

**Course analysis for course
ML2305 Production logistics and Supply chains**

Period: Period 2 2020.

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Examiner: Magnus Wiktorsson

Teachers in course: Tarun Kumar Agrawal, Jannicke Baalsrud Hauge, Masoud Zafarzadeh, Wajid Ali Khilji, Magnus Wiktorsson; Jan Olhager (Guest Lecturer, Lund University); Jannis Angelis (Guest Lecturer INDEK, KTH) and Patrik Johansson (Guest Lecturer, Scania)

Examining moments:

- PRO1 - Project work, 3.0 credits, Grading scale: A, B, C, D, E, FX, F
- TEN1 - Written exam, 3.0 credits, Grading scale: A, B, C, D, E, FX, F

1. Description of the course evaluation process

The course was evaluated in two ways. First, an online Mentimeter based evaluation was performed on the last day in course, second a LEQ was performed by the students. The Mentimeter evaluation was done just before the final presentation for PRO1, before the written exam (TEN), and the LEQ was conducted after the exam. Generally, the online feedback worked very well and gave the opportunity of anonymous feedback from 100% of the students. The LEQ gave a response rate of 52%.

2. Statement of meetings held with students

A physical meeting was held with the student representative at the start of P2, discussing P2 courses in the master's programme, including ML2305.

3. Course content

3.1 Intended learning outcomes

After passing the course, the students should be able to:

- Define production logistics and supply chain management and categorise the different elements in a supply chain by applying an established framework.
- Describe, analyse and compare different transport systems and warehouse logistics systems, their components and underlying technologies for internal and external material flows.
- Explain how and under which requirements an increased digitisation and various IT systems can facilitate a transparent and seamless information flow in production logistics or in a supply chain.
- Identify and analyse interplay and information sharing in different parts of the production logistics, between different units in an organisation and between companies in a supply chain for physical products.

- Analyse the needs of a producing company, regarding its internal and external logistics systems from environmental, social and economical perspectives and set together possible solution proposals.

3.2 Examination and finalizing the course

- **Grading scale**

A, B, C, D, E, FX, F

- **Examination**

PRO1 - Project work, 3.0 credits, Grading scale: A, B, C, D, E, FX, F

TEN1 – Online exam, 3.0 credits, Grading scale: A, B, C, D, E, FX, F

	ILOS	PRO1 (3,0)	TEN1 (3,0)
ILO1	Define production logistics and supply chain management and categorise the different elements in a supply chain by applying an established framework.		X
ILO2	Describe, analyse and compare different transport systems and warehouse logistics systems, their components and underlying technologies for internal and external material flows.		X
ILO3	Explain how and under which requirements an increased digitization and various IT systems can facilitate a transparent and seamless information flow in production logistics or in a supply chain.		X
ILO4	Identify and analyse interplay and information sharing in different parts of the production logistics, between different units in an organization and between companies in a supply chain for physical products.	X	X
ILO5	Analyse the needs of a producing company, regarding its internal and external logistics systems from sustainability perspectives and set together possible solution proposals.	X	

- **PRO1 – Projektarbete, 3.0, betygsskala: A, B, C, D, E, FX, F**

Group work, Case based. Continuous in the course. Written report and oral presentation.

The purpose of the project is to understand, analyze and experimentally validate the functioning of various production logistics and supply chain technologies/systems. Students are provided with a topic (concerning one technology/system) and they have to conduct experiments in KTH/Scania Smart Factory Lab. During the experimentation, they have to identify and analyze interplay and information sharing in different parts of the production logistics, between different units in an organization and between companies in a supply chain for physical products. This task shall be performed in a group of 2-3 students. The students also present the finding through a report and oral presentation. In the report and presentation, students must also highlight the needs of a production company, regarding its internal and external logistics systems from sustainability perspectives and set together possible solution proposals.

Basic Criteria (BC): Attendance at lab introduction, submission of assignment report and oral presentation of projects. Lab introduction is important and compulsory to attend as all the

safety instructions will be explained during the session, which is mandatory before starting experiments in lab.

For **Fx** grade the *BC* should be fulfilled. Possibility of supplementation is provided by agreement.

	A	B	C	D	E
ILO4	<i>BC + In the light of a structured external analysis and in a scientific approach, present an identification and analysis</i> regarding collaboration and information sharing (between components or units) for a specific production logistical problem	Partly satisfying criterion for A	<i>BC + In the light of an external analysis, present an identification and analysis</i> regarding collaboration and information sharing (between components or units) for a specific production logistical problem.	Partly satisfying criterion for C	<i>BC + Present an identification and analysis</i> regarding collaboration and information sharing (between components or units) for a specific production logistical problem
ILO5	<i>BC + In the light of a structured external analysis and in a scientific approach, present an analysis</i> of a company's needs with regard to sustainability perspectives and compile possible solutions that can help solve the company's problems in production logistics.	Partly satisfying criterion for A	<i>BC + In the light of an external analysis, present an analysis</i> of a company's needs with regard to sustainability perspectives and compile possible solutions that can help solve the company's problems in production logistics.	Partly satisfying criterion for C	<i>BC + Present an analysis</i> of a company's needs with regard to sustainability perspectives and compile possible solutions that can help solve the company's problems in production logistics.

- **TEN1 – Online Exam, 3.0, betygsskala: A, B, C, D, E, FX, F**

The purpose of the online exam is to evaluate the understanding and knowledge of the students related to the first four ILOs. Online exam will be a mix subjective and objective questions which are divided into three different levels (A < B < C). Level A is Basic, Level B is Intermediate and Level C is advanced level. Levels are interlinked. One has to pass the previous level in order to gain access to questions of higher level.

- **Final Grades:**

- For a passing grade in the course, the student has to pass (at least score E) in TEN1 and PRO1.
- The Final grade is set according to following table with the two grades.

PRO1 (3hp)	TEN1 (3hp)				
	A	B	C	D	E
A	A	B	B	C	D
B	A	B	C	C	D
C	B	B	C	D	D
D	B	C	C	D	E
E	C	C	D	D	E

4. Students' work effort time in relation to points

The extent of students work are estimated to corresponds to the course's points (40 hours / 1.5 credits). This is also verified by the statements in the course evaluations, indicating a work load of some 20-23 hours a week.

5. Students' results

In 2020 - Total 23 students

	A	B	C	D	E	F	Did not take exam
PRO1	9	0	2	9	3	0	0
TEN1	3	6	6	5	2	0	1
Final	3	5	7	5	2	0	1

In 2019 - Total 13 students

	A	B	C	D	E	F	Did not take exam
PRO1	6	2	2	3	0	0	0
TEN1	5	3	1	1	1	1	1
Final	4	5	0	2	0	0	2

This course ran for the second time with almost double the number of students in 2019 and the average scores of the students were almost same.

6. Answers to open questions

The general view of the course is positive. The students specially liked the guest lectures, experimental work and some of the topics covered during the lectures. The responses on all the LEQ statements scored between 5 and 6 on a 7 grade scale.

7. Summary of students' opinions

The student course evaluation has been run as live Menti.com anonymous quiz with the course responsible running the questions. This way it was possible to achieve very high rate of response (75% to 100%).

The LEQ however did only have a response rate of 52% (12 out of 23).

As a note, the students composed of some coming from programmes in HPU, some internationally and others on exchange program. This meant that their awareness and engagement in similar activities before joining this program could be different.

Overall, these are the key things the responses indicated as positive:

- The students found the guest lectures very interesting and insightful. Specially the one from industrial guest lecturer. It helped them to connect theory with practice.
- The amount of the activities (lectures, 3 guest lecture) was mostly regarded as just right. Some students asked for some more study visits.
- Regarding project work, the students liked it very much. They found them interesting and the experiments helped them to understand the practical applications of technologies.
- They found some of the lectures on specific topic like Blockchain, very useful.

Things that could be improved considering students' evaluations include:

- Better explanation of the project tasks
- More literature for each lectures would be beneficial
- The students suggested that the canvas page structure can be further improved and the presentations can be uploaded in advance.
- The content of some of the lectures can be more detailed and better connected.

8. Overall impression

After the students have completed the answers to the survey, they had a chance to reflect upon the summarised results. It appears that there are some clear areas of improvement. It was challenging for students, teachers as well as the course responsible to handle unexpected disruptions that the course faced due to the pandemic situations. The industry visits were cancelled at the last moment, all the experiments/project works were undertaken within the campus due to the last minute access restrictions in Scania Smart Factory lab and all the theoretical lectures moved online. Nevertheless, towards the end of the course the students felt satisfied and expressed a good learning experience.

9. Analysis

Some key issues of consideration for future development include the following:

At program level

- Efforts were taken to coordinate among teachers to perceive and plan for more or less smooth student workload over the period and to have sufficient time gap between two consecutive course examinations. This practice should continue to make sure students have an evenly distributed work load.

At course level

- Include more content related to sustainable supply chain and logistics practices e.g. practical examples of environmental impact estimation. This relates to the bit lower scores on if the students achieved the ILOs, where ILO5 was estimated to be least fulfilled.
- How to balance the exposure differences between students from students with Bachelor from KTH Södertälje versus students from other backgrounds that have limited exposure to some basic topics
- This could be an opportunity to introduce blended learning and flipped classroom structured for basic topics to bring most students *to similar level and reduce lectures on basic topics during lectures*.
- Course lectures can be more detailed and better linked to each other. As per the students' feedback, certain lectures need more detailed. One of the possibility would be to reduce the number topics covered during the lectures and rather have more detailed and focused lectures.

Other issues (miscellaneous)

- Mixed views were observed on the amount of experimental work. While most felt it was right amount there were exceptions that wanted more.
 - While differences are appreciated it is probably fair to keep the same proportion in the next round with possibly advancing focus areas. Returning to experiments on industry site (after pandemic) will also improve learning.
- How to balance workload over the weeks and further improve communication
 - Specifically for the course, it is important to clearly set pre-readings, activities and project tasks so that students could plan and redistribute their own workload and are more engaged in lectures.

As a last remark, the cohort was a very nice mix of diverse academic backgrounds. It has been a very lively experience with active discussions and different opinions. We hope the students keep up the engaging spirit and their active role to improve the program as it progress in the upcoming periods as well.

10. Priority course development

Following aspects of the course should be developed in the first place:

- Further clarify the project assignment (PRO1).
- Further synchronise course content between lectures.
- More literature and pre-reading.
- Adaptation of course for online-offline format.
- Possibly include even more material relating to ILO5

11. Other information