Reg No: MSGB34/20211

Faculty of Health, Science and Technology
Mechanical Engineering

Syllabus

Production Systems

Course Code:	MSGB34
Course Title:	Production Systems *Produktionssystem*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
IEA (Industrial Management)
MTA (Mechanical Engineering)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2020-11-09, and is valid from the Spring semester 2021 at Karlstad University.

Prerequisites
Master of Science in Industrial Engineering and Management: Industrial organisation (7.5 ECTS credits), Industrial Management Accounting (7.5 ECTS credits), Mathematical Statistics (7.5 ECTS credits), and registered for Materials and Manufacturing Technology (7.5 ECTS credits), or equivalent

Master of Science in Mechanical Engineering: Mechanical Engineering 45 ECTS credits, including mechanics, solid mechanics, materials, engineering design, and manufacturing technology, or equivalent

Learning Outcomes
This is a basic course on the field of production. It links the following areas into a system: sustainability, organisation, layout and flow, production logistics, lean production, production

planning, production economy, quality methods and tools. The aim of the course is for students to acquire knowledge of these areas and gain a holistic perspective on the processes of the production system.

Upon completion of the course, students should be able to:

The production system generally
- give an account of how production can be viewed from a systems perspective,
- give an account of the basic principles of the sustainability of an engineering and production system from environmental, societal, and economic perspectives.

The management and organisation of the production system
- give an account of the most common forms of organisation for a manufacturing company,
- give an account of different forms of workshop layout and material flows,
- describe the preparation process in a manufacturing company,
- describe the planning process in a manufacturing company and give an account of central concepts in production logistics and supply chain management,
- give an account of and perform simple production simulation, and
- give an account of the concepts Lean Production and Toyota Production System (TPS) and the most common lean tools.

The economy of the production system
- give an account of the concepts fixed costs and variable costs, and direct and indirect costs,
- give an account of calculation models and perform investment and product calculations,
- calculate frozen capital and the value of work in progress (WIP), and
- give an account of different profitability concepts and key performance indicators and calculate them.

The quality and development of the production system
- give an outline of the central concepts in Total Quality Management (TQM),
- give an account of the basics of process and quality management and quality planning,
- give an account of methods and tools for improvements and control,
- apply the 7 QC tools, and
- give an account of the capability concept and calculate process capability.

Content
The course starts with a section on the role of industry in society and how production has been organised in a historical perspective. Industrial production and its impact on the environment is treated along with environmental management systems such as ISO 14000. In the section on the management and organisation of the production system the focus is on production processes and layout design with special emphasis on material flows and principles of flow. In logistics, supply chain management, order quantities and material planning are treated. The basics of lean production are covered using Toyota's production system as a model. The most common lean tools are treated and the theory is illustrated by means of a lean game. Computer exercises in production simulation linked to different flow principles are included. The economy of the production system deals with models for describing a company in economic terms, with a special emphasis on product and investment calculation. Long-term capital investment is discussed in connection with layout and the principles of flow and planning. Quality assurance is treated in terms of the strategies for improvement such as TQM and Sex sigma. Systematics deals with quality management and quality planning. Special attention is given to the 7 QC tools and process capability. Instruction is in the form of lectures, exercises, and one case study.

Reading List

See separate document.

Examination
Assessment is based on a written exam, mandatory laboratory work, and hand-in assignments.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades
One of the grades U (Fail), 3 (Pass), 4 (Not without Distinction) or 5 (Pass with Distinction) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.