Applied Planning and Control in Operations Management

Tillämpad planering och styrning av produktionsverksamhet
6 credits

Programme course

TPPE83

Valid from: 2025 Spring semester

Determined by	**Main field of study**	
Board of Studies for Industrial Engineering and Logistics	Industrial Engineering and Management	
Date determined	**Course level**	**Progressive specialisation**
2024-08-28	Second cycle	A1N
Revised by	**Disciplinary domain**	
	Social sciences	
Revision date	**Subject group**	
	Industrial Engineering and Management	
Offered first time	**Offered for the last time**	
Autumn semester 2022		
Department	**Replaced by**	
Institutionen för ekonomisk och industriell utveckling		

Course offered for

- Master's Programme in Industrial Engineering and Management

Prerequisites

Calculus, Mathematical statistics, Basic course in Manufacturing Planning and Control

Intended learning outcomes

After taking this course, the student should be able to:

- correctly select, use and evaluate planning and control methods in various industrial sustainable production environments and then be able to analyze and use these methods more effectively in an increasingly digitized environment,
- model and, with the help of a commercial software, solve and evaluate linear continuous and discrete optimization problems with the aim of being used as decision support within sustainable production environments
- understand the basics of a commercial business system (ERP) and describe its main function, as well as understand how digitization can make the use of the business system more efficient and its possibilities for processing large amounts of data.

Course content

Manufacturing planning and control is the backbone of operations in any service company or manufacturing company. In today's global competition and digital environment, new methods and techniques for planning and control have emerged. Despite this, traditional methods and techniques in planning and control still dominate, and in connection with these traditional planning methods, optimization is often used as decision support. The course is therefore structured around a part that focuses on modeling optimization problems and three parts that address some of the existing planning paradigms.

1. The first part is based on optimization as decision support, where the focus is on formulating, solving, and evaluating the solution of continuous and discrete optimization problems, both in linear programming (LP) and integer optimization (HP). The formulation is first done mathematically and then this formulation is rewritten in a commercial software which then solves and presents the solution.
2. The first paradigm covers efficiency-based management, with the base in Manufacturing Resource Planning (MRPII) which includes Net Requirements Planning (MRP). This paradigm includes, for example, customer order management in Master Planning (MPS) and capacity planning at all levels within MRPII.
3. The second paradigm covers constraint-based management with e.g., theory of constraints (TOC) and drum-buffer-rope (DBR). This paradigm contains on hands planning in DBR.
4. The third paradigm is lean-based management with e.g., rate-based scheduling and includes the use of Mixed-Model-Scheduling within Final Assembly Scheduling.

Each paradigm incorporates advanced level methods and techniques, but also the latest developments in digitalization and sustainability. How to use Artificial Intelligence and Enterprise Resource Planning systems in each management paradigm is discussed together with the impact on sustainability. Finally, so called hybrid systems are covered where methods from the different management paradigms are combined to fulfill more complex requirements from an operations strategy perspective.

Teaching and working methods

The course is divided into three parts. Part 1 is a theoretical part and based on lectures that create a knowledge base within the various parts at an advanced level. Part 1 is examined with a written exam (TEN2) and graded (U, 3, 4, 5).

Part 2 includes a teaching case that runs through the entire course containing the different paradigms. The students get to test their advanced knowledge in a practical case to clearly see the usefulness in an industrial environment. Part 2 is examined orally where the students have to present data in the case and answer related questions (UPG2) and are graded (U, G).

Part 3 is a set of labs in formulating and using commercial software to solve a few optimization problems. Another laboratory is included where smaller tasks in a commercial business system must be solved. Part 3 is examined orally where the students have to present the formulation and solution of the various optimization problems and discuss how a business system can be used and utilized (LAB2) and graded (U, G).

Examination

TEN2	Written examination	3 credits	U, 3, 4, 5
UPG2	Case report	2 credits	U, G
LAB2	Laboratory work	1 credits	U, G

Grades for examination modules are decided in accordance with the assessment criteria presented at the start of the course.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.