



## COURSE SYLLABUS **Maintenance 5.0, 5 credits**

*Underhåll 5.0, 5 högskolepoäng*

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<b>Course Code:</b> TU5G13	<b>Education Cycle:</b> First-cycle level
<b>Confirmed by:</b> Dean Jun 1, 2022	<b>Disciplinary domain:</b> Technology
<b>Valid From:</b> Jan 1, 2023	<b>Subject group:</b> MT1
<b>Version:</b> 1	<b>Specialised in:</b> G1N

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### **Intended Learning Outcomes (ILO)**

After a successful course, the student shall

Knowledge and understanding

- demonstrate comprehension of the role of humans in maintenance management to support knowledge intensive- and innovative production development
- display knowledge of how different maintenance strategies can affect the balance of reactive and proactive maintenance behavior
- display knowledge of the economic impact of maintenance and operational reliability from a holistic perspective for a manufacturing company

Skills and abilities

- demonstrate the ability to analyze production and maintenance data using simulations
- demonstrate the ability to design a sustainable maintenance strategy

Judgement and approach

- demonstrate the ability to evaluate the effect of different maintenance strategies

### **Contents**

The historical fragmented view that has characterized the study of productivity, quality, safety and reliability in silos is addressed in this course by looking at maintenance from a systems thinking perspective. In knowledge-intensive and innovative production development, the maintenance organization strongly influences the companies' financial performance. However, it requires a major leap in knowledge when it comes to systematics and requires careful design. Industry 4.0 has introduced many new opportunities, but these potentials still depend on the ability of people and leaders in the production system. The upcoming development in maintenance, Maintenance 5.0, highlights the human role in learning, understanding, and managing change to achieve higher levels of perfection. In this course, participants explore and develop maintenance strategies to lead to excellence based on an increased understanding of the conditions for change. In addition, we use advanced simulation tools to explore the development of maintenance performance to increase understanding of future applications of "human in the loop"-simulation, a natural part of human's future role in industry. During the course

participants formulate a draft strategy for achieving Maintenance 5.0 at their own company.

The course includes the following elements:

- Maintenance terminology
- Introduction to different tactical choices of how to manage physical assets, e.g. corrective maintenance, preventive maintenance, and condition-based maintenance
- Systems thinking
- Theory and discussions on reactive and proactive maintenance and its economic impact
- The economic importance of maintenance
- Life cycle costing, key performance indicators in maintenance, and their corresponding effect to drive behavior in maintenance
- The connection between maintenance operations and production operations

### **Type of instruction**

Lectures, seminars, and exercises.

The teaching is conducted in English.

### **Prerequisites**

General entry requirements and at least 4 years of work experience (or the equivalent).

Applicants with an academic degree of at least 180 credits within the technical/scientific field are exempt from the work experience requirement (or the equivalent).

### **Examination and grades**

The course is graded Fail (U) or Pass (G).

The examination of Exercises is conducted before, during, and after labs in the course. The examination of Seminars is conducted throughout the course and requires active participation and submitted reflections, and a short final report.

The final grade will only be issued after satisfactory completion of all assessments.

Registration of examination:

Name of the Test	Value	Grading
Exercises	2 credits	U/G
Seminar	3 credits	U/G

### **Course literature**

The literature list for the course will be provided 8 weeks before the course starts.

Course material, including articles, will be provided during the course.

Reference literature

Title: Uptime: Strategies for Excellence in Maintenance Management

Author: John D. Campbell, James V. Reyes-Picknell, Hyung Sik Kim

Publisher: CRC Press Taylor & Francis Group

ISBN: 978-1-4822-5237-8