

# **Education in Materials Processing Technology (in English) for the degree in Bachelor of Engineering (240 cr)**

## **Overall Competencies**

The education in materials processing technology includes modern polymer technology and processing, and focuses on functional materials, sustainable development and design. In laboratory exercises, students in practice learn the whole process from material selection and product design, and further to production of polymer based products. Several extension study modules provide good opportunities for tailoring education according to own interests.

## **Structure of studies**

The education is structured in study modules with either 15 or 30 cr (credit units). All modules include courses or entities of either 5 or 10 cr. Notice, that the University reserves the rights to change the course names or can change courses in the modules.

## **BASIC STUDIES (60 cr)**

### **General studies (30 cr)**

#### **Learning outcomes**

The aim is to learn an effective and independent study skills. Sustainable thinking and project management skills are supporting other professional skills.

#### **Module includes following courses**

Swedish 5

English 5

Finnish 5

#### **Module includes following courses**

Introduction to Engineering Studies 5

Introduction to University Studies 5

Sustainable Engineering 5

## **Programme specific basic studies (30 cr)**

### **Basic Studies (30 cr)**

#### **Learning outcomes**

The aim of the module is to build up the mathematical basic competence to solve problems related to material properties as well as to material processing and design. Relevant

knowledge of mathematical methods as well as effects physical changes to materials and their processing are given.

**Module includes the following courses**

Mathematics 0	0
Algebra and trigonometry	5
Calculus	5
Mathematical Modelling	5
Mechanics	5
Thermodynamics	5
Statistics and Probability	5

**PROFESSIONAL STUDIES (120 cr)**

The professional studies in materials processing technology include modern polymer technology and processing, and focuses on functional materials, sustainable development and design. In laboratory exercises, students in practice learn the whole process from material selection and product design, and further to production of polymer based products.

**Materials processing (30 cr)**

**Learning outcomes**

The aim of the module is to build up the knowledge of typical methods of polymer material processing and plastic product design. In laboratory exercises, students in practice learn the whole process from product design further to production of polymer based products.

**Module includes the following courses**

Additive Manufacturing	5
Manufacturing Processes	5
Composites Processing	5
Lamina Analysis	5
Materials Design	5
Composite Mould Manufacturing	5

**Materials (30 cr)**

**Learning outcomes**

The aim of the module is to build up the knowledge of polymer based materials and their current applications as well as future application potential. Materials are defined by their chemical, physical and mechanical properties. The challenges of material properties and materials processing are analysed.

### **Module includes the following courses**

Polymer Chemistry	5
Biocomposites	5
Thermomechanical Properties	5
Polymer Blends	5
Surface Properties	5
Fluid Mechanics	5

### **Design (30 cr)**

#### **Learning outcomes**

The aim of the module is to understand and produce engineering drawings. 3 dimensional models and prototypes are produced and studied. The aim of the module is to give knowledge how to design functional products with optimal mechanical properties.

### **Module includes the following courses**

Engineering Drawing and CAD	5
Solid Modelling	5
CAM and 3D Prototyping	5
Strength of Materials	5
Product design	5
Finite Element Analysis and Design	5

### **Practical training (30 cr)**

#### **Learning outcomes**

The practical training should give knowledge and experience relevant to the working life. This may include the engineering, managerial or economical operations of companies. The student is responsible for finding his/her own work position. This gives experience in applying jobs, networking and marketing of one's own skills.

#### **Following parts are included in Practical Training**

Introductory Work Experience	15
Professional Work Experience	15

### **ELECTIVE EXTENSION STUDIES (30 cr)**

The idea of extension studies is to create an individual professional profiles by deepening and broadening of competencies. As recommended options are modules that directly relates to the field of study. Extension studies can be completed in another University in Finland or abroad.

### **Extension studies in study year 2017-2018:**

Advanced Materials and Design	15
Entrepreneurship	15
Finnish	15
Project	15
Online/External Courses	15

## **THESIS AND METHODOLOGY (30 cr)**

### **Learning outcomes**

The courses in Data Analysis and in Project Management will develop the professional, analytical and methodological skills required in the field of Materials Processing Technology. The course in Research Methodology will give the theoretical basics to understand the RDI processes in engineering and the course in Project Management will present the practical methods for the planning and managing of RDI projects. The Degree Thesis includes a defined thesis study, that is reflecting engineering relevance and utilizing professional methods, as well as a written thesis report to publish the results.

### **Module includes the following courses**

Data Analysis	5
Project Management	5
Research Methodology	5
Degree Thesis	15