the professors belonging to the Faculty of Business Administration and Social Sciences have been, and will be, involved as tutors.

Doctoral courses may be offered fully, or in part, by our own professors. A typical arrangement is that one of our own professors is the organizer of a module, and then one or more invited visiting professors also contribute to the module. Some modules are offered by visiting professors who are contracted especially for that module, - or who are employed in part-time positions.

Contributing employee	Position	Employment	Man labour-year on program-related work				Other programs and obligations	Area of expertise
			Total	Teaching and tutoring	Research	Other		
Bråthen, Svein	Professor	Permanent	0,4	0,2	0,2	0	MSc Logistics, Bachelor SCM&Log	Transport Economics
Emblemsvåg, Jan	Professor	Temporal	0,1	0,1	0	0	NTNU	Manufacturing logistics
Engelseth, Per	Professor	Permanent	0,2	0,1	0,1	0	MSc Logistics, Bachelor PetLog	SCM
Gribkovskaia, Irina	Professor	Permanent	0,4	0,2	0,2	0	MSc Petroleum Logistics	Optimization / OR
Halse, Lise L.	Associate professor	Permanent	0,4	0,2	0,2	0	Dept. ØS	SCM
Hammervoll, Trond	Professor	Temporal	0,1	0,1	0	0	HIØ	SCM
Hansson, Lisa	Professor	Permanent	0,3	0	0,3	0	MSc Logistics, MSc PetLog	Transport Policy

Haugen, Kjetil	Professor	Permanent	0,2	0,1	0,1	0	Dept. ØS	Optimization / OR / Game Theory
Helgheim, Berit Irene	Associate professor	Permanent	0,3	0,1	0,2	0	MSc Logistics, Bachelor SCM&Log	Health logistics / Econometrics
Hjelle, Harald Martin	Professor	Permanent	0,5	0,1	0,2	0,2	MSc Logistics, Bachelor SCM&Log	Administrative, Transport economics
Hoff, Arild	Professor	Permanent	0,4	0,2	0,2	0	MSc Logistics,	Optimization / OR
Hogset, Heidi	Associate professor	Permanent	0,4	0,2	0,2	0	Dept. ØS	SCM / Economics
Holmgren, Johan	Professor	Permanent	0,4	0,1	0,3	0	MSc Logistics, Bachelor SCM&Log	Transport Economics
Hvattum, Lars Magnus	Professor	Permanent	0,7	0,2	0,5	0	MSc Logistics	Optimization / OR
Jæger, Bjørn	Associate professor	Permanent	0,4	0,2	0,2	0	MSc Logistics	IT / Information flow
Krumer, Alex	Professor	Permanent	0,4	0,2	0,2	0	Dept. ØS	SCM / Sports Economics
Laporte, Gilbert	Professor	Temporal	0,1	0,1	0	0	Montreal	Optimization / OR
Marcucci, Edoardo	Professor	Permanent	0,4	0,2	0,2	0	MSc Logistics	City logistics
Molka-Danielsen, Judith Ann	Professor	Permanent	0,1	0	0,1	0	MSc Logistics	IT / AR
Olstad, Asmund	Professor/Dean	Permanent	0,5	0	0,3	0,2	MSc Logistics	Administrative and OR
Odeck, James	Professor	Temporal	0,1	0,1	0	0	NTNU/SVV	Transport Economics
Rye, Tom	Professor	Permanent	0,2	0	0,2	0	External	Transport Policy
Sandbæk, Birgithe Eckermann	Associate professor	Permanent	0,4	0,2	0,2	0		Health logistics / Econometrics
Shaton, Katerina	Postdoctoral Fellow	Temporal	1	0	1	0		Petroleum logistics

Sousa, Carlos	Professor	Permanent	0,4	0,2	0,2	0	Dept. ØS	SCM / Marketing
SUM			8,6	3,1	5,3	0,2		

Table 2 Faculty members involved in the PhD Logistics program

The 25 persons included in Table 2 are involved in the program in various ways. All of the persons are employed by the university, most of them in 100% positions. All have PhD level competences – and 18 persons are full professors.

The competences of the faculty cover the main elements of the program well, including both the more quantitative approaches and the qualitative/management related issues. We also have specialists within application areas like petroleum logistics, health logistics, event logistics, game theory, informatics and transport economics. Because PhD projects are inherently highly specialized, one could not always cover all relevant tutoring needs with full-time faculty members. This is usually resolved through the engagement of external co-tutors in relevant areas.

The qualifications of the faculty have increased significantly since the program originally was accredited. There are now 4 times as many full professors linked to the program, and our publication record is much stronger.

## 6 PhD courses that have been offered under the program over the last 5 years

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The menu of elective doctoral courses provided at MUC has been changing over time. At the startup, the following courses were identified as courses that could be provided by MUC staff (full-time or part-time employees):

- Decision-making under uncertainty
- Game theory
- Advanced routing models
- Strategic pricing
- Cost-Benefit Analysis
- Supply Chain Management Theory

- Generic Product Structures

A list of courses offered over the last years is provided below. We have not been able to re-construct a complete list of courses and course descriptions, as previous routines meant that PhD level courses have not been part of the procedures applied to Bachelor's and Master's thesis. The same goes for procedures pertaining to course evaluations. These have, up until now, been handled by the individual course leader, which means that we do not have access to many course evaluation documents in our records. Better routines have now been established, following up on the PhD committee's decision in January 2020, when it was established that all PhD courses should have evaluations, and that the evaluations should be presented to the PhD committee (Sak 8/20).

### 6.1 Overview over PhD Logistics modules offered 2004-2020

NOTE: This overview may not be complete, but is compiled from various sources for the purpose of this re-accreditation.

20 different courses have been defined, and a total of 33 courses have been offered.

Table 3 Overview of PhD Logistics courses offered by HiMolde <sup>3</sup>

Code	Title	ECTS	Runs	Responsible
DRL001	History of logistics	5	2019 2017 2015 2013 2011 2009 2005	Lars Magnus Hvattum, Øyvind Halskau
DRL002	Philosophy of Science <sup>4</sup>	5	2011	
DRL003	Transaction cost analysis - Theory and applications in distribution channels and SCM	5	2011	Arnt Buvik
DR004	Game theory	10	2008 2007 2006	Kjetil Haugen
DRL007	Cost-benefit analysis	5	2020* 2018 2015 2013 2011	Johan Holmgren, Svein Bråthen

<sup>3</sup> Status per 30 June 2020. Because of the Corona-pandemic, two courses being planned for spring 2020 have been postponed, but will run (possibly as online modules) in autumn 2020.

<sup>4</sup> Scandinavian students have been referred to the course offered under our joint PhD program in Health Sciences. The module is offered at Volda University College. See: <https://www.hivolda.no/studietilbod/vitenskapsteori-og-etikk-phd-emne/var> . Since this module is conducted in Norwegian, other students have taken similar courses at other institutions in stead.

			2010		
			2009		
			2006		
DRL008	Inter-organizational issues in supply chain management	5	2004		Arnt Buvik
DRL012	Freight transportation	5	2006		Teodor Crainic
DRL013	Model solving in mathematical programming	10	2007		
DRL015	Service system design under uncertainty	2	2010		
DRL016	Production planning and scheduling	7,5	2010		
DRL017	Industrial organization	7,5	2010		
DRL018	Local distribution planning	5	2012		Arne Løkketangen
	Modeling and optimization techniques for local distribution planning				
DRL019	Advanced Discrete-Event Simulation Modeling	7,5	2013		Irina Gribkovskaia
DRL020	Risk management	5	2014		Irina Gribkovskaia
DRL021	Academic writing	2	2015		Bjørn Jæger
DRL022	Partial Least Squares Structural Equations Modeling (PLS-SEM) Using SmartPLS	4	2016		Berit Helgheim
DRL023	How to prepare and write a PhD thesis	1	2015		Irina Gribkovskaia
DRL024	URBE – Urban freight and behavior change	5	2017		Edoardo Marcucci
DRL025	Supply chain performance measurement	5	2020*		Kim Sundtoft Hald
			2018		
DRL026	Applied linear regression and introduction to Stata	5	2018		Birgithe Sandbæk
DRL027	Heuristics for stochastic optimization	5	2019		Lars Magnus Hvattum
DRL028	Blockchain applications in SCM	5	2020*		Bjørn Jæger

Students would normally compose their course-plan comprising some master's modules, some PhD modules and paper presentations at academic conferences. The PhD courses may be offered as part of the PhD Logistics program, or as part of other PhD programs at other institutions. Historically some 50% of the credits are offered by HiMolde and some 36% by other institutions. The remaining 14% are conference presentations (see Table 4).

*Table 4 Distribution of ECTS-credits in the course part of the PhD education (historical), up until medio 2018.*

<b>Course type/institution</b>	<b>Per cent</b>
Master of Sciences Subjects/Courses at MUC	22 %
PhD Subjects/Courses at MUC	28 %
External PhD Subjects/Courses	36 %
Paper Presentations at national and international Conferences	14 %

MUC provides some 50% of the educational part of the PhD program for their own PhD students and this share has been stable over time. Some of the course-descriptions are provided in the appendix.

# 7 Tutors, co-tutors, members of mid-term evaluation committees, and adjudication committees

Table 5 Complete list of candidates, tutors and co-tutors 2002-2020

Surname	Name	Main tutor	Co-tutors
Helgheim	Berit Irene	Arild Hervik	
Hoff	Arild	Arne Løkketangen	
Lium	Arnt-Gunnar	Stein W. Wallace	
Husdal	Jan	Svein Bråthen	
Aas	Bjørnar	Stein W. Wallace	
Fostervold	Knut Anders	Hallgeir Gammelsæter	
Hannås	Gøril	Arnt Buvik	
Tysseland	Bernt Edvard	Øyvind Halskau	
Burki	Umar	Arnt Buvik	
Sandvik	Ole Steinar Holte	Svein Bråthen	
Hvattum	Lars Magnus	Arne Løkketangen	
Pettersen	Bård Inge Austigard	Kjetil K. Haugen	
Oppen	Johan	Arne Løkketangen	
Ma	Yaqin	Stein W. Wallace	
Pearson	Joseph John Acton	Harald Hjelle	
Vaagen	Hajnalka	Stein W. Wallace	
Iversen	Hans Petter	Hallgeir Gammelsæter	Dag Magne Berge
Bhatta	Bharat Prasad	Odd I. Larsen	
Thapalia	Biju Kumar	Stein W. Wallace	
Mwakibinga	Frederick Asumile	Arnt Buvik	
Bekken	Jon-Terje	Odd I. Larsen	
Shyshou	Aliaksandr	Irina Gribkovskaia	
Saeed	Naima	Odd I. Larsen	
Xu	Yue	Kjetil K. Haugen	
Chaudhry	Muhammad Omer	Svein Bråthen	
Sandbæk	Birgithe Eckermann	Berit I. Helgheim	Odd I. Larsen, Petter Aadahl (NTNU)
Qin	Feifei	Svein Bråthen	
Bakhrankova	Krystsina	Kjetil K. Haugen	
Grue	Berit	Odd I. Larsen	
Sunde	Øyvind	Odd I. Larsen	
Qian	Fubin	Irina Gribkovskaia	
Hansen	Wiljar Gudmund	Svein Bråthen	



El Meladi	Yasmine Mohamed Salem	Arnt Buvik	Iman Ramadan (Egypt)
Bø	Ola	Harald Hjelle	
Søvde	Nils Egil	Johan Oppen	
Jin	Jianyong	Arne Løkketangen	
Bottolfsen	Trond	Arnt Buvik	Trond Hammervoll
Gammelsæter	Pia	Hallgeir Gammelsæter	
Salema	Gladness Ladislaus	Arnt Buvik	
Glavee-Geo	Richard	Arnt Buvik	
Teryokhin	Sergei	Arnt Buvik	
Regmi	Uttam Kumar	Nigel Halpern	
Singstad	Kristoffer Folke	Bjørn Jæger	
Maisiuk	Yauhen	Irina Gribkovskaia	Øyvind Halskau
Lanquepin	Guillaume Albert Lucien	Asmund Olstad	
Van Eikenhorst	Dirk	Kjetil K. Haugen	
Halse	Lise Lillebrygfjeld	Ove Bjarnar	Øyvind Halskau
Pasha	Urooj	Arild Hoff	Lars Magnus Hvattum
Schøyen	Halvor	Svein Bråthen	Dag Magne Berge
Oyola Mendoza	Jorge Luis	Halvard Arntzen	David Woodruff
Norlund	Ellen Karoline	Irina Gribkovskaia	
Hunke	Kristina	Nigel Halpern	
Bjørlykke	Håkon Myklebust	Johan Oppen	
Beifert	Anatoli	Nigel Halpern	
Shaton	Katerina	Arild Hervik	Svein Bråthen
Kanani	Renger Philemon	Arnt Buvik	Judth Molka-Danielsen
Sopot	Eugen	Irina Gribkovskaia	Gilbert Laporte
Rubasheuski	Uladzimir	Johan Oppen	David Woodruff
Dugnas	Karolis	Arnt Buvik	
Uthaug	Ingrid Oline	Per Engelseth	
Karalkova	Anastasiya	Bjørn Jæger	Bjørnar Aas
Kjersem	Kristina	Jan Emblemsvåg	Bjørn Guvåg, Lise L. Halse
Assimizele	Brice	Johan Oppen	
Simwita	Yusta Wilson	Berit I. Helgheim	Ketil Danielsen
<i>Morsi</i>	<i>Maha Abd El-Hamid</i>	<i>Per Engelseth</i>	
Nordfjeld	Adriana Avila Zuniga	Hajnalka Vaagen	
Svindland	Morten	Harald Hjelle	Kevin Cullinane, Jason Monios
Brachner	Markus	Lars Magnus Hvattum	Berit Helgheim
Redutskiy	Yury	Kjetil K. Haugen	Irina Gribkovskaia
Kisialiou	Yauheni	Irina Gribkovskaia	Gilbert Laporte
Egilsson	Birnir	Harald Dolles	Lise L. Halse, Arnt Buvik
Nujen	Bella Belerivana	Hallgeir Gammelsæter	Lise L. Halse, Hans Solli-Sæther (NTNU)
Mwesiumo	Deodat Edward	Nigel Halpern	Arnt Buvik
Tveter	Eivind	Svein Bråthen	
Lin	Ning	Harald Hjelle	
Glavee-Geo	Rebecca	Arnt Buvik	
Merkel	Axel Patrick	Johan Holmgren	
Dugnas	Karolis	Bjørn Jæger	
Haukeberg	Lise Gundersen	Lise Lillebrygfjeld Halse	Ove Bjarnar
Müller	Falko	Svein Bråthen	Nigel Halpern, Jens Rekdal

Slyngstad	Line	Berit I. Helgheim	Birgithe Sandbæk
Kvadsheim	Nina Pereira	Jan Emblemsvåg	Svein Bråthen, Steinar Kristoffersen
Bach	Terje	Bjørn Jæger	Lise L. Halse
Bentsen	Håkon	Lars Magnus Hvattum	Halvard Arntzen, Arild Hoff
Tolcha	Tassew Dufera	Svein Bråthen	Johan Holmgren
Ben Ahmed	Mohamed	Lars Magnus Hvattum	Arild Hoff
Aravazhi	Agaraoli	Berit I. Helgheim	Birgithe Sandbæk, Nikhil Varma
Andersen	Terje Lauvaas	Bjørn Jæger	Lise L. Halse
Langelo	Erik	Lars Magnus Hvattum	Asmund Olstad
Klymenko	Olena	Lise Lillebrygfjeld Halse	Johan Holmgren
Harun	Magoti Daniel	Heidi Hogset	Per Engelseth
Shaabani	Homayoun	Arild Hoff	Lars Magnus Hvattum, Gilbert Laporte
Konovalenko	Anna	Sebastian Urritia	Lars Magnus Hvattum, Berit Helgheim
Hauger	Hans Otto	Johan Holmgren	Svein Bråthen
Hoff	Karoline Louise	Johan Holmgren	Svein Bråthen

*Table 6 Complete list of Adjudication committees PhD Logistics 2006-June 2020:*

<b>External opponent</b>	<b>External opponent</b>	<b>Internal opponent / administrator</b>
Professor George John	Professor Sven Arne Haugland	Professorstipendiat Lise Lillebrygfjeld Halse
Professor Kevin Cullinane	Professor Anna Bottasso	Professor Harald M. Hjelle
Professor Harilaos Psaraftis	Dr PhD Elizabeth Lindstad	Professor Arild Hoff
Professor Iris Tommelein	Professor Hans-Petter Hildre	Professor Trond Hammervoll
Professor Lorí Tavasszy	PhD James Laird	Professor James Odeck
Professor Steffen Kinkel	Associate professor, PhD Anna Fredriksson	Professor Arnt Buvik
Professor Håvard Ness	Professor Dimitrios Buhalis	Associate Professor Berit Irene Helgheim
Lecturer, PhD Christa Sys	Professor PhD Thomas Pawlik	Professor PhD Edoardo Marcucci
Dr. Trish Bradbury	Dr. Martin Anthony Littlewood	Professor Kjetil Kåre Haugen
Professor Susanne Hertz	Associate Professor Eli Hustad	Associate Professor Bjørn Jæger
Professor Stephen Gibbons	Senior Lecturer, PhD Helena Bohman	Associate professor Johan Holmgren
Professor Johan Woxenius	Researcher/PhD Linda Styhre	Associate professor Johan Holmgren
Associate professor Julia Pahl	Professor Jan Ola Strandhagen	Associate professor Arild Hoff
Associate Professor Teresa Ortuño Sánchez	Associate Professor Peter Schütz	Professor Irina Gribkovskaia
Professor Rohit Verma	Assistant professor Ana Martins	Associate Professor Bjørn Jæger
Professor Roger Vickerman	Professor Kåre Petter Hagen	Professor Kjetil Kåre Haugen
Associate Professor Anton Kleyweght	Professor Ingrid Schjøllberg	Professor Lars Magnus Hvattum

Professor Joris van de Klundert	Professor Anne Karin Lindahl	Professor Trond Hammervoll
Professor Rodney L. Stump	Professor Sven A. Haugland	Associate Professor Berit Helgheim
Professor Maria Grazia Speranza	Professor Asgeir Tomasgard	Associate Professor Arild Hoff
Professor Rafael Marti	Associate Professor Sin Ho	Associate Professor Arild Hoff
Professor Harilaos N. Psaraftis	Professor Tolga Bektas	Associate Professor Harald Hjelle
Professor Rodney L. Stump	Professor Randi Lunnan	Associate professor Heidi Hogset
Professor PhD Anders Thorstenson	Professor Dr.ing Marielle Christiansen	Associate professor Øyvind Halskau
Associate Professor Dr. Oecon Inger Beate Pettersen	Associate Professor Anna Spadavecchia	Professor Arnt Buvik
Associate Professor José Soares Brandão	Professor Marielle Christiansen	Associate professor Halvard Arntzen
Professor Sophie D'Amours	Professor Asgeir Tomasgard	Associate professor Halvard Arntzen
Professor Cristina Gimenez Thomsen	Professor, dr.oecon Trond Hammervoll	Professor Svein Bråthen
Senior Research Fellow, PhD James J. Laird	Forsknings- og utviklingskoordinator Dr Ing Ragnhild Wahl	Professor Dr.econ Arnt Buvik
Professor PhD Christian Prins	Chief Research Scientist, Doctor Scient Geir Hasle	Associate Professor Johan Oppen
Professor Susanne Hertz	Associate Professor R. Glenn Richey	Associate Professor Nigel Halpern
Professor Rodney L. Stump	Professor, dr.oecon Trond Hammervoll	Associate Professor, PhD Berit Helgheim
Professor Anders Thorstenson	Professor Stein Erik Grønland	Associate Professor Øyvind Halskau
Associate Professor in shipping economics, PhD Photis M. Panayides	Professor, dr.oecon Trond Hammervoll	Associate Professor, PhD Berit Helgheim
Reader, PhD Anne Graham	Senior Lecuturer, PhD Romano Pagliari	Associate Professor, PhD Heidi Hogset
Førsteamanuensis Stig O. Johannessen	Dosent Kajsa Lindberg	Førsteamanuensis Harald Torsteinsen
Dr. econ Kjell Jansson	Forsker II Harald Minken	Professor Irina Gribkovskaia
Professor/PHD Mikhail Y. Kovalyov	Professor/PHD Kjetil Fagerholt	Associate Professor Arild Hoff
Professor/PhD Kevin Culliane	Professor/PhD Anna-Mette Fuglseth	Førsteamanuensis Bjørn Jæger
Professor Frédéric Semet	Chief Research Scientist/ Adjunkt Professor PhD Geir Hasle	Professorstipendiat Øyvind Halskau

Professor David Woodruff	Associate Professor	Professor-stipendiat
	Sigrid Lise Nonås	Øyvind Halskau
Professor Paul John Madden	Seniorforsker Dr.Ing. Thor Bjørkvoll	Professor Arild Hervik
Associate professor Pavel Popela	Operations Researcher (dr.ing.)	Førsteamanuensis, PhD
	Nina Detlefsen	Johan Oppen
Professor Otto Anker Nielsen	Seniorforsker Terje Kristian Tretvik	1.amanuensis Harald M. Hjelle
Associate Professor Sergei Savin	Førsteamanuensis Atle Nordli	Professor Irina Gribkovskaia
Professor Eddy van de Voorde	Professor Siri Pettersen Strandenes	Professor Kjetil Haugen
Professor Karen Spens	Associate Professor Jan de Vries	Professor Arnt Buvik
Associate Professor Rodney L. Stump	Professor Sven A. Haugland	Berit I. Helgheim
Professor, PhD Manuel Laguna	Professor Kjetil Fagerholt	Associate Professor Øyvind Halskau
Professor, PhD Lisa M. Ellram	Associate Professor, dr. oecon Trond Hammervoll	Professor Arnt Buvik
Professor Khi V. Thai	Professor Otto Andersen	Professor Arild Hervik
Professor Les Foulds	Professor Kenth Lumsden	Associate Professor Svein Bråthen
Professor Michel Gendreau	Professor Vinicius Armentano	Professor Kjetil Haugen
Associate Professor Rodney L. Stump	Professor Anna- Mette Fuglseth	Associate Professor Bjørn Guvåg
Professor Karl Ulrich	Professor Pål A. Pedersen	Associate Professor Svein Bråthen
Professor Francois Louveaux	Førsteamanuensis Asgeir Tomasgard	Førsteamanuensis Professor Kjetil Haugen
Professor Frédéric Semet	Førsteamanuensis Asgeir Tomasgard	Førsteamanuensis Øyvind Halskau

*Table 7 Complete list of external mid-term evaluators 2019-2020*

- Professor Halvor Schøyen, USN
- Professor Otto Andersen, UIA
- Professor Øivind Strand, NTNU
- Professor Martina Keitsch, NTNU
- Professor Gisle Solvoll, Nord Universitet
- Førsteamanuensis Ahmad Hemmati, UIB

# 8 International dimensions of the program

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## 8.1 Internationalization

The PhD Logistics program is an international program, recruiting students from all over the world. The program is an English language program, which means that all PhD courses offered are taught in English, tutoring is offered in English and normally the PhD thesis is written in English (although Scandinavian languages are also allowed). The international dimension is also secured through the fact that international guest professors are frequently involved in the teaching and tutoring of PhD students.

Students are encouraged to spend one or two semesters as visiting scholars in a collaborating university abroad. The tutors should in general introduce students to their international network of scholars, and assist students in finding relevant research environments for co-operation. Students are also encouraged to present their work at international conferences and seminars, and may receive credits for such contributions.

Finally, most students will complete one or more PhD courses offered by foreign institutions as part of their tailor-made course plan.

A significant part of the quality assurance procedures of the program is the fact that members of the adjudication committees are recruited from well renowned academic institutions all over the world (see a complete list of institutions involved in PhD Logistics adjudication committees below).

## 8.2 Co-operation with external environments

In the first years of the PhD Logistics program we made agreements with external environments like CRT (now CIRRELT) in Montreal and with NHH related to the national research school for business administration. These environments have contributed to developing our program in various ways, and we still have important relationships with these environments, e.g. through adjunct professorships and contributions to our PhD modules and adjudication committees (see the Appendix for a more detailed example of co-operation).

The co-operation with external research environments is more important than ever, and we have important contributions from environments relevant to all

focal areas of the program. An illustration of the co-operation is the long list of research environments contributing to our adjudication committees:

### List of institutions represented in PhD Logistics adjudication committees 2006-2020:

- Aarhus University, Department of Economics and Business
- BI Norwegian Business School
- Bodø Graduate School of Business
- Bournemouth University
- Carlson School of Management, University of Minneapolis, USA
- Center for innovation, Faculty of Engineering, Bergen University College
- Civil and Environmental Engineering Department, University of California
- CRT, Centre de recherche sur les transports, Université de Montréal
- Departamento de Gestão, Escola de Economia e Gestão, Universidade do Minho
- Department of Air Transport, Cranfield University
- Department of Commerce, Finance and shipping, Faculty of Management and Economics, Cyprus University of Technology
- Department of Economics, University of Genova
- Department of Management, Colorado State University
- Department of Marketing and e-Business, College of Business and Economics, Towson University
- Department of Statistics and Operations Research, Faculty of Mathematics, University of Valencia
- Department of Statistics and Optimization, Institute of Mathematics, Faculty of Mechanical Engineering, Brno University of Technology
- Department of transportation and logistics, Chalmers University of Technology
- Dpt. Of Operations and Innovation management, Research group on Business Network Dynamics, ESADE Business School, Universitat Ramon
- DTU Institut for Transport, Denmark University of Technology
- Edificio ISCTE
- Edinburgh Napier University
- Erasmus University Rotterdam, Institute of Health Policy and Management
- Facultés Universitaires Notre-Dame de la Paix
- Faculty of marine technology and operations, Norwegian University of Science and Technology (NTNU)
- Faculty of Technology, Policy and Management, TU Delft
- Florida Atlantic University
- Gothenburg University
- HANKEN - Swedish School of Economics and Business Administration
- Harstad University College
- Henley Business School, University of Reading
- HSB City University of Applied Sciences, Bremen
- Institut Charles Delaunay University of Troyes
- Institute of Transport Economics, Oslo
- Institutt for atferdsfag, Oslo and Akershus University College
- Institutt for strategi og logistikk, Handelshøgskolen BI
- International Business Management and Marketing, The University of Alabama
- IVL Swedish Environmental Research Institute
- Jernbaneverket
- Jönköping International Business School
- Jönköping Universitet
- Karlsruhe University of Applied Sciences, Faculty of Computer Science and Business Information Systems
- LAGIS, École Centrale Lille Cite Scientifique
- Leeds School of Business
- Leeds University, Institute of transport studies
- Linköping University, Department of Science and Technology
- Liverpool John Moores University
- London School of Economics
- Malmö University
- Massey University, School of Management, Massey Business school, Albany Campus
- Nasjonalt kunnskapssenter for helsetjenesten
- NHH – Norwegian School of Economics

- NHH, Norwegian school of economics, department of strategy and management
- NTNU, Department of industrial economics and technology management
- NTNU, Faculty of Engineering Science and Technology
- NTNU, Institutt for industriell økonomi
- NTNU, Institutt for maskinteknikk og produksjon
- Operations and Information Management, The Wharton School
- School of architecture and the built environment, University of Westminster
- School of Business, Economics and Law, University of Gothenburg
- School of Economic Studies, University of Manchester
- School of Economics, Keynes College, University of Kent
- School of Hotel Administration, Cornell University
- SINTEF ICT, Applied Mathematics
- Sintef Ocean, Maritime Transport Marin Technology Center
- SINTEF Teknologi og Samfunn, Avd: Transportforskning
- Southampton Business School, University of Southampton
- Stewart School of Industrial & Systems Engineering, Georgia Institute of Technology
- Technical University of Denmark, department of technology, management and economics, management science division
- Trafikanalys, Sweden
- United Institute of Informatics Problems, National Academy of Sciences of Belarus
- Universidad Complutense de Madrid, Dpto Estadística e Investigación Operativa
- Universidade Federal de Goias
- Università degli Studi di Brescia
- Université de Valenciennes et de Hainaut-Cambresis
- Universiteit Antwerpen, Dept. Transp. & Ruimt. econ.
- University College of Southeast Norway
- University of Agder
- University of Antwerp Department of Transport and Regional economics
- University of California, Davis-Graduate School of Management
- University of Colorado at Boulder
- University of Gothenburg, Department of business administration, School of Business, Economics and Law
- University of Groningen
- University of Southern Denmark
- University of Campinas

Co-supervisors for our candidates are usually recruited from external academic environments. Typically, this would be scholars who could offer specific expertise, which is complementary to the competences of the main tutor. Quite often co-supervisors also contribute as co-authors of the academic publications of the candidates. Sometimes candidates are invited to the academic institutions of the co-supervisors as visiting scholars for a few weeks or months.

Achieving external funding for PhD scholarships is another arena for co-operation. Here we have had a mix of funders from industries (e.g. Statoil) and other public entities like The Norwegian Armed Forces, Transport agencies, and from other higher education and research institutes. On top of this, scholarships funded through the Research Council of Norway are important to us.

Another important area of co-operation is in the provision of PhD logistics modules. Most of the modules offered (see section 6.1) will have contributions ranging from 20 to 100% made by professors from other research environments. An example could be given from our most recent iteration of DRL007 Cost benefit analysis:

*This module was led by our own professor Johan Holmgren, who is responsible for the definition and integration of the module and the examination, in addition to 20% of the teaching. Another 30% of the teaching is offered by other MUC staff and our research centre. The rest of the teaching is done through contributions from scholars from Transport Analys (Sweden), Jönköping University (Sweden), Institute of Transport Economics (Norway) and the Norwegian University of Life Sciences (Norway).*

## 9 Study aids, library resources and working environment

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Students will have their own office space with necessary IT equipment provided in modern facilities. They will have access to relevant databases, library assistance and necessary software applications.

Assistance provided by the library:

- Information searching
- Writing and referencing
- EndNote
- Book a librarian

Relevant databases available at our library (also available to our students from outside the institution through VPN-login):

- ABI/INFORM Global - Economics, marketing, logistics
- Automotive News - Automotive News Online & Data Center
- Brønnøysundregistrene - [Norwegian] Enterprise information
- EBSCO eBook Collection - E-books in full text
- Elgar online - E-books on transport and logistics, also sports
- Emerald - Operations, Logistics & Quality - Journals in full text - several disciplines, including logistics
- Juridika - [Norwegian] Commentaries on the law and juridical journals from the publisher Universitetsforlaget
- Lloyds list - Shipping
- Lovdata Pro - [Norwegian] Norwegian juridical sources, laws and regulations
- OECD iLibrary - Books and journals from OECD in full text. Mainly in the subject of transport, but some titles are also available from a wide range of different subjects
- ProQuest Ebook Central - E-books in full text



- Proff Forvalt - [Norwegian] Business information
- SP Shipbase - Norwegian shipping database
- SPORTDiscus - Journals in full text, books etc. in sports, health, exercise, sports medicine
- Sage Journals - Journals covering a wide range of different subjects
- ScienceDirect - Journals in full text - all subjects
- Social Science Database - Journals in full text and bibliographic information. Social sciences
- TITLON - Database with financial data from Oslo Stock Exchange
- TRID Online - References and abstracts to transport-related literature. TRIS & ITRD databases, USA
- Taylor & Francis e-Journals - Journals covering a wide range of different subjects
- Taylor & Francis eBooks - E-books in full text
- TradeWinds - Newspaper
- Transport (Ovid) - References and abstracts to transport-related literature. Journal articles, conferences and reports
- Wiley Online Library - Journals in full text - all subjects

Students will have a well-qualified tutor appointed and at least one co-tutor. Together the tutors should have competences well related to the doctoral project. The tutors will stay in touch with the students offering their advice related to the design and content of the PhD project, giving feedback on draft publications and more general guidance. The tutors should also help PhD students to find their place in relevant internal and external research environments, e.g. through membership in internal research groups and via invitations to international academic events.

## **10 Internal accreditation documentation of the PhD programme**

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The document provided for the last internal re-accreditation of the programme is attached. The re-accreditation was approved by the PhD Committee, and by Studieutvalget March 27<sup>th</sup> 2020.

# 11 Documentation of program evaluations

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## Introduction

The survey reported on in this section, is based on responses given from former, and current, PhD Logistics students through a Questback survey conducted in November and December 2018. The main purpose of the survey was to get valuable input to the re-accreditation process, which may help us make necessary revisions to the program.

### 11.1 Data collection

The population was divided into two groups: Group 1 are the former 47 PhD Log students who had already finished their degree by 1. September 2018. Group 2 are the 18 active students on the program at that time. These students started their studies between 2008 and 1 July 2018, so some have been students on the program for a long time, some have just started. 21 persons who had been registered to the program without finishing was not defined as part of the population for this survey.

The questionnaire comprised both closed and open-ended questions (see Attachment A). Some of the questions were only asked to members of Group 1. The data collection was done in the period 15 November to 8 December 2018. All 65 members of groups 1 and 2 were approached by email, requesting them to participate. One reminder was sent to the ones who did not respond to the first email.

We got 49 answers, which means a 75% response rate for the whole group together. The response rate was a bit higher for Group 2 (83%) than for Group 1 (72%).

### 11.2 Survey output and central findings

The sample comprises 15 women and 33 men. The gender mix is quite representative of the population, where the share of women has been hovering around 1/3 most of the time. 15 current students and 34 former students have given us their feedback. 31 respondents had their scholarship financed fully by MUC, 17 by other sources or combinations. Among the respondents 42% is writing/wrote a thesis within “optimization, mathematics, econometrics”, 40% within supply chain management and the remaining 19 percent within transport

economics. 20% have written/writes a monography and 80% a paper-based thesis.

Of the 34 respondents who had finished their degree, 2 reports that they do not have a paid job at the moment. 62% works within academia, 9% within other public sectors, and 24% works in private companies. 77% reports that their current job is “relevant” or “very relevant” to their doctoral degree. Apart from the two who do not have a paid job at the moment, the rest of the respondents (18%) reports that their job is just “moderately relevant” to the doctoral degree. 91% reports that their PhD degree has been important or very important to their career.

Among the students who have finished their degree, we asked them about how many papers, based on the thesis, was accepted before and after the defense (SP8a and SP8b). On average 2,91 papers had been accepted before the defense and 2,85 papers after the defense. This also means that on average 5,76 papers have been accepted per respondent.

**SP12a. How demanding do/did you feel that the time you have spent as a doctoral student is/was?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not demanding	3	6,1	6,1	6,1
	Slightly demanding	1	2,0	2,0	8,2
	Moderately demanding	8	16,3	16,3	24,5
	Demanding	20	40,8	40,8	65,3
	Very demanding	17	34,7	34,7	100,0
	Total	49	100,0	100,0	

From SP12a it is clear that most students find their PhD studies demanding or very demanding (76%). It may be more surprising that 3 candidates responded “not demanding”. SP12b asked how satisfied students are/were being a PhD

students. The question may not be easy to interpret, but a total of 94% answering “satisfied” or “very satisfied” must be a good thing.

**SP12b. Overall, how satisfied are/were you with being a PhD student?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	2,0	2,0	2,0
	Dissatisfied	2	4,1	4,1	6,1
	Satisfied	25	51,0	51,0	57,1
	Very satisfied	21	42,9	42,9	100,0
	Total	49	100,0	100,0	

Students were able to add textual comments to this item. Some impressions from reviewing these comments are:

- As expected, most PhD students find their situation demanding, which it should be. However, the situation may be perceived as demanding from various perspectives. Whereas the professional challenges should be demanding, there may be factors that makes the situation more demanding than necessary. Some of the comments given under this item contains suggestions for improvements. These will not be treated here, but will be added to the comments given under item 18 below.
- Most of the comments revolve around the fact that making progress is the most demanding thing, and that students may feel rather alone with this responsibility. Self-organizing is mentioned as a major challenge by many. The possibility of discussing one’s own work with fellow students is limited because the settings of the different PhD projects are so different.
- This may also regard e.g. the choice of appropriate courses and deciding upon the right methodologies and research design. The may be easier if the doctoral project is linked to a university project.
- Combining teaching responsibilities with one’s own research could also be rather demanding.

- Writing the papers, learning academic writing – and the subsequent peer-review processes is also mentioned as a major challenge by respondents. Also the feedback given from the adjudication committee may be perceived as tough/hostile and without support. These things may be demanding, both with regards to work-load, and at the psychological level.
- Generally, a heavy workload is challenging

**SP13a. How would you assess the usefulness of the tutoring you get/got from main or assisting tutors?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly useful	1	2,0	2,1	2,1
	Moderately useful	6	12,2	12,5	14,6
	Useful	16	32,7	33,3	47,9
	Very useful	25	51,0	52,1	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

Students seem generally quite satisfied with the usefulness of the tutoring as well, as 85% answer “useful” or “very useful”. Still there are 7 (15%) respondents who ticked “slightly” or “moderately” useful on this question.

Students were able to add textual comments to this item. Some impressions from reviewing these comments are:

- Most of the comments given under this item highlights positive experiences with the tutors. A few have negative experiences.
- The positive statements focus on the fact that students got thorough feedback and that the co-operation was good.
- One comment says that even though the tutors were generally competent and did their job well, they were not always able to provide more

specialized guidance regarding the specific methodologies chosen for their project.

- One comment says that the main supervisor was supportive and helpful, but the co-supervisors were not.

**SP14a. How would you assess the usefulness of the doctoral courses you have participated in?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Of no use	1	2,0	2,1	2,1
	Slightly useful	2	4,1	4,3	6,4
	Moderately useful	10	20,4	21,3	27,7
	Useful	19	38,8	40,4	68,1
	Very useful	15	30,6	31,9	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

The picture is somewhat more mixed when respondents were asked to assess the usefulness of the PhD courses they had participated in (SP14a). Still, the majority (72%) ticked “useful” or “very useful”, but 13 (27%) respondents seem rather dissatisfied with the usefulness of the courses. It may be challenging to assess all courses with an average score like this, so we need to dig deeper into the comments given to interpret this item:

- Again, there is a mix of positive and negative experiences in the textual comments
- Some are satisfied with some courses, but not others
- Some highlight the fact that it is difficult to compose the mix of courses in the course plan, and that it may be difficult to find the relevant courses.

- Some ask for MUC to organize more PhD courses, e.g. in Supply Chain Management and Research methodologies.
- Some specific comments were given to particular courses. Especially the obligatory “History of Logistics”, which needs to be updated or dropped as a mandatory course.
- Several respondents mention the good thing about being able to choose quite freely among PhD courses offered. This makes the course-part more meaningful.

There seems to be room for improvement regarding information quality (SP15a) related to procedures and rules as only 65% rate this as “good” or “very good”. Only a few textual comments were given under this item, most of them from students who were satisfied with the information. There is a proposition to set up an “introduction program” for newly enrolled students, introducing benefits, organization structure, tax calculation etc.

**SP15a. How would you rate the quality of the information you get/got about relevant procedures and rules regarding your studies?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bad	3	6,1	6,3	6,3
	Fair	14	28,6	29,2	35,4
	Good	17	34,7	35,4	70,8
	Very good	14	28,6	29,2	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

The physical working conditions (SP16a) seem to be good as 94% rate these as “good” or “very good”. As could be expected, most of the comments given here are on a positive note. Some ask for more electronic databases. Several positive

remarks about the service-mindedness of the IT support and the library were given.

**SP16a. How would you rate the quality of your physical working conditions and the access to necessary services (IT, library etc.)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fair	3	6,1	6,4	6,4
	Good	18	36,7	38,3	44,7
	Very good	26	53,1	55,3	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

There seems to be room for improvement also regarding the inclusion of PhD students among the members of the faculty (SP17a). A few (3) students disagree, and 24% are neutral. Still, 70% “agree” or “strongly agree” to feel well included.

**SP17a. I feel/felt well included among the members of the faculty**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	4,1	4,3	4,3
	Disagree	1	2,0	2,1	6,4
	Neutral	11	22,4	23,4	29,8
	Agree	21	42,9	44,7	74,5
	Strongly agree	12	24,5	25,5	100,0
	Total	47	95,9	100,0	



Missing System	2	4,1		
Total	49	100,0		

When asking the more specific question about inclusion into a relevant research group (SP17b), the group of “agree” or “strongly agree” drops a little bit, compared to the general question above. 64% feel well included in a research group.

### SP17b. I feel/felt well included in a relevant research group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2,0	2,1	2,1
	Disagree	4	8,2	8,5	10,6
	Neutral	12	24,5	25,5	36,2
	Agree	10	20,4	21,3	57,4
	Strongly agree	20	40,8	42,6	100,0
	Total	47	95,9	100,0	
Missing System		2	4,1		
Total		49	100,0		

Question 17c was about inclusion into the group of doctoral students. Here, 83% seems to feel well included in the group. Only a few textual comments were given under item 17. Some state that the inclusion into relevant groups is up to the students themselves, as they would mainly feel welcome – also in social settings like lunchtime. However, especially non-Scandinavian students may feel that there is a language barriers in such settings. One respondent claims that the faculty is subdivided into conflicting “clans” with makes things complicated. Some

say that they do not want to belong to a research group, or that there are no relevant group for them.

**SP17c. I feel/felt well included among the doctoral students**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	6,1	6,3	6,3
	Neutral	5	10,2	10,4	16,7
	Agree	23	46,9	47,9	64,6
	Strongly agree	17	34,7	35,4	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

As a final question (SP18), we asked about further suggestions and comments given for improving the PhD Logistics program, and we got quite a lot of propositions. Below, we have also added a few of the comments given under other items regarding this:

1. Suggestions for introductions, seminars, information and PhD courses:
  - Seminar on academic writing, publishing and presentations at the start
  - Setting up an introduction program for new students, especially for international students
  - Offering more PhD courses on campus
  - History of Logistics needs a facelift, or should be dropped as obligatory
  - A solid introductory course on Logistics should be taken by all PhD students
  - An annual internal gathering of PhD students, supervisors and PhD committee participated. Organized as a mini-conference, where also students are reviewers.
  - There should be a compulsory course in Research design

- Organize an obligatory seminar on pedagogy
  - MUC should set up courses in research methodologies, especially in SEM (the respondent probably refers to Structural Equation Modeling)
2. Better access to library sources. What we have is not enough, and it is too time-consuming to have things ordered.
  3. One comment addresses a need for clear ethical guidelines for tutors regarding the writing of articles and workload. It is not quite clear what the respondent asks for here, but maybe this is partially related to work distribution and co-authorship? The same respondent calls for a possibility to report on potential issues with regard to supervision anonymously.
  4. One respondent reports that many students felt lonely and that it would be good to help students develop their social skills and create networks.
  5. New PhD students should get an appointed mentor among existing PhD students
  6. Insisting on social interaction between PhD students to reduce stress and loneliness. Also bring Norwegian and international students together.
  7. MUC should help graduates find a proper job.
  8. Improve the interaction with industries, companies and public and private organizations.
  9. Set up informal meetings where senior faculty members discuss problems they are working on.
  10. MUC should develop more big projects, where several PhD scholars could work together.
  11. The process of getting financing for staying abroad needs to be clarified.
  12. Set up a Canvas room for PhD students (list of courses, seminars, conferences, list of employees with their listed expertise, available software, recommended literature, platform for communication between students
  13. Degree certificates should be in English
  14. Increase control of study progress

The input from this survey has been very helpful in the development of the PhD logistics program. The response rate, both among existing and previous students is high, which gives us reliable feedback. The general impression is that most students are quite satisfied with the program and the way things are organized.

There are, of course, different experiences, also on the negative side. Based on the feedback we have made some changes, and still consider further action points.

## **12 Strategy documents**

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The most recent strategy document of Molde University College is provided as an attachment.

## **13 Protocols of the PhD Logistics committee**

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The protocols of the PhD Logistics committee for the last three years are attached.

## **14 Procedures related to the mid-way evaluation and disputations**

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### **14.1 Midway evaluations**

#### **GUIDELINES FOR MIDWAY EVALUATION (ME) PHD LOGISTICS**

Revised 28 March 2019, valid from 1 August 2019. Amended 08 October 2019.

1. ME must be conducted before the candidate has reached 2/3 of the planned duration of the doctoral work.
2. The aims of the ME are
  - a. To offer candidates an evaluation of the status, progress and preliminary results of their PhD project.
  - b. To identify issues that might impede or delay the PhD project, and to propose ways of overcoming these issues.
3. Before the PhD candidate is halfway through the planned duration of the doctoral work, the PhD committee will notify the candidate and the main supervisor that the time for a ME is coming up, and indicate an approximate time for this. The main supervisor will then be asked to

propose two opponents for the ME, one of which should not be an employee of MUC or the professional environment of the candidate. The opponents must be approved by the head of the PhD LOG committee. The opponents could not be appointed as members of the candidates' evaluation committee.

4. The PhD candidate will submit a progress report of maximum 3 pages to the opponents, with a copy to the supervisor(s), no later than two weeks prior to the ME. The report should cover the following items
  - a. Scientific activity and results
  - b. Publications
  - c. Status vs the approved course plan
  - d. An up-to-date plan of progress towards submission
  - e. Identification of any problems or potential impediments The candidate may, in addition, submit papers written as part of the doctoral work, but cannot expect a full review of these provided by the opponents. Even if the candidate writes a monograph, one would expect at least one conference paper to have been submitted to an academic conference.
5. The ME will comprise both an open, advertised session, and a closed session, which is only for the opponents, the candidate and the supervisor(s).
  - a. The open part contains
    - i. A 20-minute presentation given by the candidate, presenting the contents of the progress report
    - ii. A 20-minute session where opponents and the audience could ask questions or provide feedback.
  - b. The closed part contains:
    - i. First, a session only between the candidate and the opponents, where more detailed feedback could be provided, focusing on important issues for the remainder of the doctoral work.
    - ii. Afterwards, the supervisor(s) are invited to a discussion with the candidate and the opponents about the way ahead
6. After the ME, the opponents will fill out the designated evaluation form, which is to be handed over to the candidate, the supervisors, the employer (academic department, or other) and the PhD LOG committee. If the opponents find it necessary, they may propose extra follow-up actions like:

- a. Suggest concrete changes in the planned activities or material presented
- b. Recommend a more frequent reporting of progress
- c. Suggest changes to the plan of progress
- d. Suggest changes in the tutoring of the PhD project

## 14.2 Disputations

### CHECKLIST FOR EVALUATION COMMITTEES – DEFENCE DAY<sup>5</sup>

1. Subject for the Trial lecture shall be given 10 working days before the PhD defence date (2 weeks), at 10:00. The administrator will send the subject by email to the candidate, with a copy to the PhD secretary. If required, the secretary can take care of this. A form must be filled in, and the secretary will send the necessary form and information to the administrator.
2. Travels, etc.: For assistance with bookings and accommodation, please contact the Faculty, att: Bente Lindset (e-mail: [bente.lindset@himolde.no](mailto:bente.lindset@himolde.no) ).
3. Committee members should arrive the day before the defence, in order to prepare for the defence day, and start the work related to the evaluation of the defence and the examination report.
4. A dinner will be arranged the evening before the defence, contact Bente Lindset for reservation.
5. The defence day:

Starts at 10:15 with the trial lecture. Time limit 10:15-11:00. No questions from the committee or the audience. When the trial lecture is finished, the committee will withdraw for a short meeting, to decide whether the lecture is approved or not.
6. Lunch at 11:15 with the Evaluation Committee, supervisors, rector, dean, head of PhD Committee.

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<sup>5</sup> These are the normal procedures. Recently we have followed a modified arrangement due to the Covid-19 pandemic. This arrangement is based on a closed Zoom-meeting where only the candidate, the committee and the chair participates. The Zoom-meeting is streamed through a YouTube channel for the general audience. Questions ex. Auditorio are accommodated through a special procedure.

7. At 12:15 the committee will announce the evaluation of the trial lecture. If the trial lecture is not approved, the program ends. If the trial lecture is approved, the candidate is given 45 min to present the thesis. Then there will be a short break, and at appr. 13:15 pm, the defence begins.
8. There is no time limit for the defence. The committee has decided for themselves the order of the opponents and the questioning.
9. The leader of the defence will open for questions from the audience (ex auditorio)
10. When the defence is finished, the committee will withdraw to decide the result.

The "Examination result form" and an approval form "Godkjenning...". Must filled in and signed by the committee. The PhD secretary deliver the necessary forms to the administrator.
11. The committee's first opponent will announce the result to the candidate.

The candidate will be waiting at the reception. Refreshments and a light meal is served here for the candidates, audience and guests. The signed documents must be delivered to the secretary. This ends the official part of the program.
12. If the candidate arranges a dinner in the evening, a subsidy is given if the evaluation committee, supervisors, etc is invited. If so, the committee should expect to stay in Molde for the next day. Please inform Bente Lindset of the departure day.

## **15 Procedures for approving external PhD modules**

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As mentioned above, most students will take one or more of their PhD modules at other institutions. The composition of the course-part of the degree is mainly designed by a co-operation between the candidate and the tutor(s). This composition must comply with the regulations, which e.g. state that at least 25

ECTS needs to be approved PhD courses. Candidates must provide course descriptions and transcripts of records to have external modules approved by the PhD committee. The basic requirements is that modules needs to be accredited at PhD level by the institution offering the module, and the module needs to be evaluated as relevant to the doctoral project. The exam result also needs to be good enough to be evaluated as a pass at PhD level by the institution offering the module.

## 16 Changes made to enhance student progress

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### 16.1 Description of changes to the program since the first accreditation

The PhD Logistics program was first accredited by the Ministry of Education and Research in May 2002.

The main structural change to the program is the fact that the course-part is reduced from 60 ECTS to 45 ECTS. This is done as an adaption to changes in the typical structure and official requirements for Norwegian doctoral degrees. We have *not* chosen to lower the requirement to the minimum 30 ECTS to make room for necessary education in the specific elements of logistics which is relevant to the individual candidate.

From the original accreditation it was stated that the course-work would comprise courses from our MSc Logistics program, reading courses and seminars provided by MUC staff and external courses, and this is still the arrangement. However, we have added the opportunity to get up to 9 ECTS for approved conference papers presented at academic conferences (3 ECTS per paper). The only mandatory course in the original application was a course in the philosophy of science. Later, a course in the history of logistics has been made mandatory, but this was removed from the program again in 2019, based on student evaluations. In-stead a new requirement saying that at least 5 ECTS of the doctoral courses must be explicitly related to transport economics, logistics or supply chain management was added.

In 2018 the Midway evaluation was introduced (see procedures described above). This instrument has already proven a valuable tool for offering the candidate feedback from other scholars than their tutors, and some valuable advise on recommended adjustments in the doctoral project. Since the Midway



evaluation was thorough and quite close to the existing timing of the public presentation, we chose to drop the public presentation as a last obstacle to pass before the submission of the thesis.

## **16.2 Follow-up actions based on the 2018 survey**

The input from the survey reported on in section 11 has been very helpful in the development of the PhD logistics program. The response rate, both among existing and previous students is high, which gives us reliable feedback. The general impression is that most students are quite satisfied with the program and the way things are organized. There are, of course, different experiences, also on the negative side. Based on the feedback we have made some changes, and still consider further action points.

Some of the changes we have made, following up on the survey, are:

- We removed the course “History of Logistics” as an obligatory course, and it will not be offered in the same form anymore.
- We have introduced a requirement of at least 5 ECTS of logistics-specific content among the 25 ECTS quota of PhD-courses.
- We have set up a designated Canvas-room for PhD-students to provide more easily accessed information for the PhD students, mainly related to courses offered and procedures, rules and regulations pertaining to the programme.
- We have added a dinner-arrangement related to the annual PhD-seminar for social networking.
- The annual progress reports now also contains an item logging the frequency of contact between tutors and candidates.

# **17 Student’s participation in research groups**

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The main involvement in Research is of course the student’s tutored work with their own research project. Students should have a main tutor and at least one co-tutor and will work closely with the tutors throughout their study period.

In addition to this, students should be involved in relevant other research settings, e.g. a relevant research group, where students may present their work

and learn from the more experienced researchers. Preferably, tutors should also introduce the doctoral candidates to their own professional network, e.g. through the joint participation in academic conferences, or through related project work.

Students are encouraged to present their work at academic conferences and workshops.

The 2018 survey found that most students feel well included in faculty research activities, but not all students are part of a research group. Involving students in the research groups is a clear priority. Normally, students will be invited into the research groups via their tutor.

## **18 Selected PhD theses from the last 10 years**

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According to the mandate for the periodic evaluations, three theses should be selected for the committee. These will be provided in full-text to the committee along with the reports from the adjudication committees. The selected theses are (one from each major strand of the program):

- Transport economics: Axel Merkel: Container port infrastructure in the European Union: Inter-port competition, investment appraisal and the measurement of efficiency (2019:5)
- Optimisation/OR: Markus Brachner: Evaluating and Optimizing Emergency Response System for Helicopter Transportation in the Arctic Region (2020:2)
- Supply Chain Management / Organization: Renger Philemon Kanani: The effect of processor control on screening transaction costs in farmer-food processor relationships: An investigation of antecedents and contingency factors (2016:5)

The theses and reports of the adjudication committees are provided as attachments.

# 19 APPENDICES

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## 19.1 Appendix A: Example of international co-operation - case CRT/CIRRELT

The following is an example of the extent of co-operation with external environments. This may not be an exhausting example, but is meant to illustrate the nature of co-operation with a highly renowned international entity. A co-operation agreement was made at the start of our PhD program, and the co-operation is still important to us:

1. Professor Gilbert Laporte who works for CIRRELT and HEC Montreal holds the Canadian Research Chair in Distribution Management has over 15 years had a 20% visiting professorship with our institution. His work includes offering an annual 2,5 ECTS Master's courses in Distribution Management, and contributions to our bi-annual 5 ECTS PhD module History of Logistics, co-supervision of PhD students Aliaksander Shyshou, Eugen Sopot, Yauheni Kisialiou and master students
2. Professor Teo Crainic had a 20% position with our university for many years, co-supervised several PhD students and offered an annual 2,5 ECTS master's course.
3. CIRRELT employees Laporte and Crainic have also facilitated research stays for our master's and PhD students at CIRRELT (Aliaksandr Shyshou, Arnt-Gunnar Lium, Arild Hoff, Lars Magnus Hvattum, Zhen Zhang, Ellen Karoline Norlund, Yauheni Kisialiou), and also hosted HiMolde employees during sabbaticals (Arne Løkketangen, Irina Gribkovskaia, Øyvind Halskau, Johan Oppen, and more);
4. We have many joint academic publications with CIRRELT employees (Gribkovskaia/Laporte 12 publications, Hvattum/Laporte has 8, Hoff/Laporte 1, Hoff/Crainic, plus a number of publications with other PhD students);
5. CIRRELT, HEC Montreal and the University of Montreal organises an annual conference, Optimization Days, where a lot of HiM employees and students participate
6. Under the IFORS XX conference in Barcelona in 2014, Gilbert Laporte heading the Distribution Management field invited HiM to organize a stream in Petroleum Logistics with 4 sections and 12 presentations

7. Gilbert Laporte was invited as plenary speaker in the Logistics Analytics 2018 conference that HiM organized in Minsk in June 2018. He was also member of the scientific committee.
8. CIRRELT has been involved in several projects funded by the Research Council of Norway, where HiM has been a partner. Such arrangements have also been made related to other R&D projects with industry partners (e.g. the MOLO project with Statoil, Marintek and NTNU, plus several other R&D projects involving Statoil (now Equinor))
9. Gilbert Laporte has been actively involved in developing the field of Route Optimization at HiM, and in the development of a new track in our master's program called Logistics Analytics
10. The main contribution we have received from our co-operation with CIRRELT is that they have introduced HiM as a research school for the whole world. HiM became well known for being a CIRRELT partner, and HiM researchers have thus been able to establish their own well developed research networks.

## 19.2 APPENDIX B: SAMPLE PHD COURSE EVALUTATIONS



### Final course evaluation: PhD Course in Cost-Benefit Analysis 2013 Faculty of Economics, Informatics and Social Science

Organization	PhD-student	6	Other participants	7	
<b>Teaching:</b> (Scale: 1 = disagree, 5 = agree)					
					<b>1 2 3 4 5 Mean</b>
1. The learning objectives were clear		2	3	3	1 4 3.2
2. The lectures were organized and prepared in a way that made good learning outcome.			1	5	4 3 3.7
3. The amount of work was adequate			2	4	5 2 3.5
4. The curriculum was relevant			2	3	5 4 4.1
<b>The lectures:</b> (Scale: 1 = disagree, 5 = agree)					
					<b>1 2 3 4 5</b>
5. The lecturers' way of lecturing and other ways of disseminating knowlegde were suitable				5	5 3 3.8
6. The lecturer was open for questions and other input from the students			2		5 7 4.5
7. I found the Theoretical and conceptual platform relevant			3	3	2 5 3.7
8. I found the Wider Economic Impacts seminar relevant			3	2	1 2 5 3.3
9. I found the Real option values section relevant				1	2 6 4 4.0
10. I found the Environmental goods section relevant					1 4 8 4.5
11. I found the Traffic Safety section relevant			1	2	1 6 3 3.6
12. I found the Energy and Climate section relevant				2	2 5 4 3.8
13. I found the Health Care section relevant			1	2	3 3 4 3.5
<b>Overall evaluation:</b> (Scale: 1 = disagree, 5 = agree)					
					<b>1 2 3 4 5</b>
14. Altogether, I am satisfied with the course				3	2 3 5 3.6
PLEASE TURN					

**18. Please feel free to give additional comments (e.g. on sequencing of sections, quality aspects and so on):** *Organiser's comments in italics.*

- Good to have a mix of PhD-students and practitioners. *I agree.*
- Introduction a bit too technical. *Perhaps some aspects are.*
- Student presentations should be given before the lectures. *Others stated verbally that they liked the student presentations following the lectures. Consider to change.*
- Lectures not aligned with respect to learning outcome. *I totally disagree.*
- Group work with hands-on CBA (2 comments). *Perhaps. But priority has been given to theoretical and empirical highlights rather than computer work.*
- Name tags to ease interaction. *Sigh... but a good sign of a high number of students, though (18)*
- The WEI seminar too close to the research frontier. *An outstanding comment in a PhD course, but perhaps it was a bit too much focus on a specialized topic.*
- A bit varying quality of the lecturers with respect to communication. *We have to live with that.*

*12 out of 18 participants have responded. Overall a bit lower scores as compared with earlier years.*

## Final course evaluation: PhD Course in Cost-Benefit Analysis 2009

### Faculty of Economics, Informatics and Social Science

Organization	PhD-student	9	Other participants	4					
<b>Teaching:</b> (Scale: 1 = disagree, 5 = agree)									
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>			
1. The learning objectives were clear			3	6	4	4.1			
2. The lectures were organized and prepared in a way that made good learning outcome.			2	6	5	4.2			
3. The amount of work was adequate			1	8	3	4.1			
4. The curriculum was relevant			1	7	4	4.3			
5. The method of assessments (exams, presentations etc) enabled me to show what I have learned from the course.				5	3	4.4			
<b>The lectures:</b> (Scale: 1 = disagree, 5 = agree)					<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
6. The lecturers' way of lecturing and other ways of disseminating knowlegde were suitable			3	3	6	4.3			
7. The lecturer was open for questions and other input from the students			2	2	9	4.5			

8. I found the Theoretical and conceptual platform relevant			1	3	9	4.6	
9. I found the Critique of the CBA method relevant			1	5	7	4.5	
10. I found the Real option values section relevant			6	6	1	3.6	
11. I found the Environmental goods section relevant			4	9		4.7	
12. I found the Traffic Safety section relevant			4	6	3	3.9	
13. I found the Energy section relevant			1	5	4	3	3.7
14. I found the Transport section relevant			3	4	6	4.2	
15. I found the Health Care section relevant			4	5	4	4.0	
<b>Overall evaluation:</b> (Scale: 1 = disagree, 5 = agree)			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
17. Altogether, I am satisfied with the course			2	5	5	4.3	

**18. Please feel free to give additional comments (e.g. on sequencing of sections, quality aspects and so on):** *Organiser's comments in italics.*



- Better with group work, apply CBA on case and present it to class (2 statements). *Should be considered.*
- Good cases efficiently presented, but they should have been discussed in groups of students first. *Should be considered.*
- Literature posted too late. *It was submitted one week before. To be improved.*
- Student presentations were a very good idea. *This will be continued.*
- There should have been more interactions between lecturers and the students. *That was tried on some occasions with mixed responses, but may be alternative strategies should be tried.*
- All presentations (not just some) should have had a printout of the lectures on beforehand. *Can be improved, but many lecturers have tight deadlines.*
- A couple of the lecturers could have been more focused on the linkage between their topic and CBA, also to get a better overview. *This is a relevant comment on a couple of occasions.*
- The practical things were very well organized. *Thanks.*

*Some elements (like the method off course assessments (Q5)) was a bit premature because this course has one written home exam at the end.*

*Some of the lectures were professionally excellent but may be a bit demanding for non-economists to fully understand the topics' relevance for CBA (PhD courses do almost always have a mixed audience). Hence, a bit of calibration towards CBA application might be considered next time.*

*All 13 participants have responded.*



**and so on):** *Organiser's comments in italics.*

- Student presentations should be given before the lectures, avoiding pre-emptying of the topics and more room for discussion. *This will be considered.*
- All presentations (not just some) should have had a printout of the lectures on beforehand. *Can be improved, but many lecturers have tight deadlines.*
- Exam should be given right after the course. *A matter of taste. Some may also want some time to digest and read.*

*All 9 participants have responded, Question 10 and 12 have 2 and 1 missing respondent, respectively.*

## 19.3 APPENDIX C: SAMPLE PHD COURSE DESCRIPTIONS

Course code: DRL001

Course name: History of Logistics

Program of study: Philosophiae doctor in Logistics (ph.d)

Campus: Molde

Credits: 5

Level of study: PhD

Teaching semester: 2017 Spring

Assessment semester: 2017 Spring

Language of instruction: English

Language of examination: English

Language of literature: English

Recommended previous knowledge:

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business, management science, with background in probability theory and statistics.

Course content:

- Introduction to the history of logistics in general, starting from the middle of 18th century until today; changes in supply chains over the centuries due to changes in technologies, needs of the societies, and market situations.
- The history of purchasing; an overview over the development of theoretical frameworks within industrial purchasing and business-to-business marketing, including industrial marketing and buying behavior, inter-organizational issues in buyer-seller relationships and the network approach of inter-firm business.
- The history of inventory theory starting from early last century and the research during the last 100 years; when and how did it start, when was stochastic problems introduced, when was discount introduced, etc.
- The history of transportation economics with relations to logistical issues; the peak load problem, classical localization theory, development of the spatial dimension in logistical models, technological development within the transport sector.
- The history of production; the history and development of optimization techniques and how these techniques are used in combination with better developed computers and software to solve practical problems in production, logistics and workforce planning.
- History of distribution and vehicle routing starting with early results in routing going back to 18th century, and the development of the travelling salespersons problem, vehicle routing and arc routing problems from the middle of the last century until today.

Learning outcome:

The main purpose of this course is to give an overview of the development of logistics through time. Some topics like purchasing, transportation, inventory theory, vehicle routing and production theory will be highlighted.

Working and learning activities:

30 hours lectures. All lectures are mandatory.

Curriculum:

Required reading is given in frontier at the semesterstart.

Selection of book chapters and scientific articles

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Attendance for teaching			Not required	30 hours lectures. All lectures are mandatory.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Home assessment	Individual	-	-	Pass/fail	-	-	-	All printed and written supporting material

## DRL007 Cost Benefit Analysis

Course code: DRL007

Course name: Cost Benefit Analysis

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 5

Level of study: 3. syklus (PhD)

Teaching semester: 2018 Vår

Language of instruction: Engelsk

Language of examination: Engelsk

Language of literature: Engelsk

### Course content:

There is an increasing need for evaluation and ranking of projects within constrained public budgets. CBA is one of the methods that are extensively used in economic impact assessment of projects in the public sector. Originally, it was developed and applied within transportation, but has gained increasing attention also within environmental assessment, health care and cultural economics. The course covers fundamental theoretical and empirical issues, and applies these to actual case studies. Decisions under uncertainty and real option theory are also covered.

### Learning outcome:

To learn about the state of the art in Cost-Benefit Analysis for various sectors.

### Curriculum:

Relevant literature:

Boardman A E et al (2006). Cost-benefit analysis : concepts and practice. Upper Saddle River, N.J. : Pearson Prentice Hall. ISBN: 978-0-13-143583-4

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Oppmøte til undervisning			Not required	30 h lectures + student presentations. All lectures are mandatory.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Hjemmeeksamen	Individuell		-	Bestått/ikke bestått		30 h lectures + student presentations. All lectures are mandatory.		Egen liste. Se under

### Semesters

• 2018 Spring

### Translations

• English

## DRL019 Advanced discrete event simulation modeling

Semesters  
• 2016 Autumn  
Translations  
• English

Course code: DRL019

Course name: Advanced discrete event simulation modeling

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 7.5

Level of study: 3. syklus (PhD)

Teaching semester: 2016 Høst

Language of instruction: Engelsk

Language of examination: Engelsk

Recommended previous knowledge:

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business, management science, with background in probability theory and statistics.

Course content:

Simulation is a widely used tool for analysis of systems characterized by uncertainty in demand, lead times, capacity, prices, etc. The main objective of this course is to learn techniques and methodologies to model systems both of discrete and continuous nature, with deeper insights into the advanced modeling techniques for discrete systems, identification of the main system components and analysis of their random behavior. The course discusses the choice of simulation software and its limitations for some advanced techniques. The course provides examples from various fields: supply chain systems, production and inventory systems, transportation/distribution systems, upstream offshore logistics, health care and other service systems. Topics of the course include:

- Introduction to systems modeling
- Discrete dynamic stochastic systems: elements of Queuing Theory
- Fundamentals of continuous modeling
- Modeling tools for discrete systems
- Review of discrete simulation approaches and associated simulation software
- Input data generation and analysis
- Design of simulation experiments
- Analysis of simulation outputs
- Cases of simulation-based decision support systems

Learning outcome:

As the result of the course, students are intended to be equipped to conduct a comprehensive simulation research project: build a model of a discrete system, implement it in a simulation software, perform computational experiments, interpret the results and answer the research questions.

Working and learning activities:

As the result of the course, students are intended to be equipped to conduct a comprehensive simulation research project: build a model of a discrete system, implement it in a simulation software, perform computational experiments, interpret the results and answer the research questions.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Hjemmeeksamen	Individuell	-		Bokstavs karakter	100	The evaluation of the course will be based on the assignment to each student of a case study to be implemented in ARENA together with the written report		Egen liste. Se under

## DRL022 Partial Least Squares Structural Equations Modeling (PLS - SEM)

Semesters  
• 2017 Spring  
Translations  
• English

Course code: DRL022

Course name: Partial Least Squares Structural Equations Modeling (PLS - SEM)

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 4

Teaching semester: 2017 Vår

Recommended previous knowledge:

Relevant master degree

### Course content:

- The course is based on the PLS-SEM textbook:  
Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. 2016. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd edition. Thousand Oaks, CA: Sage.
- Presentations: The session will cover theory and its application.
- Computer exercises using the latest SmartPLS 3 version: Specifically, theoretical explanations underlying the software procedures and practical exercises where participants will apply their learning to real-world examples provided by the instructors.
- Before the course, all participants get a license key for using SmartPLS 3 Professional.

Partial least squares structural equation modeling (PLS-SEM) has recently received considerable attention in a variety of disciplines, including marketing (Hair et al 2011, according to Google scholar the most-cited article ever published in JMTP; Hair et al. 2012a, according to Google scholar the most-cited JAMS article since 2012), strategic management (Hair et al. 2012a, according to Google scholar the most-cited LRP article since 2012), and management information systems (Ringle et al. 2012, according to Google scholar the second-most cited MIS Quarterly article since 2012).

The goal of PLS-SEM is the explanation of variances (prediction-oriented character of the methodology) rather than explaining covariances (theory testing via covariance-based SEM). The application of the PLS-SEM method is of particular interest if the premises of covariance-based SEM are violated and the assumed relations of cause-and-effect are not sufficiently explored. An additional advantage of the PLS-SEM method is the unrestricted incorporation of latent variables in the path model that either draws on reflective or formative measurements models.

This four days PhD course introduces participants to the state-of-the-art of PLS-SEM using the SmartPLS 3 software. The first day of the seminar provides a profound introduction to PLS-SEM. Participants will learn the foundations of PLS-SEM and how to apply it by means of the SmartPLS software. The instructors will make use of several examples and exercises. Starting at the second day and continuing on the third day, the seminar covers extensions and new developments to PLS-SEM.

### Learning outcome:

This PhD course is designed to familiarize with the potentials of using the multivariate analysis method PLS-SEM in international business research. The objectives of this course are to provide an in-depth methodological introduction into the PLS-SEM approach (the nature of causal modeling, analytical objectives, some statistics), (2) the evaluation of measurement results, and (3) complementary analytical techniques. More specifically, participants will understand the following topics:

- Model development and fundamentals of PLS-SEM
- Assessment and reporting of measurement and structural model results
- A new criterion for discriminant validity: The heterotrait-monotrait ratio of correlations (HTMT)
- Mediating effects
- Moderating effects (interaction effects)
- Multigroup analysis
- Measurement invariance testing
- Higher-order constructs (so-called second-order models)
- New segmentation tools, such as FIMIX-PLS and PLS-POS

This course has been designed for PhD students and full-time faculty who are interested in learning how to use the PLS-SEM method in their own research applications. A basic knowledge of multivariate statistics and SEM techniques is helpful, but not required.

### Curriculum:

#### *The Book on PLS-SEM:*

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd edition. Thousand Oaks, CA: Sage.

#### *Journal Articles:*

Becker, J.-M., Rai, A., Ringle, C. M., & Völckner, F. (2013). Discovering Unobserved Heterogeneity in Structural Equation Models to Avert Validity Threats. *MIS Quarterly*, 37(3), 665-694. <http://pls-institute.org/uploads/Becker2013MISQ.pdf>

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-151. <http://dx.doi.org/10.2753/MTP1069-6679190202>

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research. *Journal of the Academy of Marketing Science*, 40(3), 414-433. <http://dx.doi.org/10.1007/s11747-011-0261-6>

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing. *Advances in International Marketing*, 20, 277-320. [http://dx.doi.org/10.1108/S1474-7979\(2009\)0000020014](http://dx.doi.org/10.1108/S1474-7979(2009)0000020014)

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J. J., Hair, J. F., Hult, G. T. M., & Calantone, R. J. (2014). Common Beliefs and Reality about Partial Least Squares: Comments on Rönkkö & Evermann (2013). *Organizational Research Methods*, 17(2), 182-209. <http://dx.doi.org/10.1177/1094428114526928>

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Oppgave(r)	2	2	Not required	Participants will receive two introductory articles on PLS-SEM long before the course start.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Annen vurderingsform, definer i kommentarfelt	Individuell	30	Minutter	Bestått/ikke bestått		The course will start with a 30 minutes exam regarding the required readings.		Alle trykte og skrevne hjelpemidler



## DRL024 Urban Freight and Behaviour Change

Emnekode: DRL024

Emnenavn: Urban Freight and Behaviour Change

Studieprogram: Philosophiae doctor in Logistics (PhD)

Studiested: Molde

Studiepoeng: 5

Studienivå: 3. syklus (PhD)

Undervisningssemester: 2017 Vår

Eksamenssemester: 2017 Vår

Undervisningsspråk: Engelsk

Språk for eksamen: Engelsk

Språk for litteratur: Engelsk

Forkunnskapskrav:

The course is aimed at Norwegian and foreign PhD students, researchers and consultants, and public sector employees working with in the realm of urban freight transport.

### Forventet læringsutbytte:

To learn how to define, design and evaluate urban freight policies capable of adequately responding to the sustainability challenges urban freight distribution poses to modern cities. Behavioural change is at the base of any solution of urban freight problems. Shared and long-standing policies must account and accommodate both private (i.e. profit oriented) and social (e.g. environmental) objectives. Urban freight problems and solutions are strictly interwoven with and dependent on technological, organizational, regulatory, and policy innovations. Results depend on the interaction among the various system components and related stakeholders. Therefore, urban freight policies/solutions should emerge from a collaborative/participatory approach compatible with larger societal sustainability goals. The course will, through a case study based approach, discuss, illustrate and show how to apply cutting edge methods (design of experiments, discrete choice modelling and agent-based modelling) useful to overcome/take-advantage-of any barriers/opportunities that should be removed/exploited when adopting innovative solutions in urban freight distribution.

### Arbeids- og læringsaktiviteter:

The URBE PhD course focuses on rigorous and robust methods, yet made comprehensible, capable of ex-ante determining the acceptability of potential alternative policies and predicting the behavioural change that might materialise when actually implemented. • The theoretical and conceptual platform covers topics like consumer choice analysis, willingness to pay measures, stakeholder interaction analysis/simulation and opinion dynamics models. Emphasis is posed on Stated Preferences (SP) methods as a valuable instrument to measure the economic value of policy options/mixes. • Based on the conviction that urban freight policy making is one of the most complex environments in the field of Transportation where interaction effects among stakeholders should be explicitly considered, the course illustrates how to: 1) elicit stakeholders' preferences for alternative policy options (focus groups and SP techniques); 2) determine their likely responses to policy changes (discrete choice modelling) and; 3) account for interaction effects in a consensus building process (agent-based modelling) in order to forecast likely results. • The course will also touch upon: 1) stakeholder engagement techniques (e.g. gamification) and how to integrate them in policy definition; 2) innovative policy measures (e.g. crowd shipping) and how they can be studied using the methodological apparatus illustrated.

Vurderingsform	Gruppering	Varighet	Varighetstype	Karakterskala	Andel	Kommentar	Hjelpemidler	Hjelpemidler
Hjemmeeksamen	-	-	-	Bestått/ikke bestått				-

Semester

• 2017 Vår

Oversettelser

• English

• Norwegian Bokmål

## Supply Chain Performance Measurement

5 days PhD course

Week 17 (April 23 – April 27) 2018.

5 ECTS

### Lecturer

Kim Sundtoft Hald, Professor (mso), Copenhagen Business School. Department of Operations Management. Denmark.

### Recommended previous knowledge

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business.

### Language

English.

### Course objective

The overall aim of the course is to develop student's competencies in managing performance in supply chains. Performance management is concerned with how managers in the supply chains can use different types of management accounting technologies to make strategic oriented design decisions and control their supply chains. Specifically, and resting firmly on an economic rational, operations management, supply chain management and performance management theory as well as on social- and organisational theories, students will be able to discuss, measure, use and respond to multiple dimensions of supply chain and network performance as well as to critically evaluate the technologies designed to manage them.

### Course content / Topics

The content of the course will be partly theory and partly case driven. Extensive literature on supply chain management, operations and performance management will serve as the objects of discussion. The following topics will be covered in the course:

- Outcome driven supply chains and dimensions of performance.
- Performance management theory and practice.
- Supply chain performance management frameworks.
- Measurement and management of supply chain risk and sustainability.
- Research opportunities in supply chains performance management.

### Learning outcomes

The course will develop students' knowledge, skills and competencies in identifying, understanding and quantifying multiple dimensions of performance in supply chains. Students will learn how to critically apply and reflect on course theories and their ability to help analyze specific case situations. Specifically, upon the completion of the course students must be able to:

- Identify, describe and critically evaluate dimensions of supply chain performance as well as their causalities.
- Design and critically evaluate performance measures, performance measurement systems and performance evaluation processes.

- Understand, select, design and critically evaluate supply chain performance management frameworks to help analyze specific case situations (e.g. supplier selection and evaluation, the total cost of ownership framework, the supply chain balanced scorecard).
- Understand and critically evaluate the measurement and management of supply chain risk and supply chain sustainability.
- Identify and discuss research opportunities in supply chain performance management.

### Learning process and principles

The course activities consist of extensive preparation before class by students, lectures, mandatory courseworks as well as student presentations given during the course and in depth case discussions/workshops. The use of a discussion oriented teaching style and use of cases will assure a high level of student involvement in the learning process. All lectures are mandatory.

### Exam

Course participation, including student presentations and comprehensive home assignment.

Mandatory class attendance.

Grading scale: Pass/fail

### Teaching resources

*Preliminary course literature/reading list of academic papers and cases:*

- Brewer, P.C., & Speh, T.W. (2000). Using the Balanced Scorecard to measure supply chain performance. *Journal of Business Logistics*, 21(1), 75-93.
- Ferreira, A., & Otley, D. (2009). The design and use of performance management systems: An extended framework for analysis. *Management accounting research*, 20(4), 263-282.
- Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: A risk management approach. *International Journal of Production Economics*.
- Hald, K. and Ellegaard (2011) 'Supplier evaluation processes: the shaping and reshaping of supplier performance' in *International Journal of Operations & Production Management*. 31(8): 888-910.
- Kulp, S. L., Narayanan, V. G., & Verkleeren, R. L. (2004). *Metalcraft supplier scorecard*. Harvard Business School.
- Melnyk, S.A., Davis, E.W., Spekman, R.E. and Sandor, J. (2010), "Outcome driven supply chains", *MIT Sloan Management Review*, Winter, 51, 2, pp. 33-38.
- Neely, A., Richards, H., Mills, J., Platts, M. and Bourse, M. (1997) "Designing performance measures: A structured approach", *International Journal of Operations & Production Management*, 17(11): 1131-1152.
- O'Connor, N., Anderson, S. & Wu, A. (2011), Strategic Performance Measurement of Suppliers at HTC, Asian Case Research Center, The University of Hong Kong pp. 1-13.
- Teng, S. G. and Jaramillo, H. (2005), A model for evaluation and selection of suppliers in global textile and apparel supply chains. *International Journal of Physical Distribution & Logistics Management* Vol. 35 No. 7, pp. 503-523.
- Tummala, R., & Schoenherr, T. (2011). Assessing and managing risks using the supply chain risk management process (SCRMP). *Supply Chain Management: An International Journal*, 16(6), 474-483.

## DRL 026 COURSE Description

Courses code:	DRL026
Course name:	Applied Linear Regression and Introduction to Stata
Program of study:	PhD in Logistics
Campus:	Molde
Credits:	5
Course content:	1. Introduction to modern linear modeling & 2. Introductory course to Stata
Teaching semester:	May-June 2018
Required prerequisite knowledge:	1. A basic knowledge of statistics is required (e.g., t-test, p-values, anova). 2. No prior knowledge of Stata is required
Learning outcome:	<p>1. Applied Linear Models. A basic knowledge of statistics is required (e.g., t-test, p-values, anova).</p> <p>A. Introduction to visualization and regression modeling  B. Model selection, predictive modeling  C. Sparse modeling, regularized regression  D. Big Data – large sample sizes.</p> <p>2. After successfully completing the introductory STATA course, students should be able to use Stata to understand and manage data, and to perform simple statistical analyses.</p> <p>More specifically, participants will be able to:  Work with syntax in DO-files in Stata  Import and export datasets  Describe and explore datasets  Generate new variables  Merge and combine datasets  Produce descriptive statistics and publication quality graphs using Stata  By understanding how a typical statistics program works, participants will have a basis for starting to use other similar programs.</p>
Working and learning activities:	<p>1. Introduction to modern linear modeling will be lecture-based. The different models will be elaborated by using real data, and exemplified through R/Stata.</p> <p>2. The STATA course is based on the textbook: Alan C. Acock: A gentle introduction to Stata, Fifth edition. Lectures and computer exercises using STATA 15 version where participants will apply their learning to examples provided by</p>

	the instructors. You need to bring your own laptop with Stata installed.
Curriculum:	<p>Rebecka Jörnsten, Professor of Biostatistics and Applied Statistics Mathematical Sciences Chalmers University of Technology/University of Gothenburg, SWEDEN</p> <p>Birgithe E. Sandbæk, Postdoc Center for Healthcare Operations Management Molde University College - Specialized University in Logistics, Norway</p>
Relevant literature:	<ol style="list-style-type: none"> <li>1. Hastie, Friedman, Tibshirani: Elements of Statistical Learning</li> <li>2. Alan C. Acock: A gentle introduction to Stata, Fifth edition</li> <li>3. Handouts</li> </ol>
Mandatory coursework	Courseworks given during the course
Form of Assessment	Form of assessment: The final course grade is based on the written exam and the course participation.
	Grouping:
	Duration: 5 days
	Grading scale: Pass/fail
	Comment :
	Support material:



# DRLO27 Heuristics for stochastic optimization (Autumn 2019)

## Table of contents

- About the course
- The course is connected to the following study programs
- Recommended requirements
- The student's learning outcomes after completing the course
- Forms of teaching and learning
- Examination
- Syllabus

## About the course

Some form of uncertainty is almost always present when important decisions are made. This is also the case for logistics planners, whether planning is performed at a strategic, tactical, or operational level. Decision support in the form of optimization tools can help planners make better choices, but many optimization problems are hard to solve and require specialized search methods to identify good solutions.

This course focuses on heuristic algorithms, in particular metaheuristics, and their application to optimization problems where uncertainty is taken into consideration. Examples from several applications in routing and scheduling are used to illustrate state-of-the-art techniques.

Topics:

- Introduction to optimization under uncertainty
- Introduction to heuristics
- Introduction to metaheuristics for stochastic optimization
- Modelling paradigms, including: Markov decision processes, stochastic programming (multi-stage, dual-level), and robust optimization
- Heuristic algorithms, based on GRASP, adaptive large neighborhood search, tabu search, iterated local search, and progressive hedging

Routing and scheduling problems, including the stochastic inventory routing problem, a fleet size and mix problem in offshore wind, the robust vehicle routing problem with time windows, and a stochastic and dynamic maritime pick-up and delivery problem.

## The course is connected to the following study programs

- Philosophiae Doctor in Logistics (PhD)

## Recommended requirements

The course is suitable for PhD candidates with some knowledge about stochastic optimization, who may learn how this domain can be approached using heuristics; PhD candidates with some knowledge about heuristics, who may learn how they need to be adapted to efficiently deal with stochastic problems; and PhD candidates with knowledge about vehicle routing and scheduling problems, who may learn how stochastic versions of such problems can be handled by heuristics.

### Facts about the course

Study points: **5**

Responsible department: **Faculty of Logistics**

Course Leader: **Lars Magnus Hvattum**

Lecture Semester: **Autumn**

Teaching language: **English**

Duration: **¼ year**

## The student's learning outcomes after completing the course

By the end of the course, the participants should be able to

- discuss different paradigms for stochastic optimization
- present basic designs of common metaheuristic frameworks
- explain common ways of adapting metaheuristics to solve stochastic optimization problems
- provide details of implementations of GRASP for solving Markov decision processes; adaptive large neighborhood search for robust optimization problems; tabu search for dynamic and stochastic routing problems; GRASP, iterated local search and progressive hedging for stochastic programming problems
- identify sources of uncertainty in typical applications of vehicle routing and scheduling problems
- write a well-structured academic report/paper on a specialized topic within heuristics for stochastic optimization

## Forms of teaching and learning

- Reading papers and book chapters
- Attending lectures (1 week intensive lectures)
- Writing academic report/paper

## Examination

- Form of assessment: Writing an academic paper/report on a topic related to the curriculum
- Duration:TBA
- Grouping:Individual
- Grading scale: Pass/Fail

## Syllabus

Part 1: Introduction to stochastic optimization

- [1] W.B. Powell. Clearing the jungle of stochastic optimization. In: INFORMS TutORials in Operations Research. Published online: 27 Oct 2014; 109-137
- [2] W.B. Powell. A unified framework for stochastic optimization. *European Journal of Operational Research*, 275:795-821, 2019.

Part 2: Introduction to heuristics

- [3] C. Blum and A. Roli. Metaheuristics in combinatorial optimization: overview and conceptual comparison. *ACM Computing Surveys*, 35:268–308, 2003.
- [4] K. Sörensen, M. Sevaux, and F. Glover. A history of metaheuristics. In: R. Martí, P. Pardalos, and M. Resende (eds) *Handbook of Heuristics*, pages 1–18. Springer, 2018.

Part 3: Introduction to metaheuristics for stochastic optimization

- [5] L. Bianchi, M. Dorigo, L.M. Gambardella, and W.J. Gutjahr. A survey on metaheuristics for stochastic combinatorial optimization. *Natural Computing*, 8:239–287, 2009.
- [6] L.M. Hvattum and E.F. Esbensen. Metaheuristics for stochastic problems. In J.J. Cochran, L. A. Cox Jr., P. Keskinocak, J.P. Kharoufeh, and J.C. Smith (eds) *Wiley Encyclopedia of Operations Research and Management Science*, volume 5, pages 3218–3229. Wiley, New York, 2011.
- [7] S. Andradóttir and A.A. Prudius. Balanced explorative and exploitative search with estimation for simulation optimization. *INFORMS Journal on Computing*, 21:193–208, 2009.

Part 4: MDP/SIRP/GRASP/PHA



# DRLO28 PhD Seminar on Blockchain Applications in Supply Chain Management (Spring 2020)

## Table of contents

- About the course
- The course is connected to the following study programs
- The student's learning outcomes after completing the course
- Forms of teaching and learning
- Coursework requirements - conditions for taking the exam
- Examination
- Syllabus

## About the course

This course focuses on the use of blockchain technologies in extended supply chains. Business-to-business operations are gaining in importance as business innovations and service-based models are increasingly inter-organisational. While standard commercially available off-the-shelf (COTS) software for intra-organisational processes have been available over the last three decades, there is still not any COTS software for inter-organisational processes. The complexity of global business networks and its multi-faceted governance structures makes interoperability across organisations a challenging task. A core challenge is information sharing. In particular sharing of sensitive information. When sharing sensitive information among organisations via a digital network, the organisations copy the information among them resulting in several instances of the information. Thus, each party must trust other parties not to share sensitive information. Scientists, businesses and authorities seek solutions addressing technical and legal challenges involved in delivering trust, like the EU regulation on electronic identification and trust services (eIDAS) that sets out rules for electronic identification and trust services (similar to BankID in Norway). Such trustworthiness works well for many e-services. However, the shared information is still copied so it exists in multiple instances, and its use by partners often involve further use in complex information chains crossing organisational and national boundaries. Organisations face a risk that the receivers of the sensitive information distribute it without their consent, resulting in a low willingness to share sensitive information (Fawcett et. al. 2007, Prajogo and Olhager, 2012). On 31st. October 2008, the solution to the closely related double-spending problem emerged. The double-spending problem had been a major obstacle to peer-to-peer electronic cash systems. The electronic cash was the Bitcoin and the technical solution has since become known as a Blockchain (Nakamoto, 2019).

Electronic cash is electronic information, so the question was soon raised whether the solution could be used to alleviate the risks of information sharing in general in a manner that had not been possible before (Dujak and Sajter 2019; Zhao et. al., 2016). If the answer is yes, sharing of sensitive information via blockchain technology can drastically improve inter-organisational processes. Today, after substantial research on the blockchain concept, it is likely that the answer is yes: blockchain technologies have the potential to improve inter-organisational information sharing and supply chain performance (Hughes et. al. 2019). However, a commercially successful «killer application» is still missing, except for the crypto cash. Also, the blockchain technology is in its early development stages and considered an immature technology in terms of scalability and handling of a large number of transactions (Yli-Huumo et al. 2016). Regardless of the question of technical improvements and commercial success or not, from a research perspective, blockchains have great value as the technology challenge established theories and applications on information sharing and supply chain management. The blockchain technology has features that spur our thoughts on information handling in supply chains.

This PhD-course will present current research on blockchains in supply chains and offer an opportunity to discuss future applications and research on this topic. By the end of the course, you should be able to prepare a research proposal with appropriate research design, measurement and consideration of ethical issues for your research.

### Facts about the course

Study points: **5**

Responsible department: **Faculty of Logistics**

Course Leader: **Bjørn Jæger**

Lecture Semester: **Spring**

Teaching language: **English**

Duration: **½ year**

## The course is connected to the following study programs

- Philosophiae Doctor in Logistics (PhD)

## The student's learning outcomes after completing the course

Properties of blockchain technologies. How blockchain technologies can be used in supply chain applications for business-to-business operations.

## Forms of teaching and learning

Lecturing, presentation of research on blockchain applications in supply chain management, organized discussions on future applications and case studies involving blockchain technologies.

## Coursework requirements - conditions for taking the exam

30 h lectures plus student presentations and course paper. All lectures are mandatory.

## Examination

- Form of assessment: Participation & student presentation of research paper design.
- Duration: One Week
- Grading scale: Pass / Fail

## Syllabus

Introduction to blockchain applications in SCM

Fawcett, S. E., Osterhaus, P., Magnan, G. M., Brau, J. C., & McCarter, M. W. (2007). Information sharing and supply chain performance: the role of connectivity and willingness. *Supply Chain Management: An International Journal*, 12(5), 358-368.

Iansiti, M., & Lakhani, K. R. (2017). The truth about blockchain. *Harvard Business Review*, 95(1), 118-127.

Prajogo, D., & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. *International Journal of Production Economics*, 135(1), 514-522.

Zhao, J. L., Fan, S., & Yan, J. (2016). Overview of business innovations and research opportunities in blockchain and introduction to the special issue. *Financial Innovation*.

#### Introduction to blockchains

Hughes, L., Dwivedi, Y. K., Misra, S. K., Rana, N. P., Raghavan, V., & Akella, V. (2019). Blockchain research, practice and policy: Applications, benefits, limitations, emerging research themes and research agenda. *International Journal of Information Management*, 49, 114-129.

Nakamoto, S. (2019). Bitcoin: A peer-to-peer electronic cash system. Manubot.

Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where is current research on blockchain technology?—a systematic review. *PLoS one*, 11(10), e0163477.

#### Blockchain applications in SCM

Dujak, D., & Sajter, D. (2019). Blockchain applications in supply chain. In *SMART Supply Network* (pp. 21-46). Springer, Cham.

Jæger, B., Bach, T., & Pedersen, S. A. (2019, September). A Blockchain Application Supporting the Manufacturing Value Chain. In *IFIP International Conference on Advances in Production Management Systems* (pp. 466-473). Springer, Cham.

Lacity, M. C. (2018). Addressing key challenges to making enterprise blockchain applications a reality. *MIS Quarterly Executive*, 17(3), 201-222.

Tian, F. (2016, June). An agri-food supply chain traceability system for China based on RFID & blockchain technology. In *2016 13th international conference on service systems and service management (ICSSSM)* (pp. 1-6). IEEE.

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019). Making sense of blockchain technology: How will it transform supply chains? *International Journal of Production Economics*, 211, 221-236.

#### Research Methodology

Saunders, M., Lewis, P., and Thornhill, A. (2019). *Research Methods for Business Students*. Pearson Publishers.

Easterby-Smith, M., Thorpe, R., Jackson, P., and Jaspersen, L. (2018). *Management and Business Research*. Sage Publishers.

## 19.4 APPENDIX D: SAMPLE PHD SCHOLARSHIP ANNOUNCEMENTS



### Ingress

Molde University College - Specialized University in Logistics has 220 employees and 2 500 students. The University College has bachelor's- and master's studies within Health Sciences and Social Care, Logistics, Sport Management, Information Technologies, Economics, and Law and Social Sciences. In addition Ph.D. programs in Logistics and Health Sciences and Social Care are offered.

## PhD Scholarship Position in Logistics

### About the position

Molde University College announces a PhD scholarship in logistics, attached to our PhD Logistics program. We are seeking candidates with a strong background in business logistics, transportation, management science, informatics, health care logistics or other relevant areas. The position is within the field of logistics, which allows for a rich set of research topics within operations management, transportation or supply chain management.

### Qualifications

Your higher education must equate 5 years of full-time studies on top of the entry requirements for first cycle studies (bachelor's degree) in Norway. For some countries this means that you must have more than 5 years of what is called higher education in your home country. Please confer the GSU-list for relevant information pertaining to your home country: <https://www.nokut.no/en/surveys-and-databases/nokuts-country-database/GSU-list/>. Your master's degree (or equivalent) must constitute at least one full year of studies (60 ECTS), and must contain an individual piece of student work, normally a master's thesis. The minimum average grade of the master's degree should be grade B or better on the ECTS grading scale, or an equivalent average grade on other grading scales.

### We offer

The place of work is Molde, Norway. The appointment period is 3-4 years. An appointment for 4 years would include 25 % working duty (teaching, supervising or doing administrative tasks). The position will be remunerated at wage level 54 on the Norwegian State salary scale, with gross salary from NOK 479 600 a year, of which 2 % is deducted for the Norwegian State Pension Fund. A higher salary may be considered for the especially qualified candidate. The appointment will be in accordance with current Norwegian regulations concerning fixed-term jobs in the public sector and guidelines for employment as a scholarship holder at universities and university colleges.

### Application / questions

The application must be submitted via the web-portal: [www.jobbnorge.no](http://www.jobbnorge.no), where all documents should be uploaded.

Along with your application, you must submit:

- A description of your proposed research topic, maximum 5 pages. The description must give a title, an outline of the research, including research question(s), theory, research method and the novelty of the research relative to the existing academic literature. A proposal that does not meet these requirements will cause a rejection of your application.
- CV (summarising your education and work experience).
- English language certified copies of educational diplomas/certificates/transcripts that clearly indicate achieved degrees and the number of credits and grades achieved for both undergraduate and graduate studies.
- A master's thesis or equivalent independent student work. If the thesis is in a non-English or non-Scandinavian language, a certified transcript of the abstract of the thesis must be provided.
- Any other academic publications (e.g. conference papers) that the applicant wishes to be considered.
- Names, positions and e-mail addresses of three persons who can be contacted as references for academic and personal qualifications.

You may be invited to an interview either in-person or via e.g. Skype.

For further information, please contact Professor Harald Martin Hjelle ([harald.hjelle@himolde.no](mailto:harald.hjelle@himolde.no)) or Dean/Professor Svein Bråthen ([svein.brathen@himolde.no](mailto:svein.brathen@himolde.no)).

The application deadline is 15 August 2020.

Molde University College is attending the Government's "Volunteer for inclusion"-programme. We would like to include applicants with limited functional abilities or gaps in their CV. However, the qualification requirements for the position must be met.

According to the Freedom of Information Act section 25, 2nd part, the list of applicants can be made public. Requests for anonymity must be specifically justified, but cannot be guaranteed.

Jobbnorge ID: 188553, Deadline: Saturday, August 15, 2020

## Ingress

Molde University College - Specialized University in Logistics has 220 employees and 2 500 students. The University College has bachelor's- and master's studies within Health Sciences and Social Care, Logistics, Sport Management, Information Technologies, Economics, and Law and Social Sciences. In addition Ph.D. programs in Logistics and Health Sciences and Social Care are offered.

# PhD Scholarship Position in Logistics with focus on Urban Freight Distribution

## About the position

We are primarily seeking candidates with a background in transport economics, urban planning/studies, policy studies, environmental management, or similar areas. Candidates with a background in civil engineering, business logistics, geography, informatics, management science or other relevant areas are also encouraged to apply for the position. A background in quantitative methods is considered a merit. The position is related to city logistics in general, and to a Horizon 2020 project dealing with low-emission adaptive last mile logistics supporting the "on demand economy".

## Qualifications

Your higher education must equate 5 years of full-time studies on top of the entry requirements for first cycle studies (bachelor's degree) in Norway. For some countries this means that you must have more than 5 years of what is called higher education in your home country. Please confer the GSU-list for relevant information pertaining to your home country: <https://www.nokut.no/en/surveys-and-databases/nokuts-country-database/GSU-list/>. Your master's degree (or equivalent) must constitute at least one full year of studies (60 ECTS), and must contain an individual piece of student work, normally a master's thesis. The minimum average grade of the master's degree should be grade B or better on the ECTS grading scale, or an equivalent average grade on other grading scales.

## We offer

The place of work is Molde, Norway. The appointment period is 3 years. The position will be remunerated at wage level 54 on the Norwegian State salary scale, with gross salary from NOK 479 600 a year, of which 2 % is deducted for the Norwegian State Pension Fund. A higher salary may be considered for the especially qualified candidate. The appointment will be in accordance with current Norwegian regulations concerning fixed-term jobs in the public sector and guidelines for employment as a scholarship holder at universities and university colleges.

## Application / questions

The application must be submitted via the web-portal: [www.jobbnorge.no](http://www.jobbnorge.no), where all documents should be uploaded.

Along with your application, you must submit:

- A draft description of the PhD project (maximum five pages). Urban, metropolitan and peri-urban areas are experiencing a huge increase in demand for new logistics solutions that need to be compatible with "on demand economy" constraints and characteristics. Below we indicate a relevant, yet not exhaustive, list of research topics:
  - Shared, connected, automated and low-emission logistics
  - Policy-making, planning and behavioural change
  - Analysis, prioritization and combination of public/private competing interests
  - Innovative business models and regulatory schemes
  - Agile urban freight storage and last mile distribution schemes
  - Digitalization in urban freight transport
- CV (summarising your education and work experience).
- English language certified copies of educational diplomas/certificates/transcripts that clearly indicate achieved degrees and the number of credits and grades achieved for both undergraduate and graduate studies.
- A master's thesis or equivalent independent student work. If the thesis is in a non-English or non-Scandinavian language, a certified transcript of the abstract of the thesis must be provided.
- Any other academic publications (e.g. conference papers) that the applicant wishes to be considered.
- Names, positions and e-mail addresses of three persons who can be contacted as references for academic and personal qualifications.

Applicants may be invited to an interview. The evaluation of the candidates will be based on a combination of academic and personal qualifications.

The scholarship will only be awarded if admission to the MUC PhD Logistics programme is granted. For further reading about this programme visit <https://www.himolde.no/english/studies/programmes/phd-in-logistics/index.html>.

For further information, please contact Professor Lisa Hansson ([lisa.hansson@himolde.no](mailto:lisa.hansson@himolde.no)), Professor Edoardo Marcucci ([edoardo.marcucci@himolde.no](mailto:edoardo.marcucci@himolde.no)) or Dean/Professor Svein Bråthen ([svein.brathen@himolde.no](mailto:svein.brathen@himolde.no)).

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The application deadline is 15 August 2020.

Molde University College is attending the Government's "Volunteer for inclusion"-programme. We would like to include applicants with limited functional abilities or gaps in their CV. However, the qualification requirements for the position must be met.

According to the Freedom of Information Act section 25, 2nd part, the list of applicants can be made public. Requests for anonymity must be specifically justified, but cannot be guaranteed.

Jobbnorge ID: 188559, Deadline: Saturday, August 15, 2020

## 19.5 APPENDIX E: Detailed guidelines for the PhD Education in Logistics

Detailed guidelines for the PhD education in logistics on the basis of Regulations for the Philosophiae Doctor Degree (PhD) at Molde University College – Specialized University in Logistics. <sup>6</sup>

Adopted by the Doctoral Degree Committee for logistics 13 June 2014. Last revision 8 January 2020

### Section 2 Scope, content and objectives on PhD education

The PhD education in logistics normally consists of three years full-time study, and includes required coursework comprising a minimum of 45 credits.

### Section 3 Responsibility for the PhD education

The PhD education in logistics is managed by the Faculty of logistics. The programme's Doctoral Degree Committee is responsible for the admission of candidates, execution of the programme, approval of the programme curriculum and course description, and preparing detailed guidelines for the programme.

### Section 5-1 Conditions of admission and application requirements

- a. For admission to the PhD Logistics program, the applicant is required to hold a 5 year Master's degree or equivalent, in accordance with descriptions in the second cycle of the Qualifications Framework.
- b. An average ECTS-grade B or better for the second cycle modules is normally required. For applicants with other grading scales, a corresponding requirement will apply.
- c. The educational background must be relevant to the PhD Logistics program.
- d. The education belonging to the second cycle must contain an independent piece of student work. This would normally mean a Master's thesis, but other forms of independent student work may also qualify.
- e. The application for admission to the program must contain the following elements:
  - i. Certified documentation of the educational background (diplomas, transcripts of records).
  - ii. The Master's thesis, or other independent piece of student work belonging to the second cycle education, must be provided in full text. If this document is written in a non-Scandinavian or English language, a certified English language translation of the abstract must also be submitted.
  - iii. A preliminary plan for the doctoral project, including tentative formulations of the research problem or research questions, links to the existing research literature and relevant elements of theory and methodology.
  - iv. A progress plan, including a tentative course plan.
  - v. Documentation of financing in the form of, or, on par with, PhD scholarships offered by Molde University College.
  - vi. A preliminary assessment of potential issues related to intellectual property rights and ethical issues, including an assessment of the need

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<sup>6</sup> The Regulations (forskriften) are provided in full-text as an attachment

- for registration/approval by relevant bodies related to data protection regulations, ethical committees etc.
- f. The application to the program may also include:
- i. Other academic publications that you have contributed to
  - ii. A motivation letter
  - iii. Recommendations from professors, tutors or work affiliations
  - iv. A list of character references with contact details
  - v. Preferred tutor(s) for the PhD project
  - vi. Tentative plans for a research stays abroad
  - vii. If the candidate wants to write a thesis in a language other than the ones mentioned in the regulations §10-1, the application must specifically mention this.

### **Section 5-7 Involuntary termination in the event of delay or lack of progress**

Decision on involuntary termination is made by the Faculty after recommendation by the Doctoral Degree Committee.

### **Section 7-1 Appointment of academic supervisors**

The main supervisor should normally be employed at Molde University College.

### **Section 8-1 Purpose, content and scope**

The coursework for PhD in logistics must consist of at least 45 credits, 30 of which must be exam based courses, meaning that the sum of credits of conference papers and tutored self-study courses could not exceed 15 ECTS. Courses at PhD level must total a minimum of 25 ECTS.

Compulsory subjects in the course part: Philosophy of science (min. 5 ECTS)

At least 5 ECTS must be doctoral courses explicitly related to logistics, supply chain management or transport economics.

Up to 3 presentations at international conferences can be approved with 3 credits each.

Changes in the approved study plan must be approved by the Doctoral Degree Committee.

For Master's modules to be acknowledged as a part of the course plan, the candidate must have achieved a grade B or better, alternatively the grade "Passed". For PhD modules to be approved, a grade recognized as a "pass" by the institution offering the module, must be achieved.

The instruction can be given as regular lectures/seminars, partly as short concentrated courses or in other forms that are approved by the university college. In those subject areas where there are no suitable courses available, individual reading material can be approved as a part of the instruction program.

In special situations full or partial exemption can be granted if other training or research activities give the required competence and can be documented.

The PhD student normally spends at least one semester at a recognized foreign academic or research institution, where it is possible to continue the research work for the thesis. If this is not possible or desirable, an approved Norwegian institution can be selected. Other arrangements can be made to ensure that the student obtains insight into alternative research methods and different approaches to the subject.

### **Section 9-2 Midway evaluation**

A mandatory midway evaluation will be carried out within 2/3 of the stipulated study period. Guidelines and evaluation form for midway evaluation for the PhD programme in logistics are available.

### **Section 10-1 Thesis requirements**

If the thesis consists mainly of papers/articles, written for refereed journals, the candidate should normally be single author of at least one of the papers/articles in the thesis.

### **Section 14 Appointment of the evaluation committee**

When the supervisor assesses that the handling in of the thesis is 3-6 months ahead, the supervisor notifies the Doctoral Degree Committee, which appoints an evaluation committee. The Doctoral Degree Committee appoints the administrator of the evaluation committee, normally the local member.

There should not be joint publications between the main supervisor and the external members of the committee for the last five years.

An opponent can only be appointed for maximum two candidates from the same main supervisor within a five year period.

None of the suggested member can have family relations, supervision relations or joint publications with the candidate, and cannot have contributed to the thesis in any other way.

## **19.6 APPENDIX F: LIST OF EXTERNAL ATTACHMENTS SUBMITTED TO THE COMMITTEE**

- Attachment A: 3 selected PhD theses with reports of the adjudication committees
- Attachment B: Internal re-accreditation document from 2018
- Attachment C: The most recent strategy document of Molde University College
- Attachment D: Protocols of the PhD committee
- Attachment E: Regulations for PhD programmes at Molde University College (Norwegian language only: Forskrift for graden)



philosophiae doctor (ph.d.) ved Høgskolen i Molde,  
Vitenskapelig høgskole i logistikk)

# Mandate for the periodic evaluation of the PhD Logistics program

Faculty of Logistics 16 March 2020

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## 1. Introduction

Periodic evaluations (PE) of study programs is an important element in Molde University College's (MUC's) quality assurance system. The Faculty of Logistics (FL) has developed its own procedure for such evaluations, based on MUC's general strategy for educational programs. This is also made with reference to the national guidelines outlined in the Norwegian white paper on higher education («*Stortingsmelding 16, Kultur for kvalitet i høyere utdanning*»<sup>1</sup>).

The aim of the PE is to conduct a systematic review of all study programs belonging to the FL, assuring that they adhere to the demands set out in the governmental regulations pertaining to quality assurance in Norwegian higher education<sup>2</sup>. The PE should identify ways of developing the quality of the programs with focus on the needs of work-life and society in general. The PE should involve representatives from work-life, community life, students and relevant external evaluators. The dean is responsible for carrying out PEs with a maximum of 6 years intervals, and that a plan for the evaluations is developed.

All FL study programs should be at an international level, and the PE should help benchmarking the programs versus relevant foreign universities both with respect to structure and academic level.

The PEs of the FL encompass

- Study programs at Bachelor-, Master-, and PhD-level
- Full time and part time students
- One-year study programs

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<sup>1</sup>Kunnskapsdepartementet (2017). *Kultur for kvalitet i høyere utdanning* (St.meld. nr.16 (2016-2017) hentet fra <https://www.regjeringen.no/no/dokumenter/meld.-st.-16-20162017/id2536007/sec1>.

<sup>2</sup>Studiekvalitetsforskriften (2010). Forskrift om kvalitetssikring og kvalitetsutvikling i høyere utdanning og fagskoleutdanning (FOR-2019-07-11-1005).

[https://lovdata.no/dokument/SF/forskrift/2010-02-01-96/KAPITTEL\\_2#%C2%A72-1](https://lovdata.no/dokument/SF/forskrift/2010-02-01-96/KAPITTEL_2#%C2%A72-1).

The mandate contained in this document should contribute to making the PE of the PhD Logistics program efficient, useful and well aligned with the relevant guidelines and regulations.

### 1.1 The mandate of the evaluation committee (EC)

The EC will, based on the submitted information (see section 2.1), evaluate the following elements related to the PhD Logistics program:

1. The relevancy of the program vs. the needs of work-life and society
2. If the content of the program and the stated learning outcomes are up-to-date and relevant
3. If the program provides a good learning environment for the students
4. If the academic quality of the faculty and the qualifications of the tutors are relevant and meet an appropriate international level for PhD education
5. If students have a satisfactory progress and completion rate, and that the PhD theses represent independent pieces of work at a high international level

Based on an assessment of program strengths and weaknesses, the report from the EC should point to areas where the quality of the PhD Logistics program could be enhanced. The committee may make minor delimitations/expansions of the mandate if needed.

The evaluation report is due 3 months after the committee has received the necessary information and the mandate. The report should be submitted to the Faculty of Logistics.

### 1.2 The composition of the evaluation committee

The evaluation committee for this program will have the following members:

1. Two members from academic institutions with relevant PhD programs. The members should be associate or full professors. One of these external members will chair the committee.
2. One internal associate or full professor from the Faculty of Logistics.
3. One member representing the current PhD-students on the program.
4. A secretary for the committee.

The PhD Logistics committee should propose members in group 1-3 above. The Dean appoints the committee. The internal member (item 2 above) could *not* be a member of the faculty management or chair of the PhD Logistics committee. The secretary is responsible for providing necessary documentation and to compile, write and submit the final report. The secretary also ensures that all committee members sign a confidentiality agreement related to the treatment of person-sensitive information received (e.g. related to protocols of the PhD committee or assessment reports).

To make the outcome of the evaluation accessible to all student and faculty members, the evaluation report must be written in English.

## 2. Procedures and detailed guidelines for the PE

The PE is a three-stage procedure;

- Stage 1: The preparatory work of the Faculty
- Stage 2: The work of the EC
- Stage 3: The Faculty's follow-up on the recommendations

### 2.1 Preparatory work from the Faculty

The aim of the preparatory work from the Faculty is to provide the committee with the necessary documentation needed to conduct their evaluation. The information provided should contain the following elements:

- A description of the PhD Logistics program: Name, level, content and stated learning outcomes.
- Quantitative information about completion rates and student progress.
- An overview over all PhD theses defended under the PhD Logistics program.
- An overview over current students registered to the program, specified with age, gender, nationality and type of financing.
- A description of the recruitment processes related to the program, including an assessment of the recruitment base (recent number and composition of applicants to scholarships).
- A description of the qualifications of the faculty, with respect to educational level, areas of expertise, research activities and scientific publication activities.
- A description of PhD courses that have been offered under the program over the last 5 years, including course evaluation documentation and procedures.
- A description of the involved tutors, co-tutors, members of mid-term evaluation committees, and PhD committees.
- A description of the international dimensions of the program, including the international dimension in scholarly work, the involvement of international scholars/research environments in the teaching and tutoring of students, as well as the nationality of the students.
- A description of the available study aids, library resources, computer recourses and physical working environment for the PhD Logistics students.
- An overview of the student progress and completion rate.

**In addition, the following documents should be submitted to the committee:**

- Internal accreditation documentation for the PhD program

- Documentation of program evaluations
- Strategy documents for MUC and FL
- Study program and module descriptions
- Protocols of the PhD Logistics committee for the last 3 years
- Procedures related to mid-way evaluation and disputations
- Procedures related to how the quality of the external PhD modules is assessed
- An overview of changes made in order to enhance the student progress and completion rate
- A description of how the students are participating in the research groups
- Three selected PhD theses from the last 10 years of the program, with committee reports. There should be one thesis belonging to each of the main strands of the program: Optimization, SCM/OR and Transport Economics.

If the committee wants, it may request another three theses of its own selection from the last 10 years of the program, including the respective committee reports.

## 2.2 Indicative assessment criteria

The following elements constitute recommended assessment criteria and dimensions that the committee might base their evaluation on. The committee chooses freely which of these elements it wants to emphasize when assessing the five main points of the mandate identified in Section 1.1 above.

### **About the program**

- Is the name of the program appropriate? Does it communicate well with relevant audiences?
- Does information provided via MUC webpages and other information channels seem adequate and up-to-date?
- How does the profile of the program compare to other national or international PhD programs within relevant areas?
- Does the program seem relevant to the needs of work-life and society?
- How do you consider the labour market for the candidates of the program?
- How should the program develop to make sure it is up-to-date and meets the market needs?

### **Learning outcomes, learning environment and student progress**

- How would you assess the formulated learning outcomes of the program relative to the national and European qualification frameworks?
- Do the learning outcomes seem up-to-date?
- Do the teaching and tutoring activities support students in an appropriate manner towards versus the expected learning outcomes?

- Does the quality of the PhD modules offered internally seem adequate?
- Is the quality of external PhD modules well ensured?
- Does the completion rate of the program seem acceptable?
- Does student progress seem to be satisfactory?
- Has the program made any changes to enhance student progress or completion rate?

### **Research activities and support**

- Does the research produced by students of the program seem to meet established academic standards?
- Does the faculty, and do the tutors, possess the necessary capacity and competences for tutoring and teaching students within the subject areas of the program?
- Do the PhD Logistics students seem to be well integrated in the research groups and research projects of the faculty?
- Do the committees for mid-term evaluation and final evaluation of the PhD projects seem to be well qualified?

### **Organization and management of the PhD Logistics program**

- Does the PhD committee seem to focus on relevant issues?
- Does the co-operation and division of responsibility between the PhD Logistics committee and the Faculty seem to work well?
- Does the mid-way evaluation system seem to work well?
- Do the routines related to the disputations seem to work well?
- Do students seem to have sufficient opportunities to communicate potential issues with relevant bodies and actors?

### **Internationalization**

- Does the international dimension seem to be well covered within the program?
  - With respect to the contents of the program/modules?
  - With respect to the teaching, tutoring and assessment of the candidates?
  - With respect to the recruitment to the program?
- Do the arrangements pertaining to research stays abroad seem adequate?
- Are students well introduced to relevant international academic networks?



**Molde University College**  
Specialized University in Logistics

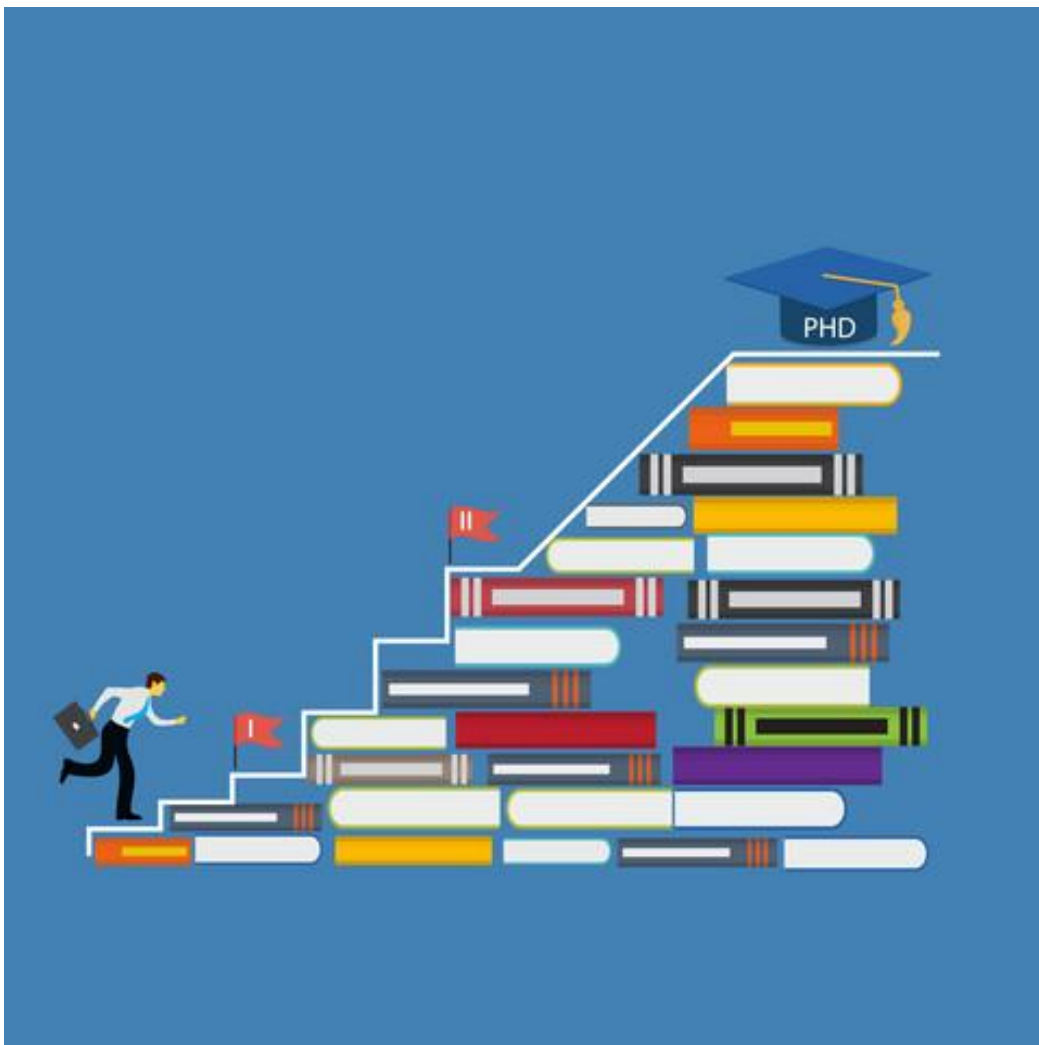
# PHD LOGISTICS

INTERNAL ACCREDITATION DOCUMENT

APPROVED BY THE PHD LOGISTICS COMMITTEE

28 MARCH 2019

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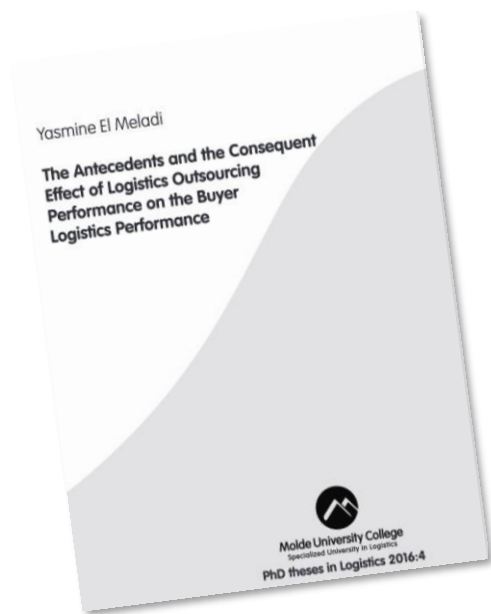
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# 1 INTRODUCTION

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This document contains a self-assessment of Molde University College's (HiMolde) PhD Logistics program, conducted in the autumn semester of 2018 as a result of an internal re-accreditation procedure. The document summarizes the development over the 16 years that the program has been running, and reviews the results and the current status of the program against a backdrop of central guidelines established by Norwegian authorities, NOKUT (the Norwegian Agency for Quality Assurance in Education) and Universities Norway (UHR). It also contains information required for internal re-accreditation processes at HiMolde.



*Figure 1 Since the first PhD Logistics degrees were obtained in 2006, almost 50 candidates have defended their thesis under this program*

The information included in this document has been collected and compiled from various internal sources by the Vera Høstmark, Bente Lindset, Ning Lin, Øivind Opdal and Harald M. Hjelle. Part of the text and some data is taken from the report of a group led by Professor Øyvind Halskau in 2013<sup>1</sup>. The document is authored by Professor Harald M. Hjelle, chair of the PhD Logistics committee, but important contributions have been given by the individual members of the PhD Logistics committee, based on a draft version circulated in mid December 2018.

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<sup>1</sup> «Logistikkutvalget 2013»

The structure of this document is as follows; after an introduction summing up the processes around accreditations, a discussion of the term “logistics”, comments on changes made to the program after the first accreditation, we move on to Section 2 where the formal input required by the HiMolde system for approval for study programs is provided. In Section 3 we provide historical information about the first 16 years of the program. In Section 4 we report on a survey conducted in November/December 2018 among former and current PhD Logistics students. Then we move on to briefly summarize accreditation requirements relevant to PhD programs in Section 5, before we sum up this self-evaluation and propose some changes to the program based on this review of the program in Section 6. Finally, several attachments are included in Section 7 providing more detail on various elements.

### 1.1 Background: three central processes in our recent history

The history of logistics at HiMolde may have started with the 2 year study program in “Transportfag” established in 1970, but a more plausible date would be the introduction of the 3rd year specialization program in “Materialadministrasjon” (“Materials management”) in 1987. In the early 1990s, the college expressed an ambition to offer higher university degrees and a 4-year “siviløkonom” study program in particular. This ambition was obstructed when the Parliament actually stopped the establishment of more such studies<sup>2</sup>. An alternative strategy had to be developed.

In the mid-1990s HiMolde had initiated a project under an EU supported programme for establishing international joint Master programs, and after 3 years HiMolde launched such a program in Logistics in co-operation with The University of Westminster (UoW) in London and Arnhem Business School in The Netherlands. The formal degree belonged to UoW, but the two other partners recruited students to the program and developed master-modules that entered into the degree. The program was launched in 1998 after a lengthy and demanding accreditation process within the UoW. Extensive documentation was prepared, which came in very handy when the newly appointed minister of higher education (Lilletun) launched a trial program for Master’s degrees in Norway with a very short application deadline. As one of three higher education institutions in Norway HiMolde was awarded the right to offer a

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<sup>2</sup> This restriction has later on been relaxed and we have now been able to offer studies qualifying for the title of “siviløkonom” for many years.

Master's degree in 1999, on a trial basis (MSc Logistics). This first process of accreditation was very short– with a minimal lead time of just a few months in the spring of 1999 and the launching of the programme in August 1999. The process leading up to this achievement, however, actually started in the early 1990s.

This *first process* and application was prepared by a dedicated group, called "Logistikkutvalget" appointed by the board. It presented its report "Prioritering av logistikk" on April 19<sup>th</sup>, 1999. Here the first idea for the second accreditation process was born – the ambition to apply for a PhD program in Logistics. At this point of time, the Ministry had launched the possibility for "regional colleges" to apply for PhD accreditation. The colleges in Stavanger, Bodø and Agder had already applied for their first PhD degrees to be accredited.

The preparation of a PhD application (*second process*) was submitted a year later (August 21<sup>st</sup>, 2000). At this point of time Norgesnettrådet was the body evaluating such applications (NOKUT was not yet born). In March 16<sup>th</sup> 2001 an international committee was appointed for the evaluation of the application, and HiMolde received the committee's recommendation October 1<sup>st</sup>, 2001. The recommendation was a "conditional yes" – saying that HiMolde could be given accreditation provided that a binding agreement was made with another higher education institution offering PhD education in areas that filled in the "gaps" that the faculty in Molde had concerning "what many would regard the most central areas of logistics".

In the following months there was an extensive communication between Norgesnettrådet and HiMolde about the interpretation of this formulation. This ended with Norgesnettrådet asking the committee to make a more precise definition of what these "central areas of logistics" were. The answer stated that "operations analysis" is central, and that beyond that it is hard to define "central areas". In March 2002 HiMolde reported that they had set up an agreement with NHH about a binding co-operation for PhD education, and that they were in the process of entering into a similar agreement with CRT in Montreal. In May 2002 the ministry informed HiMolde that it would grant HiMolde the right to offer a PhD in Logistics.

The *third process* concerns the accreditation as a Specialized University. Even though this was a lengthy process, eventually leading up to accreditation in 2009, it is not that relevant to the work of this committee, because the key issues were not so much about the definition of logistics as the previous one. The main struggle was related to the interpretation of the term "a stable PhD program" in the conditions for becoming a specialized university. As we had admitted the first students to the PhD

program in 2002, and awarded the first degrees in 2006 our program was not assessed to be "stable" by the first committee. HiMolde made a formal charge about this because recent university accreditation processes (Stavanger and Agder) had "passed" the same hurdle with PhD programs which had not yet produced a single candidate. A second committee eventually recommended to award HiMolde the Specialized university status.

## 1.2 The definition of "logistics"

Previous accreditation processes have, as noted above, led to lengthy discussions about what an appropriate definition of the term "logistics" is. This is, of course, a relevant discussion as the accrediting regulations demand a clear definition of the subject area meant to be covered by the program. The previous processes makes it clear that, although most persons would have some conception of what the term means, finding the exact, and generally accepted, definition is hard.

The original scientific committee, recommending the accreditation of the program back in 2001, stated that "*Logistics is not a classical scientific discipline with a well-defined theoretical foundation*<sup>3</sup>". As illustrated in the historical review above, the two scientific committees involved in our accreditation as a specialized university also struggled to clearly define what an exact definition of logistics should be.

Traditional definitions of logistics and supply chain management often focus on the management and optimization of the *flow* of products from raw materials to end-products. This could be exemplified by the definition of logistics provided by The Council of Supply Chain management professionals<sup>4</sup>:

*The process of planning, implementing and controlling the efficient, cost effective flow and storage of raw materials, in process inventory, finished goods, and related information from point-of-origin to point-of consumption for the purpose of conforming to customer requirements.*

or the definition of Supply Chain Management given by Martin Christopher:

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<sup>3</sup> Our translation from Norwegian

<sup>4</sup> cscmp.org

*The management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole<sup>5</sup>.*

We find it natural not only to focus on the *flow of materials and information, but also the provision of services and the flow of people*. The term “customer” needs to be interpreted in a wider sense by including users of public services (e.g. patients in a health logistics context, or transport system users). Studying the inter-action and management of different actors in a supply chain will also be key to our understanding of logistics, encompassing focus on central aspects like incentive structures, opportunistic behavior, and transaction costs.

### 1.3 Description of related study programs at HiMolde

HiMolde has currently some 500 students on programs related to logistics. These programs are

- Bachelor in Logistics and Supply Chain Management (180 ECTS)
- Bachelor in Petroleum Logistics (180 ECTS)
- Bachelor in Marine Logistics and Economics(180 ECTS)
- Bachelor in Sustainable Logistics and Circular Economics (180 ECTS)<sup>6</sup>
- MSc Logistics (120 ECTS)
- MSc Petroleum Logistics (120 ECTS)
- Experience-based Master’s program in Logistics (90 ECTS)
- PhD Logistics (180 ECTS)

With the exception of the Experience-based master’s program, all of these master’s programs would qualify for the PhD logistics program. Historically, we have recruited 45 of the 87 admitted students from our own Master’s programs (see Figure 2). This means that we have a solid recruitment base for the program, but also that our program seems attractive to students from other institutions.

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<sup>5</sup> Martin Christopher: *Logistics and Supply Chain Management*, 4<sup>th</sup> ed., Prentice Hall, 2013

<sup>6</sup> Starting up in 2019

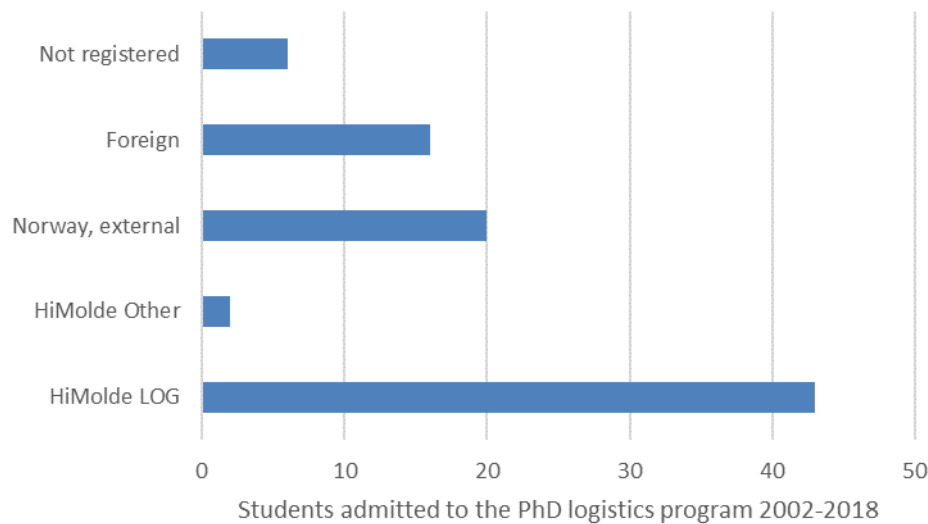


Figure 2 Recruitment base of the PhD logistics program 2002-2018

#### 1.4 Description of changes to the program since the first accreditation

The PhD Logistics program was first accredited by the Ministry of Education and Research in May 2002 (Figure 3).

The main structural change to the program is the reduction of the course part of the program from 60 ECTS to 45 ECTS. This was done as an adaption to changes in the structure and official requirements for most Norwegian doctoral programs. We have chosen *not* to lower the requirement to the minimum 30 ECTS, to make room for necessary education in the specific elements of logistics which is relevant to the individual candidate.

From the original accreditation it was stated that the course-work would comprise courses from our MSc Logistics program, reading courses and seminars provided by HiMolde staff and external courses, and this is still the arrangement. However, we have added the opportunity to attain up to 9 ECTS for approved conference presentations at academic conferences (3 ECTS per presentation). The only mandatory course in the original application was a course in the philosophy of science. Later, a course in the history of logistics has been made mandatory. The menu of elective doctoral courses provided at HiMolde has been changing over time. At the startup, the following courses were identified as courses that could be provided by HiMolde staff (full-time or part-time employees):



- Decision-making under uncertainty
- Game theory
- Advanced routing models
- Strategic pricing
- Cost-Benefit Analysis
- Supply Chain Management Theory
- Generic Product Structures

A list of courses offered over the last years is provided in section 0.



Figure 3 The original accreditation letter for the PhD Logistics program from 2002

From the above, we may conclude that very few changes has been made to the program since the original accreditation was given in 2002, except that the menu of elective PhD courses keeps changing according to the need for specialized competences among the current group of students, which courses are available at other institutions – and the areas of expertise of the faculty members.



## 2 INTERNAL RE-ACCREDITATION INPUT<sup>7</sup>

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### 2.1 About the study program

#### 2.1.1 *Name of the program*

PhD in Logistics

#### 2.1.2 *Name of the degree*

Philosophiae Doctor (PhD)

#### 2.1.3 *Justification of why the name of the program is appropriate for the program profile and level*

The name of the program indicates that the program is meant to cover all relevant research approaches and angles within logistics. The term “PhD” clearly indicates that this is a doctoral program.

#### 2.1.4 *Program level*

Doctoral

#### 2.1.5 *Workload in terms of credits*

180 ECTS

#### 2.1.6 *Planned start*

Running

#### 2.1.7 *Information about, and justification of, the admission requirements*

The admission requirements are to a large extent based on national guidelines provided by UHR. They are described in the document called [“Regulations for the Philosophiae Doctor Degree \(PhD\) at Molde University College – Specialized University in Logistics, section 5: Admission”](#):

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<sup>7</sup> This part of the document is structured according to the internal procedures described in «Mal for opprettelse av studier» KS\_STF007.doc

### **Section 5-1 Conditions of admission**

In order to be admitted to PhD education, applicants must normally have a master's degree (120 ECTS), c.f. the descriptions in the second cycle of the National Qualifications Framework, or the equivalent education within a relevant field of study. Applicants must have a strong academic record from their previous studies.

Each program may establish minimum requirements regarding weighted average grade for the education that provides the basis for admission. Molde University College may require that applicants complete specific subject courses prior to granting admission.

### **Section 5-2 Admission application**

The application should contain:

- documentation of the educational qualifications to serve as the basis of admission
- a short project description that includes scientific description of the project
- progress plan, including plan for the required coursework
- funding plan
- proposal for at least one academic supervisor
- any plans for a stay at another institution
- plans for research dissemination
- information about any restrictions on intellectual property rights that are intended to protect the rights of others
- a description of any legal or ethical issues raised by the project and how these can be addressed. The application must state whether the project is dependent on permission granted by committees on research ethics and other authorities or private individuals (research subjects, patients, parents, etc.). If possible, such permission should be obtained in writing and attached to the application.
- plan for the required coursework, including coursework targeted towards general competency in accordance with the qualifications framework

The candidate and the main academic supervisor should, as quickly as possible

and within three (3) months of admission, review the project description and assess the need for any adjustments. The project description should provide an explanation of the thematic area, research questions, and the choice of theory and methodology.

For appointment of research fellows see the regulations concerning terms and conditions of employment for research fellows, FOR 2006-01-31-102, section 1-3, paragraph 8, issued by the Ministry of Education and Research, and our own supplementary guidelines.

If the applicant considers using a language different from that which is approved according to regulation, section 10-1, an application for approval must be submitted with the project study plan.

Step-by-step practical guidelines is offered in the document called "[Admission to the PhD Degree Programme in Logistics](#)" (slightly revised here):

### **Deadline for Applications**

Applicants with their own funding can apply anytime during the academic year. Applicants with financial aid from the university college should apply as soon as possible after receiving notification that financial assistance has been granted.

### **What will be evaluated?**

Applicants appointed as a research fellow (stipendiat) by the college are automatically qualified for the doctoral degree program and only their study plan must be approved by the Doctoral Degree Committee. For all other applicants the Committee will evaluate their qualifications.

### **What should the application include?**

- Personal information in the form of a CV
- Transcripts of relevant higher education. Applicants with their own financial means must submit certified copies of transcripts. A 'stipendiat' is not required to submit certified copies of transcripts.
- A short description of the project. It should include some details about what will be done the first year; otherwise give a more general description of the project.

- Name of advisor(s). The principal advisor must be employed by the college. All advisors must have been asked and be willing to be advisors.
- List of courses that total 45 credits.
- Plan for stay abroad.
- Plan for required work (if relevant) whether it is completely or partially determined.

### **What should the list of courses include?**

The course plan may comprise elements belonging to:

1. The MSc Logistics program at HiMolde
2. Doctoral courses provided by HiMolde
3. Courses at master's or preferably doctoral level at other (foreign or Norwegian) universities
4. Presentations of papers at international academic conferences, which each will count 3 ECTS each (maximum 9 ECTS in total)
5. Tutored self-study courses.

Courses at PhD level must total a minimum of 25 ECTS and DRL002 Philosophy of Science is obligatory. At least 5 ECTS must be doctoral courses explicitly related to logistics, supply chain management or transport economics. A minimum of 30 ECTS must be exam-based courses, meaning that the sum of credits of conference papers and tutored self-study courses could not exceed 15 ECTS.

There should be a reasonable division between breadth and depth of the study, along with a reasonable number of courses at the doctoral degree level. It is acceptable to say that X number of credits will be taken during an extended stay at an institution abroad. For a study abroad the applicant must indicate what type of courses are involved. As soon as it is clear what courses the applicant plans to take, he/she must send the application to the university college for approval. Such an application will be reviewed on an ongoing basis.

Changes are always possible, e.g. the student may become aware of an external course such as the Nordic research courses. Application for changes must be sent to the college. Such applications will be reviewed on an ongoing basis.

## **Stay in a foreign country**

Study or research in a foreign country is desirable, but not required. A stay abroad can be used to take relevant courses and to obtain expertise not available at Molde University College.

## **Funding**

Admission to the program is contingent upon satisfactory funding. An applicant who is a research fellow/stipendiat within the Norwegian framework has per definition adequate funding. Equivalent funding provided by employers with a co-operation agreement with Molde University College may also be accepted as satisfactory.

The admission criteria is mainly based on the national guidelines for doctoral programs given [by UHR](#). The more detailed information offered in our local guidelines has been gradually developed and amended as we have gained experience with the program. E.g. the text pertaining to funding has been found necessary because we have a lot of interest from foreign students claiming that they will be “self financed”, but where the effect of that is low progress due to students having to seek other working opportunities to be able to support themselves. We have also amended the requirements for the composition of the course plan to secure a reasonable mix of courses. Since the recruitment base for the study program is quite wide, many students will benefit from a selection of courses offered at the Master’s level before they engage in PhD level courses. However, at least 25 ECTS credits must be at PhD level. In addition, conference presentation may count a maximum of 9 credits.

## **2.2 Involvement in Research**

The main involvement in Research is of course the student’s tutored work with their own research project. Students should have a main tutor and at least one co-tutor and will work closely with the tutors throughout their study period.

In addition to this, students should be involved in relevant other research settings, e.g. a relevant research group, where students may present their work and learn from the more experienced researchers. Preferably, tutors should also introduce the doctoral candidates to their own professional network, e.g. through the joint participation in academic conferences, or through related project work.

Students are encouraged to present their work at academic conferences and workshops.

### 2.3 Description of the faculty staff involved in the study program

Most of the associate and full professors of the Faculty of Logistics are eligible as tutors for students of this program. In addition some of the professors belonging to the Faculty of Business Administration and Social Sciences have been, and will be, involved as tutors.

Doctoral courses may be offered fully, or in part, by our own professors. A typical arrangement is that one of our own professors is the organizer of a module, and then one or more invited visiting professors also contribute to the module. Some modules are offered by visiting professors who are contracted especially for that module, - or who are employed in part-time positions.

Contributing employee	Position	Employment	Man labour-year on program-related work				Man-years in other programs	Formal pedagogical competence	Area of expertise
			Total	Teaching and Tutoring	Research	Other			
Bråthen, Svein	Professor /dean	Permanent	0,5	0,2	0,2	0,1	MSc Logistics, Bachelor SCM&Log	No	Administrative. Transport Economics
Buvik, Arnt Sture	Professor	Permanent	0,2	0,1	0,1	0	MSc Logistics, Bachelor SCM&Log	Yes	SCM
Engelseth, Per	Professor	Permanent	0,2	0,1	0,1	0	MSc Logistics, Bachelor PetLog	Yes	SCM
Emblemsvåg, Jan	Professor	Limited	0,2	0,2	0	0		?	Production engineering



Gammelsæter, Hallgeir	Professor	Permanent (dept. ØS)	0,2	0,1	0,1	0	Masters in Sport Mgmt and Social Change and Management	?	Management Science
Gribkovskaia, Irina	Professor	Permanent	0,4	0,2	0,2	0	MSc Petroleum Logistics	No	Optimization / OR
Halse, Lise L.	Associate professor	Permanent (dept. ØS)	0,4	0,2	0,2	0	Social Change and Management	Yes	Management science, engineering
Hammervoll, Trond	Professor	Limited	0,1	0,1				?	Supply Chain Management
Hansson, Lisa	Associate professor	Permanent	0,3	0	0,3	0	MSc Logistics, MSc PetLog	?	Transport Policy
Helgheim, Berit Irene	Associate professor	Permanent	0,3	0,1	0,2	0	MSc Logistics, Bachelor SCM&Log	?	Health logistics / Econometrics
Hervik, Arild	Professor	Limited	0,1	0,1				?	Economics / Econometrics
Hjelle, Harald Martin	Professor	Permanent	0,5	0,1	0,2	0,2	MSc Logistics, Bachelor SCM&Log	Yes	Administrative, Transport economics
Hoff, Arild	Professor	Permanent	0,4	0,1	0,3	0	MSc Logistics,	Yes	Optimization / OR
Holmgren, Johan	Professor	Permanent	0,4	0,1	0,3	0	MSc Logistics, Bachelor SCM&Log	Yes	Transport Economics
Hvattum, Lars Magnus	Professor	Permanent	0,3	0,2	0,1	0	MSc Logistics	Yes	Optimization / OR
Jæger, Bjørn	Associate professor	Permanent	0,4	0,2	0,2	0	MSc Logistics	Yes	IT / Information flow
Laporte, Gilbert	Professor	Limited	0,1	0,1				?	Distribution / optimization / OR
Marcucci, Edoardo	Professor	Permanent	0,6	0,2	0,4	0	MSc Logistics	?	City logistics

Molka-Danielsen, Judith Ann	Professor	Permanent	0,1	0	0,1	0	MSc Logistics	Yes	IT / AR
Larsen, Odd I.	Professor	Limited	0,2	0,1	0,1			?	Transport Economics
Odeck, James	Professor		0,1	0,1			MSc Logistics	?	Transport Economics
Olstad, Asmund	Professor	Permanent	0,5	0	0,5	0	MSc Logistics	No	OR
Oppen, Johan	Professor	Limited	0,1	0,1				?	Optimization / OR
Sandbæk, Birgithe Eckermann	Postdoctoral Fellow	Temporal	1	0,2	0,8	0		Yes	Health logistics / Econometrics
Shaton, Katerina	Postdoctoral Fellow	Temporal	1	0	1	0		No	Petroleum logistics
SUM			8,6	2,9	5,4	0,3			

Table 1 Faculty members involved in the PhD Logistics program

The 25 persons included in Table 1 are involved in the program in various ways. All of them are employed by the university. All have PhD level competences – and 19 persons are full professors.

The competences of the faculty cover the main elements of the program well, including the quantitative approaches and qualitative/management related issues. We also have specialists within application areas like petroleum logistics, health logistics, informatics and transport economics. Because PhD projects are inherently highly specialized, one could not always cover all relevant tutoring needs with full-time faculty members. This is usually resolved through the engagement of external co-tutors in relevant areas.

## 2.4 Working Life Relevancy

A doctoral program has traditionally mainly been aimed at educating researchers for academic positions within research and higher education. However, there is an increasing interest among private sector actors to hire PhD candidates as well. The PhD Logistics program aims to qualify for both these sectors, and candidates who have finished the program have found jobs both in academia and private enterprises (see a survey of post PhD jobs held by our candidates in the next section).

## 2.5 Learning outcomes

A candidate who has completed the PhD program should obtain the following learning outcomes defined in terms of knowledge, skills and general competences:

### **Knowledge**

- is at the forefront of logistics, mastering scientific theories and methods of logistics research;
- have demonstrated expert knowledge of the chosen focal area of logistics.
- can evaluate and assess various theories, methods and processes in Logistics research and in applied research and development (R&D) projects in an international perspective;
- can contribute to the development of new knowledge, new theories, and methods in Logistics.

### **Skills**

- can formulate research questions for academic research and applied research and development at a recognized international level in Logistics;
- can contribute to new knowledge in logistics through scientific research that can be published in peer-reviewed national and international scientific journals;
- can handle complexity, create an overview and synthesize established scientific knowledge and practice;
- can critically evaluate and constructively criticize scientific research in Logistics.
- is able to plan, structure and present a lecture.

### **General competencies**

- can identify relevant ethical issues and conduct research with academic integrity;
- can disseminate research and development through highly ranked national and international channels and participate in debates;
- can identify their own research in logistics within a wider research area and social context;

- can evaluate the need for renewal, and can initiate and be engaged in innovation.

## 2.6 Internationalization

The PhD Logistics program is an international program, recruiting students from all over the world. The program is an English language program, which means that all PhD courses offered are taught in English, tutoring is offered in English and normally the PhD thesis is written in English (although Scandinavian languages are also allowed). The international dimension is also secured through the fact that international guest professors are frequently involved in the teaching and tutoring of PhD students.

Students are encouraged to spend one or two semesters as visiting scholars in a collaborating university abroad. The tutors should in general introduce students to their international network of scholars, and assist students in finding relevant research environments for co-operation. Students are also encouraged to present their work at international conferences and seminars, and may receive credits for such contributions.

Finally, most students will complete one or more PhD courses offered by foreign institutions as part of their tailor-made course plan.

A significant part of the quality assurance procedures of the program is the fact that members of the adjudication committees are recruited from well renowned academic institutions all over the world (see a complete list of institutions involved in PhD Logistics adjudication committees in section 0).

## 2.7 Learning environment

Students will have their own office space with necessary IT equipment, access to relevant databases and library assistance. Students will have a well qualified tutor appointed and at least one co-tutor. The tutors will stay in touch with the students offering their advice related to the design and content of the PhD project, giving feedback on draft publications and more general guidance. The tutors should also help PhD students to find their place in relevant internal and external research environments, e.g. through membership in internal research groups and via invitations to international academic events.

Students will also participate in a number of relevant courses, and must complete these with a satisfactory result. Some of these courses will be offered at Molde University College, some will be offered by external institutions. Students will have a fixed allowance for expenses related to the participation in such courses.

## 2.8 Co-operation with external environments

In the first years of the PhD Logistics program we made agreements with external environments like CRT (now CIRRELT) in Montreal and with NHH related to the national research school for business administration. These environments have contributed to developing our program in various ways, and we still have important relationships with these environments, e.g. through adjunct professorships and contributions to our PhD modules and adjudication committees (see section 0 for a more detailed example of co-operation).

The co-operation with external research environments is more important than ever, and we have important contributions from environments relevant to all focal areas of the program. An illustration of the co-operation is the long list of research environments contributing to our adjudication committees, see section 0.

Co-supervisors for our candidates are usually recruited from external academic environments. Typically, this would be scholars who could offer specific expertise, which is complementary to the competences of the main tutor. Quite often co-supervisors also contribute as co-authors of the academic publications of the candidates. Sometimes candidates are invited to the academic institutions of the co-supervisors as visiting scholars for a few weeks or months.

Achieving external funding for PhD scholarships is another arena for co-operation. Here we have had a mix of funders from industries (e.g. Statoil) and other public entities like The Norwegian Armed Forces, Transport agencies, and from other higher education and research institutes. On top of this, scholarships funded through the Research Council of Norway are important to us.

Another important area of co-operation is in the provision of PhD logistics modules. Most of the modules offered (see section 3.2) will have contributions ranging from 20 to 100% made by professors from other research environments. An example could be given from our most recent iteration of DRL007 Cost benefit analysis:

This module was led by our own professor Johan Holmgren, who is responsible for the definition and integration of the module and the examination, in addition to 20%

of the teaching. Another 30% of the teaching is offered by other HiMolde staff and our research center. The rest of the teaching is done through contributions from scholars from Transport Analys (Sweden), Jönköping University (Sweden), Institute of Transport Economics (Norway) and the Norwegian University of Life Sciences (Norway).

At the more strategic level, we are now in a process with the Norwegian University of Science and Technology (NTNU), where a closer co-operation about our PhD programs is on the agenda.

## 2.9 Costs and financing

For the time being, HiMolde does not have guidelines explaining how costs and financing should be described, e.g. with respect to which indirect costs should be attributed to individual programs etc. We have therefore roughly outlined the annual costs of the program, partly based on cost reports for 2018 and the number of man-years estimated as belonging to the program in Table 1.

We have made a cost and financing example, which assumes 25 PhD students on the program. This is a bit higher than the current number, but should be our long-term aim. We assume that 15 of these students are financed internally (over the HiMolde general budget), 5 students are assumed to be financed through research project grants (NRC and others), and 5 students are assumed to have other financing (from other employers).

We have also assumed that three doctoral courses are held annually, and five doctoral defenses.

The example illustrated in Table 2 shows total costs in the area of 23 MNOK with such input figures. If we assume average indirect costs per man-year of NOK 320 000 (for both scholarship holders and faculty members), this adds another 10-11 MNOK, and the total costs would then amount to almost 34 MNOK. Most of this would have to be financed out of the general HiMolde budgets, but we have assumed 10 scholarships being financed from other sources, and then the university will receive some incentive money per graduated candidate. We will also benefit from the fact that the PhD students financed by HiMolde will contribute with 25% working duties. Evaluated at their salary, this could be regarded as an income above 2 MNOK – or 3 MNOK, if we also consider indirect costs. In total, this would amount to more than 16

MNOK of income, making the net costs somewhat short of 6 MNOK if we do not consider indirect costs, or some 18 MNOK if we do include such costs.

### Assumptions

Total number of PhD students		25
PhD students with MUC funding		15
PhD students with project funding		5
PhD students with other external funding		5
Salary and social costs per man-year PhD scholarship	kr	588 484
Annual allowance for travels etc. PhD students	kr	50 000
Unit grant for externally funded PhD scholarships	kr	1 095 000
Unit grant per graduated PhD student	kr	387 950
Number of defences		5
Unit cost per defence (avg. 2018)	kr	71 190
Total man-years faculty members		8
Salary and social costs per man-year faculty	kr	846 846
Number of PhD courses per year		3
Estimated unit cost per course	kr	60 000

### Estimated costs

Salary and social costs PhD students	kr	14 712 094
Annual allowance for travels etc. PhD students	kr	1 250 000
Doctoral defences	kr	355 950
Salary and social costs faculty members	kr	6 774 765
Costs PhD courses	kr	180 000
<b>Total costs excluding indirect costs</b>	<b>kr</b>	<b>23 272 809</b>

Applying a flat rate for indirect costs of 320'/man-year	kr	10 560 000
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<b>Total costs including indirect costs</b>	<b>kr</b>	<b>33 832 809</b>
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### Estimated income

Externally funded scholarships	kr	10 950 000
Incentive grant graduated PhD students	kr	1 939 750
Value of teaching duties PhD students	kr	2 206 814
Indirect costs saved for PhD students teaching	kr	1 200 000
<b>Total income</b>	<b>kr</b>	<b>16 296 564</b>

<b>Net costs excluding indirect costs</b>	<b>kr</b>	<b>5 776 245</b>
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<b>Net costs including indirect costs</b>	<b>kr</b>	<b>17 536 245</b>
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Table 2 Estimated costs and financing





# 3 HISTORICAL INFORMATION

## 2002-2018<sup>8</sup>

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### 3.1 Candidates registered to the program

A total of 87 students have been admitted to the PhD Logistics program from the start in 2002. 48 of these have successfully defended their thesis since then, 19 students are currently registered on the program as active students. The remaining 20 students have left the program at various stages without defending their thesis. Successfully completing a doctoral program is not self-evident. Some candidates have left early, e.g. due to other job offerings or because they found out that an academic career was not what they wanted. Some candidates have left at a later stage because they were not able to make the necessary progress. The statistics for each year are illustrated in Figure 4. The number of students leaving the program has been exceptionally high in 2018. This is due to a particular process this year initiated with students who had spent a long time on the program without the necessary progress.

Average net<sup>9</sup> time from start-up to submission of the thesis is 1363 days, equivalent to 3.73 years. The average time from submission to the public defence is 5 months.

18 (38%) of the new doctors from the program are Norwegian citizens. 14 other nationalities are represented, and the biggest groups come from Belarus (13%), China (8%), and Pakistan (8%). The share of Norwegian students is somewhat higher among the current PhD students registered to the program (47%).

52% of the new doctors had their financing from a scholarship provided by Molde University College. 21% had financing from the so-called Quota-program for developing countries. This possibility does no longer exist, but was typical in the early years of the program. Other funding sources are e.g. the Research Council of Norway and other universities.

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<sup>8</sup> The historical data is compiled at 15 September 2018. Any events happening after this date will not be represented in these figures.

<sup>9</sup> Time for compulsory working duties and sickness leaves are deducted.

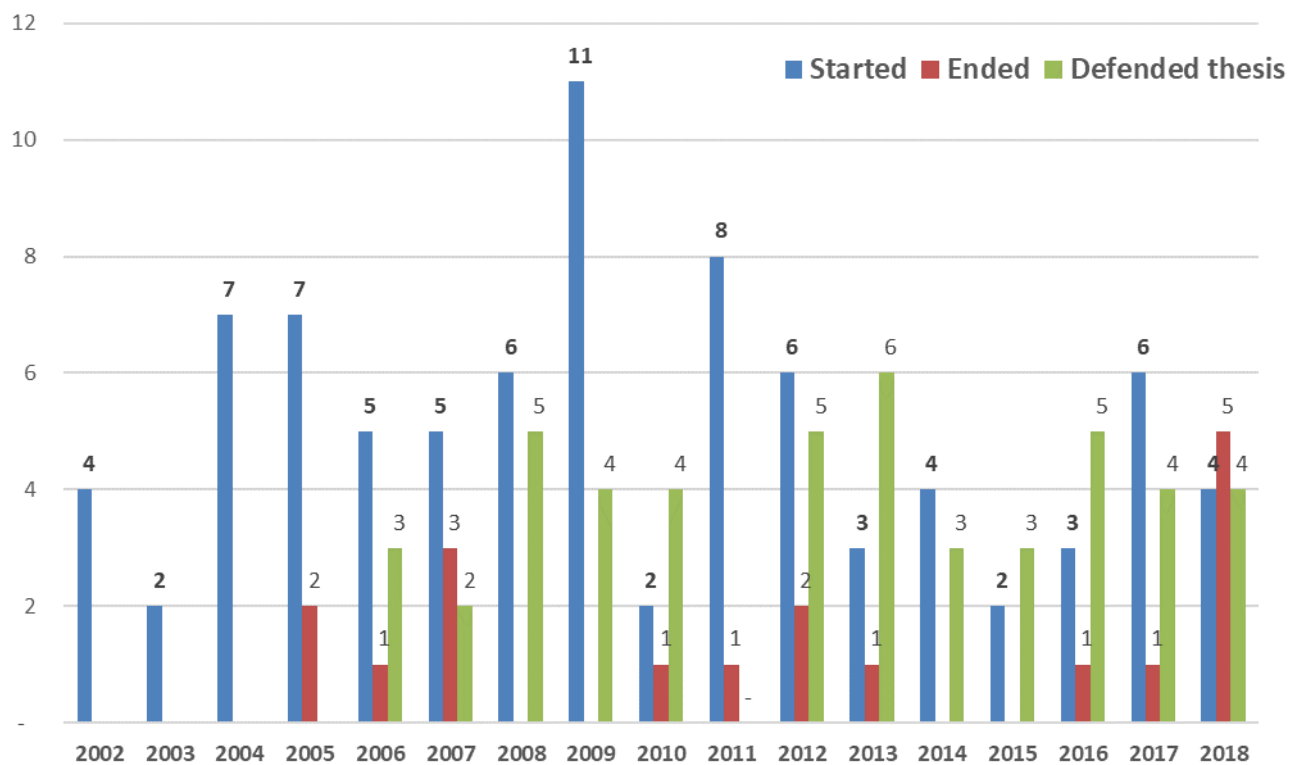


Figure 4 Candidates started, ended without finishing and successfully defended their thesis 2002-2018

### 3.2 Overview over PhD Logistics modules offered 2004-2018

NOTE: This overview may not be complete, but is compiled from various sources for the purpose of this re-accreditation. 20 different courses have been defined, and a total of 33 courses have been offered.

Students would normally compose their course-plan of some master's modules, some PhD modules and paper presentations at academic conferences. The PhD courses may be offered as part of the PhD Logistics program, or as part of other PhD programs at other institutions. Historically some 50% of the credits are offered by HiMolde and some 36% by other institutions. The remaining 14% are conference presentations (see Table 4).

Table 3 Overview of PhD courses offered by HiMolde between 2014 and 2018

Code	Title	ECTS	Runs	Responsible
DRL001	History of logistics	5	2017 2015 2013 2011 2009 2005	Lars Magnus Hvattum, Øyvind Halskau
DRL002	Philosophy of Science <sup>10</sup>	5	2011	
DRL003	Transaction cost analysis - Theory and applications in distribution channels and SCM	5	2011	Arnt Buvik
DR004	Game theory	10	2008 2007 2006	Kjetil Haugen
DRL007	Cost-benefit analysis	5	2018 2015 2013 2011 2010 2009 2006	Johan Holmgren, Svein Bråthen
DRL008	Inter-organizational issues in supply chain management	5	2004	Arnt Buvik
DRL012	Freight transportation	5	2006	Teodor Crainic
DRL013	Model solving in mathematical programming	10	2007	
DRL015	Service system design under uncertainty	2	2010	
DRL016	Production planning and scheduling	7,5	2010	
DRL017	Industrial organization	7,5	2010	
DRL018	Local distribution planning Modeling and optimization techniques for local distribution planning	5	2012	Arne Løkketangen
DRL019	Advanced Discrete-Event Simulation Modeling	7,5	2013	Irina Gribkovskaia
DRL020	Risk management	5	2014	Irina Gribkovskaia
DRL021	Academic writing	2	2015	Bjørn Jæger
DRL022	Partial Least Squares Structural Equations Modeling (PLS-SEM) Using SmartPLS	4	2016	Berit Helgheim
DRL023	How to prepare and write a PhD thesis	1	2015	Irina Gribkovskaia
DRL024	URBE – Urban freight and behavior change	5	2017	Edoardo Marcucci
DRL025	Supply chain performance measurement	5	2018	Kim Sundtoft Hald
DRL026	Applied linear regression and introduction to Stata	5	2018	Birgithe Sandbæk

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<sup>10</sup> Scandinavian students have been referred to the course offered under our joint PhD program in Health Sciences. The module is offered at Volda University College. See: <https://www.hivolda.no/studietilbod/vitenskapsteori-og-etikk-phd-emne/var> . Since this module is conducted in Norwegian, other students have taken similar courses at other institutions instead.

Table 4 Distribution of ECTS in the course part of the PhD education (historical).

Course type/institution	Per cent
Master of Sciences Subjects/Courses at HiMolde	22 %
PhD Subjects/Courses at HiMolde	28 %
External PhD Subjects/Courses	36 %
Paper Presentations at national and international Conferences	14 %

HiMolde provides some 50% of the educational part of the PhD program for their own PhD students and this share has been stable over time.

### 3.3 Doctoral defences / dissertations

All the 48 theses that have been successfully defended under the PhD Logistics program are listed in the appendix (section 7.2.) 16 (33%) of the new doctors are women and 32 (67%) men.

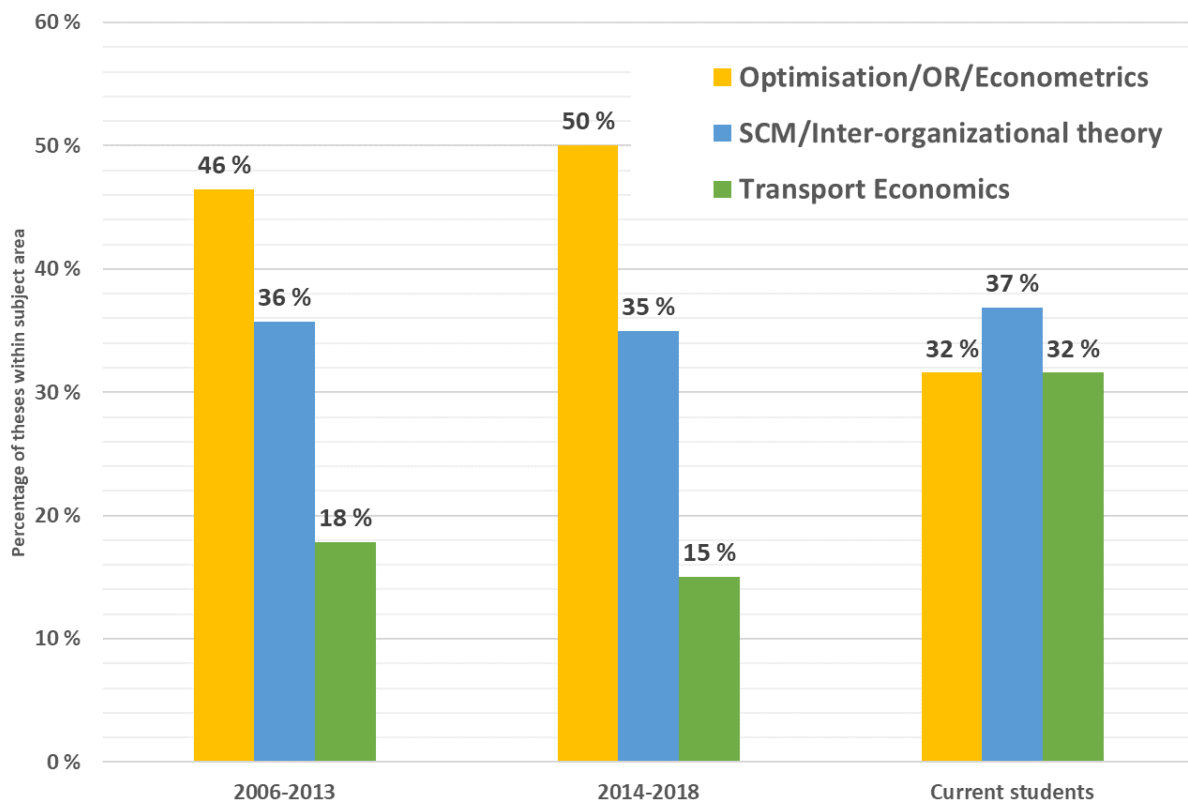


Figure 5 Percentage of theses within subject areas – developments

A broad segmentation into three different subject areas are given in Figure 5. The «Optimization/OR/Econometrics» segment has been somewhat dominant in the program up until now. The share of theses defended under the «SCM/Inter-organizational theory» segment has been stable. Among the current 19 students the share of the students within transport economic issues has increased, and is now on par with the two other segments.

### **Average progress seems better than in most Norwegian PhD programs**

In a recent report evaluating the Norwegian research schools<sup>11</sup>, NIFU found that the average completion rate after 5 years of study for programs within Business Economics and Administration was 45%, - for all programs 41.1%. The equivalent figure for our PhD Logistics program is 58.8%.<sup>12</sup> Only one of the 13 national research schools evaluated has achieved a higher number (“Climate dynamics” with 69%).

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<sup>11</sup> <https://brage.bibsys.no/xmlui/bitstream/handle/11250/2558931/NIFU-report2018-13.pdf?sequence=1&isAllowed=y>

<sup>12</sup> 40 out of the 48 who have finished, have defended their thesis within 5 years. In addition 20 students have left the program and not finished. The percentage is calculated as 40/(48+20).



# 4 SURVEY AMONG PHD LOGISTICS STUDENTS 2002-2018

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## 4.1 Introduction

The PhD Logistics program has been running for 16 years, and as far as we know, there has been no systematic survey of student experiences with the program in these years. This does not mean that student responses and contributions to various elements of the program has been missing. Many courses have had student evaluations, and PhD students have been represented in different committees over the years, as well as the PhD Logistics committee itself.

The survey reported on in this section, is based on responses given from former, and current, PhD Logistics students through a Questback survey conducted in November and December 2018. The main purpose of the survey is to get valuable input to the re-accreditation process, which may help us make necessary revisions to the program.

## 4.2 Data collection

The population has been divided into two groups: Group 1 are the former 47 PhD Log students who had already finished their degree by 1. September 2018. Group 2 are the 18 active students on the program at that time. These students started their studies between 2008 and 1 July 2018, so some have been students on the program for a long time, some have just started. 21 persons who had been registered to the program without finishing was not defined as part of the population for this survey.

The questionnaire comprised both closed and open-ended questions (see Attachment A). Some of the questions were only asked to members of Group 1. The data collection was done in the period 15 November to 8 December 2018. All 65 members of groups 1 and 2 were approached by email, requesting them to participate. One reminder was sent to the ones who did not respond to the first email.

We got 49 answers, which means a 75% response rate for the whole group together. The response rate is a bit higher for Group 2 (83%) than for Group 1 (72%).

## 4.3 Survey output and central findings

The sample comprises 15 women and 33 men. The gender mix is quite representative of the population, where the share of women has been hovering around 1/3 most of the time. 15 current students and 34 former students have given us their feedback. 31 respondents had their scholarship financed fully by HiMolde, 17 by other sources

or combinations. Among the respondents 42% is writing/wrote a thesis within “optimization, mathematics, econometrics”, 40% within supply chain management and the remaining 19 percent within transport economics. 20% have written/writes a monography and 80% a paper-based thesis.

Of the 34 respondents who had finished their degree, 2 reports that they do not have a paid job at the moment. 62% works within academia, 9% within other public sectors, and 24% works in private companies. 77% reports that their current job is “relevant” or “very relevant” to their doctoral degree. Apart from the two who do not have a paid job at the moment, the rest of the respondents (18%) reports that their job is just “moderately relevant” to the doctoral degree. 91% reports that their PhD degree has been important or very important to their career.

Among the students who have finished their degree, we asked them about how many papers, based on the thesis, was accepted before and after the defense (SP8a and SP8b). On average 2,91 papers had been accepted before the defense and 2,85 papers after the defense. This also means that on average 5,76 papers have been accepted per respondent.

**SP12a. How demanding do/did you feel that the time you have spent as a doctoral student is/was?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not demanding	3	6,1	6,1	6,1
	Slightly demanding	1	2,0	2,0	8,2
	Moderately demanding	8	16,3	16,3	24,5
	Demanding	20	40,8	40,8	65,3
	Very demanding	17	34,7	34,7	100,0
	Total	49	100,0	100,0	

From SP12a it is clear that most students find their PhD studies demanding or very demanding (76%). It may be more surprising that 3 candidates responded “not



demanding”. SP12b asked how satisfied students are/were being a PhD students. The question may not be easy to interpret, but a total of 94% answering “satisfied” or “very satisfied” must be a good thing.

**SP12b. Overall, how satisfied are/were you with being a PhD student?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	2,0	2,0	2,0
	Dissatisfied	2	4,1	4,1	6,1
	Satisfied	25	51,0	51,0	57,1
	Very satisfied	21	42,9	42,9	100,0
	Total	49	100,0	100,0	

Students were able to add textual comments to this item. Some impressions from reviewing these comments are:

- As expected, most PhD students find their situation demanding, which it should be. However, the situation may be perceived as demanding from various perspectives. Whereas the professional challenges should be demanding, there may be factors that makes the situation more demanding than necessary. Some of the comments given under this item contains suggestions for improvements. These will not be treated here, but will be added to the comments given under item 18 below.
- Most of the comments revolve around the fact that making progress is the most demanding thing, and that students may feel rather alone with this responsibility. Self-organizing is mentioned as a major challenge by many. The possibility of discussing one’s own work with fellow students is limited because the settings of the different PhD projects are so different.
- This may also regard e.g. the choice of appropriate courses and deciding upon the right methodologies and research design. The may be easier if the doctoral project is linked to a university project.
- Combining teaching responsibilities with one’s own research could also be rather demanding.

- Writing the papers, learning academic writing – and the subsequent peer-review processes is also mentioned as a major challenge by respondents. Also the feedback given from the adjudication committee may be perceived as tough/hostile and without support. These things may be demanding, both with regards to work-load, and at the psychological level.
- Generally, a heavy workload is challenging

**SP13a. How would you assess the usefulness of the tutoring you get/got from main or assisting tutors?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly useful	1	2,0	2,1	2,1
	Moderately useful	6	12,2	12,5	14,6
	Useful	16	32,7	33,3	47,9
	Very useful	25	51,0	52,1	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

Students seem generally quite satisfied with the usefulness of the tutoring as well, as 85% answer “useful” or “very useful”. Still there are 7 (15%) respondents who ticked “slightly” or “moderately” useful on this question.

Students were able to add textual comments to this item. Some impressions from reviewing these comments are:

- Most of the comments given under this item highlights positive experiences with the tutors. A few have negative experiences.
- The positive statements focus on the fact that students got thorough feedback and that the co-operation was good.

- One comment says that even though the tutors were generally competent and did their job well, they were not always able to provide more specialized guidance regarding the specific methodologies chosen for their project.
- One comment says that the main supervisor was supportive and helpful, but the co-supervisors were not.

**SP14a. How would you assess the usefulness of the doctoral courses you have participated in?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Of no use	1	2,0	2,1	2,1
	Slightly useful	2	4,1	4,3	6,4
	Moderately useful	10	20,4	21,3	27,7
	Useful	19	38,8	40,4	68,1
	Very useful	15	30,6	31,9	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

The picture is somewhat more mixed when respondents were asked to assess the usefulness of the PhD courses they had participated in (SP14a). Still, the majority (72%) ticked “useful” or “very useful”, but 13 (27%) respondents seem rather dissatisfied with the usefulness of the courses. It may be challenging to assess all courses with an average score like this, so we need to dig deeper into the comments given to interpret this item:

- Again, there is a mix of positive and negative experiences in the textual comments
- Some are satisfied with some courses, but not others

- Some highlight the fact that it is difficult to compose the mix of courses in the course plan, and that it may be difficult to find the relevant courses.
- Some ask for HiMolde to organize more PhD courses, e.g. in Supply Chain Management and Research methodologies.
- Some specific comments were given to particular courses. Especially the obligatory “History of Logistics”, which needs to be updated or dropped as a mandatory course.
- Several respondents mention the good thing about being able to choose quite freely among PhD courses offered. This makes the course-part more meaningful.

There seems to be room for improvement regarding information quality (SP15a) related to procedures and rules as only 65% rate this as “good” or “very good”. Only a few textual comments were given under this item, most of them from students who were satisfied with the information. There is a proposition to set up an “introduction program” for newly enrolled students, introducing benefits, organization structure, tax calculation etc.

**SP15a. How would you rate the quality of the information you get/got about relevant procedures and rules regarding your studies?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bad	3	6,1	6,3	6,3
	Fair	14	28,6	29,2	35,4
	Good	17	34,7	35,4	70,8
	Very good	14	28,6	29,2	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

The physical working conditions (SP16a) seem to be good as 94% rate these as “good” or “very good”. As could be expected, most of the comments given here are on a positive note. Some ask for more electronic databases. Several positive remarks about the service-mindedness of the IT support and the library were given.

**SP16a. How would you rate the quality of your physical working conditions and the access to necessary services (IT, library etc.)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fair	3	6,1	6,4	6,4
	Good	18	36,7	38,3	44,7
	Very good	26	53,1	55,3	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

There seems to be room for improvement also regarding the inclusion of PhD students among the members of the faculty (SP17a). A few (3) students disagree, and 24% are neutral. Still, 70% “agree” or “strongly agree” to feel well included.

**SP17a. I feel/felt well included among the members of the faculty**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	4,1	4,3	4,3
	Disagree	1	2,0	2,1	6,4
	Neutral	11	22,4	23,4	29,8
	Agree	21	42,9	44,7	74,5
	Strongly agree	12	24,5	25,5	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

When asking the more specific question about inclusion into a relevant research group (SP17b), the group of “agree” or “strongly agree” drops a little bit, compared to the general question above. 64% feel well included in a research group.

**SP17b. I feel/felt well included in a relevant research group**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2,0	2,1	2,1
	Disagree	4	8,2	8,5	10,6
	Neutral	12	24,5	25,5	36,2
	Agree	10	20,4	21,3	57,4
	Strongly agree	20	40,8	42,6	100,0
	Total	47	95,9	100,0	
Missing	System	2	4,1		
Total		49	100,0		

Question 17c was about inclusion into the group of doctoral students. Here, 83% seems to feel well included in the group. Only a few textual comments were given under item 17. Some state that the inclusion into relevant groups is up to the students themselves, as they would mainly feel welcome – also in social settings like lunchtime. However, especially non-Scandinavian students may feel that there is a language barriers in such settings. One respondent claims that the faculty is subdivided into conflicting “clans” with makes things complicated. Some say that they do not want to belong to a research group, or that there are no relevant group for them.

**SP17c. I feel/felt well included among the doctoral students**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	6,1	6,3	6,3
	Neutral	5	10,2	10,4	16,7
	Agree	23	46,9	47,9	64,6
	Strongly agree	17	34,7	35,4	100,0
	Total	48	98,0	100,0	
Missing	System	1	2,0		
Total		49	100,0		

As a final question (SP18), we asked about further suggestions and comments given for improving the PhD Logistics program, and we got quite a lot of propositions. Below, we have also added a few of the comments given under other items regarding this:

1. Suggestions for introductions, seminars, information and PhD courses:
  - Seminar on academic writing, publishing and presentations at the start
  - Setting up an introduction program for new students, especially for international students
  - Offering more PhD courses on campus
  - History of Logistics needs a facelift, or should be dropped as obligatory

- A solid introductory course on Logistics should be taken by all PhD students
  - An annual internal gathering of PhD students, supervisors and PhD committee participated. Organized as a mini-conference, where also students are reviewers.
  - There should be a compulsory course in Research design
  - Organize an obligatory seminar on pedagogy
  - HiMolde should set up courses in research methodologies, especially in SEM (the respondent probably refers to Structural Equation Modeling)
2. **Better access to library sources.** What we have is not enough, and it is too time-consuming to have things ordered.
  3. One comment addresses a need for **clear ethical guidelines for tutors** regarding the writing of articles and workload. It is not quite clear what the respondent asks for here, but maybe this is partially related to work distribution and co-authorship? The same respondent calls for a possibility to report on potential issues with regard to supervision anonymously.
  4. One respondent reports that many students felt lonely and that it would be good to **help students develop their social skills and create networks.**
  5. New PhD students should get an appointed mentor among existing PhD students
  6. **Insisting on social interaction** between PhD students to reduce stress and loneliness. Also bring Norwegian and international students together.
  7. HiMolde should help graduates find a proper job.
  8. Improve the interaction with industries, companies and public and private organizations.
  9. Set up informal meetings where senior faculty members discuss problems they are working on.
  10. HiMolde should develop more big projects, where several PhD scholars could work together.
  11. The process of **getting financing for staying abroad** needs to be clarified.
  12. **Set up a Canvas room for PhD students** (list of courses, seminars, conferences, list of employees with their listed expertise, available software, recommended literature, platform for communication between students)
  13. Degree certificates should be in English
  14. Increase control of study progress



The input from this survey will be very helpful in the current internal re-accreditation process of the PhD logistics program. The response rate, both among existing and previous students is high, which gives us reliable feedback. The general impression is that most students are quite satisfied with the program and the way things are organized. There are, of course, different experiences, also on the negative side. Based on the feedback we will make some propositions for changes in the final part of this document. Some of the natural action points will pertain to the design of the program and some are more aimed at administrative procedures etc.



# 5 ACCREDITATION REQUIREMENTS FOR NORWEGIAN PHD-PROGRAMS

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Two Norwegian language documents are very relevant for the accreditation of Norwegian PhD programs:

- [NOKUT: Veiledning om akkreditering av studietilbud. Veiledning til institusjoner som søker NOKUT om akkreditering. Mai 2017.](#)
- [UHR \(Universitets- og Høgskolerådet\): Veiledende retningslinjer for gradene philosophiae doctor \(ph.d\) og philosophiae doctor \(ph.d\) i kunstnerisk utviklingsarbeid. Godkjent av UHRs styre 9.4.2018.](#)

These are documents of 44 and 17 pages respectively, and we could not include all elements here, but we will briefly review a few key aspects:

## **From the NOKUT guide for accreditation (informal translation from Norwegian):**

- For PhD programs it must be clear which academic areas the program encompasses
- All study programs should have arrangements for student exchange
- The research environment (faculty) must possess the necessary breadth and depth within all essential areas of the study program and be stable
- The research environment (faculty) must prove a high level of competence, including publications at a high international level, and results from co-operation with other research environments nationally and internationally
- The institution must prove that it can accommodate at least 15 PhD candidates in the program
- (In the previous version it was stated that the faculty had to comprise at least 8 man-years with PhD competences and 4 with full professor competence)
- The institution is responsible for ensuring that faculty members have a relevant pedagogical competence
- The PhD program must have a clear definition of who is responsible for the quality of the program
- At least 50% of the man-years attached to the program should be persons with their main affiliation to the institution

### From the UHR guidelines for PhD programs (informal translation from Norwegian):

- PhD programs should qualify for scientific research at an international level according to good academic principles and ethical standards
- The workload should be equal to 3 years of full-time studies and include course-work equivalent to at least 30 ECTS.
- The main component should be an independent piece of research or research and development conducted under active guidance
- The institution and tutors should ensure that the candidate participates actively in the research environment
- At least one of the tutors should have prior experience as tutors at PhD level
- The candidate and tutors should have regular contact. The frequency of contacts should be included in the annual report of progress.
- The institution is responsible for making the course-work part being at a high international level. Training in presenting results and an introduction in ethics, theory and methodologies should be part of this. The training should play a part in achieving the learning outcomes outlined in “det nasjonale kvalifikasjonsrammeverket”.
- The institution should offer the candidate guidance about future job opportunities within and outside academia.
- If the institution does not offer all the courses itself, it must facilitate the opportunity for the candidate to receive equivalent training at other institutions.
- Both the tutor and the candidate are responsible for annual progress reports
- A mid-term evaluation should normally be done in the 3<sup>rd</sup> or 4<sup>th</sup> semester

NOKUT has recently carried out inspections of the quality assurance work in two very relevant institutions for HiMolde, namely NHH and BI. The overall results of these inspections are that NHH “passed” and BI did not pass. In both cases PhD programs were part of the inspection. We have briefly reviewed these reports and found that the most interesting findings related to the PhD programs could be found in the NHH case. The recommendations for improvements here addressed i.a. the following items:

- Course evaluations of PhD courses were not conducted as systematically as for lower level courses
- The institution should establish a systematic education of PhD tutors

One of the main reasons why NHH passed the evaluation was that quality assurance procedures seemed to be well known among persons at various levels, which did not seem to be the case for BI. NHH also received credit for a systematic program evaluation every 5 years and the fact that they conducted surveys among PhD students every 3 years.



# 6 SELF-EVALUATION AND RECOMMENDATIONS FOR THE FURTHER DEVELOPMENT OF THE PROGRAM

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## 6.1 Self-evaluation versus central accreditation requirements

Based on the review of the historical developments and outputs from the PhD Logistics program, the survey among former and current students, and the accreditation requirements, the following observations could be made:

1. **Activity level.** The program has produced almost 50 candidates who have successfully defended their thesis between 2006 and 2018. The number of candidates registered to the program has been around 20. The typical output of candidates per year has varied considerably (between 0 and 6). An average output has been 3-4 candidates per year. This means that the number of students has been high enough related to the required 15. However, for the accreditation as a specialized university, the requirement may be some 25 students on the program.
2. **Recruitment to the program.** The recruitment to the program has generally been good, with a balanced mix of Norwegian and foreign students, and also a good supply of candidates from our own Master's programs in logistics.
3. **The qualifications of the faculty** has grown significantly since the program originally was accredited. We now have 3-4 times as many full professors linked to the program as at the time of the original accreditation. The publication record for relevant members of the Faculty is also much stronger now, with publication frequencies on par with, or above relevant benchmarks.
4. **The menu of PhD courses offered by HiMolde** will typically not be sufficient for completing an optimal course plan for most students. We have on average offered 2-3 courses per year. One of the two mandatory courses, "The philosophy of science", has normally not been provided by HiMolde, but for students who could handle a Norwegian language program, a relevant substitute course is offered under our joint PhD program in Health Science. This course encompasses also the necessary elements also pertaining to research ethics.

5. **Students seems generally satisfied with the program.** The output from our recent survey among former and current students generally gave a positive impression, but it also gave us valuable tips for improvements – some of these are contained in the action points suggested below.

## 6.2 Suggested action points for consideration

1. We should carefully re-consider the course-part of the program, addressing the following items:
  - a. Which courses should be considered obligatory (if any)?
  - b. If we want to keep the “History of Logistics” course, it should be re-designed. If we choose to drop it, should it be replaced by another basic logistics course? Maybe some semi-obligatory ones (“either this or that”)
  - c. We should consider running the “Philosophy of Science” course at HiMolde, making sure the course also includes necessary elements related to research ethics and possibly procedures for handling sensitive data (this may, as an alternative, be included in a course in separate course in research methodology instead)
  - d. We should consider a requirement to include at least one course related to specific research methodology
  - e. Which/how many voluntary courses should we plan for per year? Historically, we have offered 2-3 such courses per year.
  - f. We should maintain a high proportion of “electives” – several respondents have highlighted this a very positive element of the program, ensuring that the course plan is relevant – and also allowing students to network internationally at external courses.
2. We should **consider transforming our current PhD seminars into a one-day conference** (possibly with several parallel tracks) where students also act as reviewers of each other’s papers. Maybe, also adding a social “conference dinner” at the end for networking. All tutors and PhD Committee members should also take part in this conference.
3. We should consider establishing a **“buddy” system**, where new PhD students get an appointed buddy from students in their 2<sup>nd</sup> or 3<sup>rd</sup> year. An **introduction program** should be developed, enabling the buddy to quickly introduce the new student to formal and informal aspects of being a PhD student at HiMolde.
4. HiMolde needs to have a high focus on securing the **necessary access to academic databases**, especially now that there is a potential conflict with Elsevier.
5. **Guidelines for tutors should be developed**, highlighting their main responsibilities and ethical guidelines, principles for co-authorship, ways of helping PhD candidates to network internally and externally. We should also provide a training program for tutors.
6. **The annual progress reports** should contain reporting of the frequency and extent of contact between the tutors and the candidates.



7. **We should offer PhD students information about career opportunities** both within and outside academia. Maybe this could be added to the Canvas room for PhD students.



# 7 ATTACHMENTS

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## 7.1 Attachment A: Study plan according to HiMolde template

### 7.1.1 *Program content*

Logistics deals with the organization of the flow of products, services and information from raw materials to the end user in a supply chain. The analysis of such supply chains may be built on a broad spectrum of academic disciplines, such as economics, business administration, industrial organization, engineering, management science, information science and computer science. Quantitative techniques and models based on mathematics, statistics, engineering, and operations research are also useful tools in such analyses.

The PhD logistics program is organized as a three year full-time program, or – if the candidate has 25% work-load related to e.g. teaching and tutoring, - a four year program.

The main part of the program is related to the doctoral project, which is defined on an individual bases where the candidate pursues a given research task under guidance from well qualified tutors. The project is defined as part of the admission procedure, and the project plan must be approved by the PhD Logistics committee. The end product of the research project is the doctoral thesis, which may be in the form of a scientific monography or a collection of academic papers of a quality that would make them acceptable for publication in peer-reviewed academic journals.

The candidate must also complete courses according to an approved course plan, comprising a total workload equivalent to 45 ECTS. One PhD module is compulsory, DRL002 Philosophy of Science. In addition at least 5 ECTS must be PhD courses with an explicit content related to logistics, supply chain management or transport economics. The remaining 35 credits may comprise a mix of PhD courses offered under the PhD Logistics program, approved PhD courses from other institutions, a limited number of Master's modules and approved presentations at international conferences.

### 7.1.2 *Why choose this program?*

The overall purpose of the program is to give the student a deepened and broadened theoretical and methodological knowledge, alongside the experience of having completed a substantial piece of original scientific work.

### 7.1.3 *Learning outcomes*

A candidate who has completed the PhD program should obtain the following learning outcomes defined in terms of knowledge, skills and general competences:

#### **Knowledge**

- is at the forefront of logistics, mastering scientific theories and methods of logistics research;
- have demonstrated expert knowledge of the chosen focal area of logistics.
- can evaluate and assess various theories, methods and processes in Logistics research and in applied research and development (R&D) projects in an international perspective;
- can contribute to the development of new knowledge, new theories, and methods in Logistics.

#### **Skills**

- can formulate research questions for academic research and applied research and development at a recognized international level in Logistics;
- can contribute to new knowledge in logistics through scientific research that can be published in peer-reviewed national and international scientific journals;
- can handle complexity, create an overview and synthesize established scientific knowledge and practice;
- can critically evaluate and constructively criticize scientific research in Logistics.
- is able to plan, structure and present a lecture.

#### **General competencies**

- can identify relevant ethical issues and conduct research with academic integrity;

- can disseminate research and development through highly ranked national and international channels and participate in debates;
- can identify their own research in logistics within a wider research area and social context;
- can evaluate the need for renewal, and can initiate and be engaged in innovation.

#### 7.1.4 Admission

To be eligible for admittance, one must have an excellent academic record with at least a five-year master-level degree in a relevant field, or equivalent educational qualifications. For applicants with a Norwegian background, an average mark B from the master-level study is needed, for international applicants an equivalent level would be required. The application must also comprise a good plan for the research project, and a course plan. For further details, read the detailed rules governing the program.

#### **Financial requirements**

There is no tuition fee at Molde University College (HiMolde). However, you need to be able to support yourself financially. Normally, this means applying for a PhD scholarship provided by HiMolde, The Research Council of Norway or other Norwegian scholarship providers. Scholarships provided by the college are advertised on the university college's web-pages and the portal [www.jobbnorge.no](http://www.jobbnorge.no) whenever they become available.

Applicants with funding from employers/funders abroad may be accepted only if HiMolde has made a special agreement with that employer/funder. The doctoral committee will only evaluate applications for admission to the program if access to one of the funding schemes mentioned above can be documented by the applicant.

Provided financing is in order, candidates may submit an application for admittance to the program. This application should describe the doctoral project in terms of topic chosen, tentative research questions and preliminary ideas for the methodological approach. The application must also contain a proposed course-plan. It is recommended that the applicant locates a member of the academic staff of HiMolde who is interested in the topic, qualified as a supervisor, and willing to help developing the project and application for admittance. The Doctoral Committee at HiMolde will make the final decision about accepting applicants as

doctoral students. Applicants who have already been through the application procedure for a scholarship from HiMolde, much of this would already have been done in that process.

Read more about the [application process](#) here.

### 7.1.5 Program structure

#### **Study information**

The doctoral program at HiMolde is a three-year full-time program leading to a doctoral degree (PhD) in Logistics. If you have 25% working duties, the planned duration of the program is extended to four years.

The conferral of the doctoral degree in Logistics signifies that the candidate has attained expert competence in a major field of study. You will normally have one supervisor at HiMolde, plus one or more co-supervisors from other institutions. Suggesting co-supervisors is the duty of your main supervisor, and the Doctoral Degree Committee must approve them.

When you are approximately half-way through your doctoral program period (within 2/3 of the stipulated study period), you will have to pass a midway evaluation process, where two evaluators (one internal and one external) will give you feedback and advice on your progression. The evaluators may also make recommendations to your tutors and the university if any adjustments should be made.

About half a year before you plan to complete your degree, you will give a public presentation. If this presentation is approved, your adjudication committee will be appointed. The committee has three members, including one member from HiMolde and at least one international member. The committee has two major duties: To evaluate if your thesis is accepted for its final defense, and to evaluate your trial lecture and public defense.

#### **Content and structure of the program**

The general structure is as follows: The total workload of the program is 180 ECTS. 45 ECTS is allocated to the course plan, and the rest to the thesis work. There is one obligatory course: DRL002 Philosophy of Science (5 ECTS). Holders of Norwegian

scholarships will in addition normally have one year workload of required duties for HiMolde. Doctoral students may spend one or two semesters abroad, for both courses and thesis work.

In co-operation with the supervisor, candidates should propose a list of suggested courses to the Doctoral Degree Committee. The composition of the list should take into account both the suggested topic for the thesis and the background of the candidate. For example, if the candidate does not have a solid background in logistics, the course plan should contain a necessary amount of courses in logistics. In addition, The Doctoral Degree Committee may require that the candidate takes courses without credit if this is necessary to bring the candidate up to an acceptable level for starting the doctoral study.

The course plan may comprise elements belonging to:

6. The MSc Logistics program at HiMolde
7. Doctoral courses provided by HiMolde
8. Courses at master's or preferably doctoral level at other (foreign or Norwegian) universities
9. Presentations of papers at international academic conferences, which each will count 3 ECTS each (maximum 9 ECTS in total)
10. Tutored self-study courses.

Courses at PhD level must total a minimum of 25 ECTS and DRL002 Philosophy of Science is obligatory. At least 5 ECTS must be doctoral courses explicitly related to logistics, supply chain management or transport economics. A minimum of 30 ECTS must be exam-based courses, meaning that the sum of credits of conference papers and tutored self-study courses could not exceed 15 ECTS.

## **Obligatory PhD Courses**

### **DRL002 Philosophy of science (5 ECTS)**

This course is given in Norwegian by Volda University College, see:

<https://www.hivolda.no/studietilbod/vitenskapsteori-og-etikk-phd-emne/var> . You may choose a similar course from other institutions, but these must be approved as substitutes by the PhD Logistics committee.

## **Elective courses**

Courses listed in section 3.2 in the accreditation document, have been defined and run as electives under the PhD Logistics program. Such courses, and courses yet to be defined, will be offered at HiMolde at irregular intervals. Please find more information about scheduled PhD courses here:

<https://www.himolde.no/english/studies/programmes/phd-in-logistics/ph.d-courses/>



## 7.2 Attachment B: List of PhD Logistics dissertations 2006-2018

- Bella B. Nujen: The global shift-back: backshoring from a knowledge perspective Supply Chain Management in Professional Football (PhD theses in logistics 2018:4)
- Birnir Egilsson: Supply Chain Management in Professional Football (PhD theses in logistics 2018:3)
- Sergei Teryokhin: Inter-organizational information systems (IOS) in buyer-seller relationships: transaction costs and coordination perspectives (PhD theses in logistics 2018:2)
- Eivind Tveter: Four essays on the wider economic benefits of transport improvements (PhD theses in logistics 2018:1)
- Yury Redutskiy: Strategic planning problems for smart solutions in oil and gas industry (PhD theses in logistics 2017:4)
- Yusta Wilson Simwita: Improving healthcare processes: An empirical study based on orthopaedic care processes (PhD theses in logistics 2017:3)
- Katerina Shaton: Essays on upstream gas transport infrastructure planning and appraisal (PhD theses in logistics 2017:2)
- Brice Assimizele: Models and algorithms for optimal dynamic allocation of patrol tugs to oil tankers along the northern Norwegian coast (PhD theses in logistics 2017:1)
- Renger Philemon Kanani: The effect of processor control on screening transaction costs in farmer–food processor relationships: An investigation of antecedents and contingency factors (PhD theses in logistics 2016:5)
- Yasmine Mohamed El Meladi: The antecedents and the consequent effect of logistics outsourcing performance on the buyer logistics performance: An empirical study of textile and clothing exporting companies in Egypt (PhD theses in logistics 2016:4)
- Birgithe Eckermann Sandbæk: Essays on factors influencing operating room efficiency (PhD theses in logistics 2016:3)
- Jorge Luis Oyola Mendoza: Essays on stochastic and multi-objective capacitated vehicle routing problems (PhD theses in logistics 2016:2)
- Uladzimir Rubasheuski: Models and algorithms for coordinated lot-sizing and joint replenishment (PhD theses in logistics 2016:1)
- Ellen Karoline Norlund: Green transportation planning in offshore supply (PhD theses in logistics 2015:3)

- Dirk van Eikenhorst: Capacitated lot sizing problem with sequence dependent setups without setup carry-over (PhD theses in logistics 2015:2)
- Urooj Pasha: Solution methods for fleet composition and routing problems (PhD theses in logistics 2015:1)
- Lise Lillebrygfjeld Halse: Walking the path of change: globalization of the maritime cluster in North West Norway (PhD theses in logistics 2014:3)
- Gladness Ladislaus Salema: The antecedents of supplier logistics performance: an empirical study of the essential medicines supply in Tanzania (PhD theses in logistics 2014:2)
- Muhammad Omer Chaudhry: An assessment of linkages between investment in transport infrastructure and economic development (PhD theses in logistics 2014:1)
- Nils Egil Søvde: Optimization of terrain transportation problems in forestry (PhD theses in logistics 2013:6)
- Hans Petter Iversen: Logistikkferinger i psykiatri og psykisk helsearbeid: Om forståelse, organisering og ledelse av relasjoner i en profesjonell organisasjon i omstilling (PhD theses in logistics 2013:5)
- Trond Bottolfsen: The impact of internal, customer and supplier integration on store performance (PhD theses in logistics 2013:4)
- Halvor Schøyen: Identifying efficiency potentials in maritime logistics: Investigations from container and bulk trades (PhD theses in logistics 2013:3)
- Jianyong Jin: Cooperative parallel metaheuristics for large scale vehicle routing problems (PhD theses in logistics 2013:2)
- Uttam Kumar Regmi: Essays on air transport marketing and economics (PhD theses in logistics 2013:1)
- Richard Glavee-Geo: The antecedents and consequences of supplier satisfaction in agro-commodity value chain: an empirical study of smallholder cocoa growers of Ghana (PhD theses in logistics 2012:5)
- Guillaume Lanquepin: Algorithms for dynamic pricing and lot sizing (PhD theses in logistics 2012:4)
- Feifei Qin: Essays on efficient operational strategy of urban rail transit (PhD theses in logistics 2012:3)
- Fubin Qian: Passenger risk minimization in helicopter transportation for the offshore petroleum industry (PhD theses in logistics 2012:2)
- Ola Bø: Aspects of production tracking systems in the supply network for caught seafood (PhD theses in logistics 2012:1)

- Xu, Yue: Competition and cooperation: a game theoretic analysis on the development of Norwegian continental shelf (PhD theses in logistics 2010:4)
- Aliaksandr Shyshou: Vessel planning in offshore oil and gas operations (PhD theses in logistics 2010:3)
- Biju K. Thapalia: Stochastic single-commodity network design (PhD theses in logistics 2010:2)
- Krystsina Bakhrankova: Production planning in continuous process industries: theoretical and optimization issues (PhD theses in logistics 2010:1)
- Bharat P. Bhatta: Discrete choice analysis with emphasis on problems of network-based level of service attributes in travel demand modeling (PhD theses in logistics 2009:4)
- Umar Burki: Cross cultural effects on the relational governance of buyer-supplier relationships: an empirical study of the textile exporting firms of Pakistan (PhD theses in logistics 2009:3)
- Hajnalka Vaagen: Assortment planning under uncertainty (PhD theses in logistics 2009:2)
- Naima Saeed: Competition and cooperation among container terminals in Pakistan: with emphasis on game theoretical analysis (PhD theses in logistics 2009:1)
- Ole Holte Sandvik: Essays on buyer-seller relationships and risk in supply chain management (PhD theses in logistics 2008:5)
- Bernt E. Tysseland: System supportability and life cycle cost based decisions (PhD theses in logistics 2008:4)
- Bjørnar Aas: Upstream logistics in offshore petroleum production (PhD theses in logistics 2008:3)
- Frederick Mwakibinga: Public sector procurement in Tanzania: an analysis of rule compliance antecedents (PhD theses in logistics 2008:2)
- Johan Oppen: Models and solutions for rich transportation problems (PhD theses in logistics 2008:1)
- Lars Magnus Hvattum: Heuristics for stochastic vehicle and inventory routing problems (PhD theses in logistics 2007:2)
- Gøril Hannås: Vertical electronic coordination and specific IT investments in business-to-business relationships (PhD theses in logistics 2007:1)
- Arild Hoff: Heuristics for rich vehicle routing problems (PhD theses in logistics 2006:3)

- Arnt Gunnar Lium: Stochastic service network design (PhD theses in logistics 2006:2)
- Berit Helgheim: Production processes in health care (PhD theses in logistics 2006:1)

### 7.3 Attachment C: List of institutions represented in PhD Logistics adjudication committees 2006-2018

- Aarhus University, Department of Economics and Business
- BI Norwegian Business School
- Bodø Graduate School of Business
- Bournemouth University
- Center for innovation, Faculty of Engineering, Bergen University College
- Civil and Environmental Engineering Department, University of California
- CRT, Centre de recherche sur les transports, Université de Montréal
- Departamento de Gestão, Escola de Economia e Gestão, Universidade do Minho
- Department of Air Transport, Cranfield University
- Department of Commerce, Finance and shipping, Faculty of Management and Economics, Cyprus University of Technology
- Department of Management, Colorado State University
- Department of Marketing and e-Business, College of Business and Economics, Towson University
- Department of Statistics and Operations Research, Faculty of Mathematics, University of Valencia
- Department of Statistics and Optimization, Institute of Mathematics, Faculty of Mechanical Engineering, Brno University of Technology
- Department of transportation and logistics, Chalmers University of Technology
- Dpt. Of Operations and Innovation management, Research group on Business Network Dynamics, ESADE Business School, Universitat Ramon
- DTU Institut for Transport, Denmark University of Technology
- Edifício ISCTE
- Edinburgh Napier University
- Erasmus University Rotterdam, Institute of Health Policy and Management
- Facultés Universitaires Notre-Dame de la Paix
- Faculty of marine technology and operations, Norwegian University of Science and Technology (NTNU)
- Faculty of Technology, Policy and Management, TU Delft
- Florida Atlantic University
- Gothenburg University
- HANKEN - Swedish School of Economics and Business Administration

- Harstad University College
- Henley Business School, University of Reading
- HSB City University of Applied Sciences
- Institut Charles Delaunay University of Troyes
- Institute of Transport Economics, Oslo
- Institutt for atferdsfag, Oslo and Akershus University College
- Institutt for strategi og logistikk, Handelshøgskolen BI
- International Business Management and Marketing, The University of Alabama
- IVL Swedish Environmental Research Institute
- Jernbaneverket
- Jönköping International Business School
- Jönköping Universitet
- Karlsruhe University of Applied Sciences, Faculty of Computer Science and Business Information Systems
- LAGIS, École Centrale Lille Cite Scientifique
- Leeds School of Business
- Leeds University, Institute of transport studies
- Linköping University, Department of Science and Technology
- Liverpool John Moores University
- London School of Economics
- Malmö University
- Massey University, School of Management, Massey Business school, Albany Campus
- Nasjonalt kunnskapssenter for helsetjenesten
- NHH – Norwegian School of Economics
- NTNU, Department of industrial economics and technology management
- NTNU, Faculty of Engineering Science and Technology
- NTNU, Institutt for industriell økonomi
- NTNU, Institutt for maskinteknikk og produksjon
- Operations and Information Management, The Wharton School
- School of architecture and the built environment, University of Westminster
- School of Economic Studies, University of Manchester
- School of Economics, Keynes College, University of Kent
- School of Hotel Administration, Cornell University
- SINTEF ICT, Applied Mathematics

- SINTEF Teknologi og Samfunn, Avd: Transportforskning
- Southampton Business School, University of Southampton
- Stewart School of Industrial & Systems Engineering, Georgia Institute of Technology
- Trafikanalys, Sweden
- United Institute of Informatics Problems, National Academy of Sciences of Belarus
- Universidad Complutense de Madrid, Dpto Estadística e Investigación Operativa
- Universidade Federal de Goias
- Università degli Studi di Brescia
- Université de Valenciennes et de Hainaut-Cambresis
- Universiteit Antwerpen, Dept. Transp. & Ruimt. econ.
- University College of Southeast Norway
- University of Agder
- University of Antwerp Department of Transport and Regional economics
- University of California, Davis-Graduate School of Management
- University of Colorado at Boulder
- University of Gothenburg, Department of business administration, School of Business, Economics and Law
- University of Groningen
- University of Southern Denmark
- University of Campinas





## 7.4 Attachment D: PhD course descriptions from the Student's Handbook

Course codes registered in FS

<b>Emnekode</b>	<b>Navn</b>
DRL001	The history of logistics
DRL002	Philosophy of Science
DRL003	Transaction Cost Analysis
DRL004	Game theory
DRL007	Cost benefit analysis
DRL008	Interorganizational Issues in Supply Chain Management
DRL010	Nordic Research Course in Multimodal transportation in quantitative logistics.
DRL015	Service Design under Uncertainty
DRL016	Production Planning and Scheduling
DRL017	Industrial Organization
DRL018	Local Distribution Planning
DRL019	Advanced discrete-event modeling
DRL020	Risk Management
DRL021	Academic Writing
DRL022	Partial Least Squares Structural Equations Modeling (PLS - SEM)
DRL023	How to Prepare and Write PhD Thesis
DRL024	Urban Freight and Behaviour Change
DRL025	Supply Chain Performance Measurement
DRL026	Applied Linear Regression and Introduction to Stata
DRL805	Presentation of papers and talks at international conferences
DRL950	PhD thesis
DRL999	Self studv

Course code: DRL001  
 Course name: History of Logistics  
 Program of study: Philosophiae doctor in Logistics (ph.d)

Campus: Molde

Credits: 5

Level of study: PhD

Teaching semester: 2017 Spring

Assessment semester: 2017 Spring

Language of instruction: English

Language of examination: English

Language of literature: English

Recommended previous knowledge:

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business, management science, with background in probability theory and statistics.

**Course content:**

- Introduction to the history of logistics in general, starting from the middle of 18th century until today; changes in supply chains over the centuries due to changes in technologies, needs of the societies, and market situations.
- The history of purchasing; an overview over the development of theoretical frameworks within industrial purchasing and business-to-business marketing, including industrial marketing and buying behavior, inter-organizational issues in buyer-seller relationships and the network approach of inter-firm business.
- The history of inventory theory starting from early last century and the research during the last 100 years; when and how did it start, when was stochastic problems introduced, when was discount introduced, etc.
- The history of transportation economics with relations to logistical issues; the peak load problem, classical localization theory, development of the spatial dimension in logistical models, technological development within the transport sector.
- The history of production; the history and development of optimization techniques and how these techniques are used in combination with better developed computers and software to solve practical problems in production, logistics and workforce planning.
- History of distribution and vehicle routing starting with early results in routing going back to 18th century, and the development of the travelling salespersons problem, vehicle routing and arc routing problems from the middle of the last century until today.

**Learning outcome:**

The main purpose of this course is to give an overview of the development of logistics through time. Some topics like purchasing, transportation, inventory theory, vehicle routing and production theory will be highlighted.

**Working and learning activities:**

30 hours lectures. All lectures are mandatory.

**Curriculum:**

Required reading is given in front of the semester start.

**Selection of book chapters and scientific articles**

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Attendance for teaching			Not required	30 hours lectures. All lectures are mandatory.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Home assessment	Individual		-	Pass/fail				All printed and written supporting material

## DRL007 Cost Benefit Analysis

Course code: DRL007

Course name: Cost Benefit Analysis

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 5

Level of study: 3. syklus (PhD)

Teaching semester: 2018 Vår

Language of instruction: Engelsk

Language of examination: Engelsk

Language of literature: Engelsk

### Course content:

There is an increasing need for evaluation and ranking of projects within constrained public budgets. CBA is one of the methods that are extensively used in economic impact assessment of projects in the public sector. Originally, it was developed and applied within transportation, but has gained increasing attention also within environmental assessment, health care and cultural economics. The course covers fundamental theoretical and empirical issues, and applies these to actual case studies. Decisions under uncertainty and real option theory are also covered.

### Learning outcome:

To learn about the state of the art in Cost-Benefit Analysis for various sectors.

### Curriculum:

Relevant literature:

Boardman A E et al (2006). Cost-benefit analysis : concepts and practice. Upper Saddle River, N.J. : Pearson Prentice Hall. ISBN: 978-0-13-143583-4

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Oppmøte til undervisning			Not required	30 h lectures + student presentations. All lectures are mandatory.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Hjemmeeksamen	Individuell		-	Bestått/ikke bestått		30 h lectures + student presentations. All lectures are mandatory.		Egen liste. Se under

### Semesters

• 2018 Spring

### Translations

• English

## DRL019 Advanced discrete event simulation modeling

Semesters  
• 2016 Autumn  
Translations  
• English

Course code: DRL019

Course name: Advanced discrete event simulation modeling

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 7.5

Level of study: 3. syklus (PhD)

Teaching semester: 2016 Høst

Language of instruction: Engelsk

Language of examination: Engelsk

Recommended previous knowledge:

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business, management science, with background in probability theory and statistics.

Course content:

Simulation is a widely used tool for analysis of systems characterized by uncertainty in demand, lead times, capacity, prices, etc. The main objective of this course is to learn techniques and methodologies to model systems both of discrete and continuous nature, with deeper insights into the advanced modeling techniques for discrete systems, identification of the main system components and analysis of their random behavior. The course discusses the choice of simulation software and its limitations for some advanced techniques. The course provides examples from various fields: supply chain systems, production and inventory systems, transportation/distribution systems, upstream offshore logistics, health care and other service systems. Topics of the course include:

- Introduction to systems modeling
- Discrete dynamic stochastic systems: elements of Queuing Theory
- Fundamentals of continuous modeling
- Modeling tools for discrete systems
- Review of discrete simulation approaches and associated simulation software
- Input data generation and analysis
- Design of simulation experiments
- Analysis of simulation outputs
- Cases of simulation-based decision support systems

Learning outcome:

As the result of the course, students are intended to be equipped to conduct a comprehensive simulation research project: build a model of a discrete system, implement it in a simulation software, perform computational experiments, interpret the results and answer the research questions.

Working and learning activities:

As the result of the course, students are intended to be equipped to conduct a comprehensive simulation research project: build a model of a discrete system, implement it in a simulation software, perform computational experiments, interpret the results and answer the research questions.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Hjemmeeksamen	Individuell	-		Bokstavs karakter	100	The evaluation of the course will be based on the assignment to each student of a case study to be implemented in ARENA together with the written report		Egen liste. Se under

## DRL022 Partial Least Squares Structural Equations Modeling (PLS - SEM)

Semesters  
• 2017 Spring  
Translations  
• English

Course code: DRL022

Course name: Partial Least Squares Structural Equations Modeling (PLS - SEM)

Program of study: Philosophiae doctor in Logistics (PhD)

Campus: Molde

Credits: 4

Teaching semester: 2017 Vår

Recommended previous knowledge:

Relevant master degree

### Course content:

- The course is based on the PLS-SEM textbook:  
Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. 2016. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd edition. Thousand Oaks, CA: Sage.
- Presentations: The session will cover theory and its application.
- Computer exercises using the latest SmartPLS 3 version: Specifically, theoretical explanations underlying the software procedures and practical exercises where participants will apply their learning to real-world examples provided by the instructors.
- Before the course, all participants get a license key for using SmartPLS 3 Professional.

Partial least squares structural equation modeling (PLS-SEM) has recently received considerable attention in a variety of disciplines, including marketing (Hair et al 2011, according to Google scholar the most-cited article ever published in JMTP; Hair et al. 2012a, according to Google scholar the most-cited JAMS article since 2012), strategic management (Hair et al. 2012a, according to Google scholar the most-cited LRP article since 2012), and management information systems (Ringle et al. 2012, according to Google scholar the second-most cited MIS Quarterly article since 2012).

The goal of PLS-SEM is the explanation of variances (prediction-oriented character of the methodology) rather than explaining covariances (theory testing via covariance-based SEM). The application of the PLS-SEM method is of particular interest if the premises of covariance-based SEM are violated and the assumed relations of cause-and-effect are not sufficiently explored. An additional advantage of the PLS-SEM method is the unrestricted incorporation of latent variables in the path model that either draws on reflective or formative measurements models.

This four days PhD course introduces participants to the state-of-the-art of PLS-SEM using the SmartPLS 3 software. The first day of the seminar provides a profound introduction to PLS-SEM. Participants will learn the foundations of PLS-SEM and how to apply it by means of the SmartPLS software. The instructors will make use of several examples and exercises. Starting at the second day and continuing on the third day, the seminar covers extensions and new developments to PLS-SEM.

### Learning outcome:

This PhD course is designed to familiarize with the potentials of using the multivariate analysis method PLS-SEM in international business research. The objectives of this course are to provide an in-depth methodological introduction into the PLS-SEM approach (the nature of causal modeling, analytical objectives, some statistics), (2) the evaluation of measurement results, and (3) complementary analytical techniques. More specifically, participants will understand the following topics:

- Model development and fundamentals of PLS-SEM
- Assessment and reporting of measurement and structural model results
- A new criterion for discriminant validity: The heterotrait-monotrait ratio of correlations (HTMT)
- Mediating effects
- Moderating effects (interaction effects)
- Multigroup analysis
- Measurement invariance testing
- Higher-order constructs (so-called second-order models)
- New segmentation tools, such as FIMIX-PLS and PLS-POS

This course has been designed for PhD students and full-time faculty who are interested in learning how to use the PLS-SEM method in their own research applications. A basic knowledge of multivariate statistics and SEM techniques is helpful, but not required.

### Curriculum:

#### *The Book on PLS-SEM:*

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd edition. Thousand Oaks, CA: Sage.

#### *Journal Articles:*

Becker, J.-M., Rai, A., Ringle, C. M., & Völckner, F. (2013). Discovering Unobserved Heterogeneity in Structural Equation Models to Avert Validity Threats. *MIS Quarterly*, 37(3), 665-694. <http://pls-institute.org/uploads/Becker2013MISQ.pdf>

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-151. <http://dx.doi.org/10.2753/MTP1069-6679190202>

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research. *Journal of the Academy of Marketing Science*, 40(3), 414-433. <http://dx.doi.org/10.1007/s11747-011-0261-6>

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing. *Advances in International Marketing*, 20, 277-320. [http://dx.doi.org/10.1108/S1474-7979\(2009\)0000020014](http://dx.doi.org/10.1108/S1474-7979(2009)0000020014)

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J. J., Hair, J. F., Hult, G. T. M., & Calantone, R. J. (2014). Common Beliefs and Reality about Partial Least Squares: Comments on Rönkkö & Evermann (2013). *Organizational Research Methods*, 17(2), 182-209. <http://dx.doi.org/10.1177/1094428114526928>

Mandatory coursework	Courseworks given	Courseworks required	Presence	Comment
Oppgave(r)	2	2	Not required	Participants will receive two introductory articles on PLS-SEM long before the course start.

Form of assessment	Grouping	Duration	Type of duration	Grading scale	Proportion	Comment	Supported material	Support material
Annen vurderingsform, definer i kommentarfelt	Individuell	30	Minutter	Bestått/ikke bestått		The course will start with a 30 minutes exam regarding the required readings.		Alle trykte og skrevne hjelpemidler

## DRL024 Urban Freight and Behaviour Change

Emnekode: DRL024

Emnenavn: Urban Freight and Behaviour Change

Studieprogram: Philosophiae doctor in Logistics (PhD)

Studiested: Molde

Studiepoeng: 5

Studienivå: 3. syklus (PhD)

Undervisningssemester: 2017 Vår

Eksamenssemester: 2017 Vår

Undervisningsspråk: Engelsk

Språk for eksamen: Engelsk

Språk for litteratur: Engelsk

Forkunnskapskrav:

The course is aimed at Norwegian and foreign PhD students, researchers and consultants, and public sector employees working with in the realm of urban freight transport.

### Forventet læringsutbytte:

To learn how to define, design and evaluate urban freight policies capable of adequately responding to the sustainability challenges urban freight distribution poses to modern cities. Behavioural change is at the base of any solution of urban freight problems. Shared and long-standing policies must account and accommodate both private (i.e. profit oriented) and social (e.g. environmental) objectives. Urban freight problems and solutions are strictly interwoven with and dependent on technological, organizational, regulatory, and policy innovations. Results depend on the interaction among the various system components and related stakeholders. Therefore, urban freight policies/solutions should emerge from a collaborative/participatory approach compatible with larger societal sustainability goals. The course will, through a case study based approach, discuss, illustrate and show how to apply cutting edge methods (design of experiments, discrete choice modelling and agent-based modelling) useful to overcome/take-advantage-of any barriers/opportunities that should be removed/exploited when adopting innovative solutions in urban freight distribution.

### Arbeids- og læringsaktiviteter:

The URBE PhD course focuses on rigorous and robust methods, yet made comprehensible, capable of ex-ante determining the acceptability of potential alternative policies and predicting the behavioural change that might materialise when actually implemented. • The theoretical and conceptual platform covers topics like consumer choice analysis, willingness to pay measures, stakeholder interaction analysis/simulation and opinion dynamics models. Emphasis is posed on Stated Preferences (SP) methods as a valuable instrument to measure the economic value of policy options/mixes. • Based on the conviction that urban freight policy making is one of the most complex environments in the field of Transportation where interaction effects among stakeholders should be explicitly considered, the course illustrates how to: 1) elicit stakeholders' preferences for alternative policy options (focus groups and SP techniques); 2) determine their likely responses to policy changes (discrete choice modelling) and; 3) account for interaction effects in a consensus building process (agent-based modelling) in order to forecast likely results. • The course will also touch upon: 1) stakeholder engagement techniques (e.g. gamification) and how to integrate them in policy definition; 2) innovative policy measures (e.g. crowd shipping) and how they can be studied using the methodological apparatus illustrated.

Vurderingsform	Gruppering	Varighet	Varighetstype	Karakterskala	Andel	Kommentar	Hjelpemidler	Hjelpemidler
Hjemmeeksamen	-	-	-	Bestått/ikke bestått				-

Semester

• 2017 Vår

Oversettelser

• English

• Norwegian Bokmål

## Supply Chain Performance Measurement

5 days PhD course

Week 17 (April 23 – April 27) 2018.

5 ECTS

### Lecturer

Kim Sundtoft Hald, Professor (mso), Copenhagen Business School. Department of Operations Management. Denmark.

### Recommended previous knowledge

The course is aimed at PhD students within the field of logistics and supply chain management, economics and business.

### Language

English.

### Course objective

The overall aim of the course is to develop student's competencies in managing performance in supply chains. Performance management is concerned with how managers in the supply chains can use different types of management accounting technologies to make strategic oriented design decisions and control their supply chains. Specifically, and resting firmly on an economic rational, operations management, supply chain management and performance management theory as well as on social- and organisational theories, students will be able to discuss, measure, use and respond to multiple dimensions of supply chain and network performance as well as to critically evaluate the technologies designed to manage them.

### Course content / Topics

The content of the course will be partly theory and partly case driven. Extensive literature on supply chain management, operations and performance management will serve as the objects of discussion. The following topics will be covered in the course:

- Outcome driven supply chains and dimensions of performance.
- Performance management theory and practice.
- Supply chain performance management frameworks.
- Measurement and management of supply chain risk and sustainability.
- Research opportunities in supply chains performance management.

### Learning outcomes

The course will develop students' knowledge, skills and competencies in identifying, understanding and quantifying multiple dimensions of performance in supply chains. Students will learn how to critically apply and reflect on course theories and their ability to help analyze specific case situations. Specifically, upon the completion of the course students must be able to:

- Identify, describe and critically evaluate dimensions of supply chain performance as well as their causalities.
- Design and critically evaluate performance measures, performance measurement systems and performance evaluation processes.



- Understand, select, design and critically evaluate supply chain performance management frameworks to help analyze specific case situations (e.g. supplier selection and evaluation, the total cost of ownership framework, the supply chain balanced scorecard).
- Understand and critically evaluate the measurement and management of supply chain risk and supply chain sustainability.
- Identify and discuss research opportunities in supply chain performance management.

### Learning process and principles

The course activities consist of extensive preparation before class by students, lectures, mandatory courseworks as well as student presentations given during the course and in depth case discussions/workshops. The use of a discussion oriented teaching style and use of cases will assure a high level of student involvement in the learning process. All lectures are mandatory.

### Exam

Course participation, including student presentations and comprehensive home assignment.

Mandatory class attendance.

Grading scale: Pass/fail

### Teaching resources

*Preliminary course literature/reading list of academic papers and cases:*

- Brewer, P.C., & Speh, T.W. (2000). Using the Balanced Scorecard to measure supply chain performance. *Journal of Business Logistics*, 21(1), 75-93.
- Ferreira, A., & Otley, D. (2009). The design and use of performance management systems: An extended framework for analysis. *Management accounting research*, 20(4), 263-282.
- Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: A risk management approach. *International Journal of Production Economics*.
- Hald, K. and Ellegaard (2011) 'Supplier evaluation processes: the shaping and reshaping of supplier performance' in *International Journal of Operations & Production Management*. 31(8): 888-910.
- Kulp, S. L., Narayanan, V. G., & Verkleeren, R. L. (2004). *Metalcraft supplier scorecard*. Harvard Business School.
- Melnyk, S.A., Davis, E.W., Spekman, R.E. and Sandor, J. (2010), "Outcome driven supply chains", *MIT Sloan Management Review*, Winter, 51, 2, pp. 33-38.
- Neely, A., Richards, H., Mills, J., Platts, M. and Bourse, M. (1997) "Designing performance measures: A structured approach", *International Journal of Operations & Production Management*, 17(11): 1131-1152.
- O'Connor, N., Anderson, S. & Wu, A. (2011), Strategic Performance Measurement of Suppliers at HTC, Asian Case Research Center, The University of Hong Kong pp. 1-13.
- Teng, S. G. and Jaramillo, H. (2005), A model for evaluation and selection of suppliers in global textile and apparel supply chains. *International Journal of Physical Distribution & Logistics Management* Vol. 35 No. 7, pp. 503-523.
- Tummala, R., & Schoenherr, T. (2011). Assessing and managing risks using the supply chain risk management process (SCRMP). *Supply Chain Management: An International Journal*, 16(6), 474-483.

## DRL 026 COURSE Description

Courses code:	DRL026
Course name:	Applied Linear Regression and Introduction to Stata
Program of study:	PhD in Logistics
Campus:	Molde
Credits:	5
Course content:	1. Introduction to modern linear modeling & 2. Introductory course to Stata
Teaching semester:	May-June 2018
Required prerequisite knowledge:	1. A basic knowledge of statistics is required (e.g., t-test, p-values, anova). 2. No prior knowledge of Stata is required
Learning outcome:	<p>1. Applied Linear Models. A basic knowledge of statistics is required (e.g., t-test, p-values, anova).</p> <p>A. Introduction to visualization and regression modeling            B. Model selection, predictive modeling            C. Sparse modeling, regularized regression            D. Big Data – large sample sizes.</p> <p>2. After successfully completing the introductory STATA course, students should be able to use Stata to understand and manage data, and to perform simple statistical analyses.</p> <p>More specifically, participants will be able to:            Work with syntax in DO-files in Stata            Import and export datasets            Describe and explore datasets            Generate new variables            Merge and combine datasets            Produce descriptive statistics and publication quality graphs using Stata            By understanding how a typical statistics program works, participants will have a basis for starting to use other similar programs.</p>
Working and learning activities:	<p>1. Introduction to modern linear modeling will be lecture-based. The different models will be elaborated by using real data, and exemplified through R/Stata.</p> <p>2. The STATA course is based on the textbook: Alan C. Acock: A gentle introduction to Stata, Fifth edition. Lectures and computer exercises using STATA 15 version where participants will apply their learning to examples provided by</p>

	the instructors. You need to bring your own laptop with Stata installed.
Curriculum:	<p>Rebecka Jörnsten, Professor of Biostatistics and Applied Statistics Mathematical Sciences Chalmers University of Technology/University of Gothenburg, SWEDEN</p> <p>Birgithe E. Sandbæk, Postdoc Center for Healthcare Operations Management Molde University College - Specialized University in Logistics, Norway</p>
Relevant literature:	<ol style="list-style-type: none"> <li>1. Hastie, Friedman, Tibshirani: Elements of Statistical Learning</li> <li>2. Alan C. Acock: A gentle introduction to Stata, Fifth edition</li> <li>3. Handouts</li> </ol>
Mandatory coursework	Courseworks given during the course
Form of Assessment	Form of assessment: The final course grade is based on the written exam and the course participation.
	Grouping:
	Duration: 5 days
	Grading scale: Pass/fail
	Comment :
	Support material:



## 7.5 Attachment E: Example of international co-operation – case CRT/CIRRELT

The following is an example of the extent of co-operation with external environments. This may not be an exhausting example, but is meant to illustrate the nature of co-operation with a highly renowned international entity. A co-operation agreement was made at the start of our PhD program, and the co-operation is still important to us:

1. Professor Gilbert Laporte who works for CIRRELT and HEC Montreal holds the Canadian Research Chair in Distribution Management has over 15 years had a 20% visiting professorship with our institution. His work includes offering an annual 2,5 ECTS Master's courses in Distribution Management, and contributions to our bi-annual 5 ECTS PhD module History of Logistics, co-supervision of PhD students Aliaksander Shyshou, Eugen Sopot, Yauheni Kisialiou and master students
2. Professor Teo Crainic had a 20% position with our university for many years, co-supervised several PhD students and offered an annual 2,5 ECTS master's course.
3. CIRRELT employees Laporte and Crainic have also facilitated research stays for our master's and PhD students at CIRRELT (Aliaksandr Shyshou, Arnt-Gunnar Lium, Arild Hoff, Lars Magnus Hvattum, Zhen Zhang, Ellen Karoline Norlund, Yauheni Kisialiou), and also hosted HiMolde employees during sabbaticals (Arne Løkketangen, Irina Gribkovskaia, Øyvind Halskau, Johan Oppen, and more);
4. We have many joint academic publications with CIRRELT employees (Gribkovskaia/Laporte 12 publications, Hvattum/Laporte has 8, Hoff/Laporte 1, Hoff/Crainic , plus a number of publications with other PhD students);
5. CIRRELT, HEC Montreal and the University of Montreal organises an annual conference, Optimization Days, where a lot of HiM employees and students participate
6. Under the IFORS XX conference in Barcelona in 2014, Gilbert Laporte heading the Distribution Management field invited HiM to organize a stream in Petroleum Logistics with 4 sections and 12 presentations
7. Gilbert Laporte was invited as plenary speaker in the Logistics Analytics 2018 conference that HiM organized in Minsk in June 2018. He was also member of the scientific committee.
8. CIRRELT has been involved in several projects funded by the Research Council of Norway, where HiM has been a partner. Such arrangements

have also been made related to other R&D projects with industry partners (e.g. the MOLO project with Statoil, Marintek and NTNU, plus several other R&D projects involving Statoil (now Equinor))

9. Gilbert Laporte has been actively involved in developing the field of Route Optimization at HiM, and in the development of a new track in our master's program called Logistics Analytics
10. The main contribution we have received from our co-operation with CIRRELT is that they have introduced HiM as a research school for the whole world. HiM became well known for being a CIRRELT partner, and HiM researchers have thus been able to establish their own well developed research networks.