Häme University of Applied Sciences

Degree Programme in Mechanical Engineering and Production Technology 2017 onwards

Mechanical Engineering and Production Technology graduates have a wide range of career choices around the world. A mechanical engineer may work as product development engineer, design engineer, production engineer, production development engineer, technical sales engineer or project engineer, just to mention few possibilities. A typical employer is a design engineering office, small- or medium-size workshop or a large global company. A common career path may lead to expert tasks, managerial duties or entrepreneurship.

Competence and study paths

Studies in universities of applied sciences provide the following generic competences:

• Skills for lifelong learning.
• Ethical competence.
• Working community competence.
• Innovation competence.

In addition, engineering programmes provide competences like:
• Mathematics, natural science and technology competence.
• Research and development competence.
• Analytical competence and reporting ability.
• Project management competence.
• Competence to apply theoretical knowledge in practice.

Students of the Mechanical Engineering and Production Technology degree programme, who graduate with a Bachelor of Engineering degree, have a broad knowledge base in mathematics and natural sciences. The language of tuition in this programme is English and a truly international academic environment ensures high-level language and multicultural skills for graduates. They also have basic practical and professional Finnish language skills, so that they are able to integrate into Finnish working life. Bachelors of engineering graduates have the necessary design, production and automation skills required in mechanical engineering. In addition, they are well-versed in materials technology, which is necessary in the selection of raw materials. They also have deep and up-to-date knowledge about either design of mechanical systems or production systems. In each of these areas, mechanical engineers are able to utilize the relevant computer-based tools. Graduates also master all general working life needs, like economic thinking, ability to work in teams and communication skills.

The Mechanical Engineering and Production Technology degree programme allows students to
focus on production systems and design of mechanical systems. Study path includes eight common and three separate compulsory core competence modules. In addition to these, the students need to choose two profiling modules (30 cr) from the offerings from other degree programmes in HAMK, other universities in Finland or international partner universities. The total credits for all modules and thesis are 15 credits (ECTS), and for work placement is 30 credits. 240 credits are needed in total to graduate.

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BEMP17A-1000 Core competence: 150 op

BE00BS20 Orientation to engineering studies: 15 op

Objectives
Orientation to engineering studies 15 cr

On completion of the module, the student is able to manage his/her own studies and work towards clear goals as part of a project group. They understand the nature of the professional field and are committed to it. During the module, the student also acquires the safety training required for the workplace.

BE00BS21 Mechanics: 15 op

Objectives
On completion of the module, the student is able to apply power-related physical concepts in the
design of mechanical devices and understand the importance of communication for guaranteeing the
correct initial data for design work. They are also able to make use of simple mechanical drawings
as an aid to communication.

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models.
The student knows how to apply and analyze their new knowledge in new situations.

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**BE00BS22 Manufacturing: 15 op**

**Objectives**

On completion of the module, the student has knowledge of the most common manufacturing methods and the possibilities that they offer. The student also knows the basic properties of the materials commonly used in mechanical engineering and their suitability for different manufacturing processes.

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models.
The student knows how to apply and analyze their new knowledge in new situations.

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**BE00BS23 Design of a beam structure: 15 op**

**Objectives**

On completion of the module, the student is able to apply the principles of strength theory in computer-aided mechanical design and also able to understand the key magnitudes and calculation methods related to this area of knowledge. They also learn methods for structural load testing and
are able to apply these in practice.

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS02 Design methods: 15 op**

**Objectives**

On completion of the module, the student has command of the design process and design methods for machine parts, knowing how to take into account the materials' physical properties and the boundary conditions set by the manufacturing method. They are also able to conduct all necessary communication related to the design process in languages other than their native one.

**Content**

Strength theory in design
Thermodynamics
Machining
Welding engineering
Swedish for working life / Reporting in Finnish

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS03 Machine elements: 15 op**

**Objectives**
On completion of the module, the student is familiar with the most important machine components and is able to choose and size the components for normal applications. They understand the role of automation and/or embedded control in machine operations. They are able to assess and analyse the durability and reliability of machine components and communicate on these matters in a language other than their native one.

**Content**
- Selection of machine components
- Mechanical measurements
- Statistical mathematics and reliability engineering
- Basics of electrical engineering

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS04 Sheet metal structures: 15 op**

**Objectives**

On completion of the module, the student is able to design simple sheet metal products, knowing how to recognise and solve technical problems related to sheet metal structures using established methods. They are familiar with manufacturing methods for sheet metal products and are able in the design process to seek out client-orientated, sustainable and economically viable solutions. The student can communicate in English in the different situations encountered in working life.

**Content**
- Design of sheet metal products
- Sheet metal work
- Communication - Professional growth
- English for working life

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.
Excellent (5)

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS05 Product development: 15 op**

**Objectives**
On completion of the module, the student is familiar with the product design process and with model building as a part of industrial design. In addition, the student is able both to take into account different manufacturing design perspectives already in the early stages of product design and also to define functionality and control as a part of the product.

**Content**
Control systems
Product design
Entrepreneurship
Manufacturing-friendly design

**Evaluation criteria**
Satisfactory (1-2)

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

Good (3-4)

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

Excellent (5)

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BEMP17A-1005 Work Placement: 30 op**

**BE00BJ91 Work Placement - general: 15 op**

**BE00BJ92 Work Placement - professional: 15 op**

**BEMP17A-1006 Profiling competence: 3 op**

**BE00BS06 Design of industrial appliances: 15 op**

**Objectives**
On completion of the module, the student is competent in the design process for industrial machinery and its various subcomponents. The student obtains advanced knowledge of machine components
and the sizing of regulating units and also becomes familiar with the interaction between the different moving surfaces within a machine (the processes of friction, erosion, and lubrication) and the basics of the laws in operation for surfaces which are in contact with each other.

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS07 Structural analysis: 15 op**

**Objectives**

On completion of the module, the student is able to use computers to model and simulate structural mechanics and also able to understand how simulation and optimization are connected with other design and testing methods.

**Content**

FEM-calculus
Strength measurements
Structural optimisation
Numerical methods

**Evaluation criteria**

**Satisfactory (1-2)**

The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**

The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**

The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS08 Manufacturing automation in the workshop: 15 op**

**Objectives**
On completion of the module, the student has command of the principles of production management and production planning and understands both the importance of cost efficiency and the methods for obtaining it. The module also provides practical competence in CAD/CAM design and the use of CNC machines. The student has command of the basics of robotics and the programming of robots and also understands the significance of new substance-adding manufacturing methods for design and production.

**Content**
- Production management
- Use of CAD/CAM and CNC machines
- Robotics
- New manufacturing methods

**Evaluation criteria**

**Satisfactory (1-2)**
The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**
The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**
The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.

**BE00BS09 Advanced mathematics: 15 op**

**Objectives**
This mathematics module is intended for engineering students who want to strengthen their mathematical skills or who plan to study for a Master’s of Science in Engineering at a later date. The module is offered to all engineering study programs and requires prior knowledge of the essentials of engineering mathematics: Algebra, vectors and geometry, differential and integral calculus.

**Evaluation criteria**

**Satisfactory (1-2)**
The student has completed the module’s learning requirements on the minimal required level. The student is aware of and recognizes the module’s core concepts and methods.

**Good (3-4)**
The student has completed the module’s learning requirements on a good level. The student understands and is able to implement knowledge imparted in the module in practice.

**Excellent (5)**
The student has completed the module’s learning requirements excellently and has an excellent control on the module’s concepts and models. The student knows how to apply and analyze their new knowledge in new situations.
**Objectives**

**DESCRIPTION**
Thesis is a project in which you utilise your professional key areas. It is an independently produced research, product development or other development project.

**LEARNING OUTCOMES**
The student
- is able to put forward well-grounded, workplace-related development proposals
- is able to find and use source materials critically with respect to the source material’s intellectual property rights
- is able to conceptualize workplace-related phenomena based on research
- is able to use suitable development and research methods for producing new knowledge
- is capable of working together and responsibly with others in the workplace development projects and in other development projects
- is able to assess his/her own actions and decisions critically
- is able to manage entities and present his/her case logically and justifying
- is able to manage appropriate written, visual, and oral expression