20.03.2016

Curriculum at Lahti University of Applied Sciences 2016-2017

Bachelor’s Degree Programme in Process and Materials Engineeringpro 16S

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TEMAT16-1000	**CORE COMPETENCE**					**180**
TEMAT16-1001	**CORE STUDIES**					**75**
TEMAT16-1002	**Orientation**					**15**
0750OA103	Learning and Professional Growth	3				3
0750IC103	ICT Skills	3				3
0701FK103	Physics and Chemistry Basics	3				3
0701MP103	Mathematics Basics	3				3
0750TP103	Technical Drawing Basics	3				3
TEMAT16-1003	**Common Professional Studies 1**					**15**
0750MP205	Material Science Basics	5				5
0750P1205	Project 1	5				5
0750TI201	Scientific Writing	1				1
TE00AW76	Information Literacy	1				1
TE00AW75	Communicating Your Expertise	3				3
TEMAT16-1004	**Core Studies 1**					**15**
0750GT303	Geometry and Trigonometry	3				3
0750CD303	CAD Drawing	3				3
0750MK303	Chemistry for Materials Engineering	3				3
TE00AW72	Swedish, written	1,5				1,5
TE00AW73	Swedish, spoken	1,5				1,5
0750TK303	Work Safety and Safe Use of Machinery	3				3
TEMAT16-1005	**Core Studies 2**					**15**
TE00AW77	English Language and Communication		3			3
0750ME403	Mechanics		3			3
0750ST403	3D-CAD Design		3			3
TE00AX29	Business Mathematics		3			3
0750VM403	Vectors and Matrices		3			3
0754PK403	Polymer Chemistry		3			3
TEMAT16-1006	**Core Studies 3**					**15**
0750DI503	Differential and Integral Calculus		3			3
0750LO503	Strength of Materials 1		3			3

0750SA503	Electrical Engineering and Automation		3			3
TE00AX28	Physics for Materials Engineering		6			6
TEMAT16-1007	**PROFESSIONAL STUDIES**					**60**
TEMAT16-1008	**WOOD TECHNOLOGY**					**60**
TEMAT16-1009	**Wood Technology Basics**					**15**
0751PA104	Wood as Raw Material	4				4
0751PP103	Wood Industry Basics	3				3
0751PR105	Wood Product Project	5				5
0751TP103	Product Design Basics	3				3
TEMAT16-1010	**Manufacturing Technology 1**					**15**
0751HU204	Furniture Technology		4			4
0751PL203	Drying and Heat Treatment of Wood		3			3
0751PR205	Project 2 – Product Development Project		5			5
0751SJ203	Production and Processing of Sawn Goods		3			3
TEMAT16-1011	**Manufacturing Technology 2**					**15**
0751CC305	CNC and CAM Technology		5			5
0751LI303	Gluing Techniques		3			3
0751PI303	Surface Treatment		3			3
0751PT304	Woodworking and Production Technology		4			4
TEMAT16-1012	**Manufacturing Technology 3**					**15**
0751LE403	Wood-Based Panels Technology			3		3
0751PR405	Project 3 – Research and Development Project			5		5
0751TE404	Designing Plant Layout			4		4
0751VA403	Plywood Technology			3		3
TEMAT16-1013	**POLYMER AND FIBRE TECHNOLOGY**					**60**
TEMAT16-1014	**Polymer Materials**					**15**
0754KM103	Fibre Materials	3				3
0754MM103	Plastic Materials	3				3
0754MP106	Material Project	6				6
0754YM103	Composite Materials	3				3
TEMAT16-1015	**Manufacturing Polymer Products**					**15**
0754MT203	Moulds and Tools		3			3
0754TK204	Product Development Project		4			4
0754TS203	Product Design		3			3
0754VT205	Manufacturing Technology		5			5
TEMAT16-1016	**Properties and Further Processing of Polymer Products**					**15**
0754JK303	Finishing and Jointing		3			3
0754OT305	Properties and Testing Them		5			5
0754TT304	Product Development and Research Project		4			4
0754ÄM303	Smart Materials		3			3

TEMAT16-1017	**Applications of Polymer Products**					**15**
0754KK403	Nonwoven Fabrics and Technical Textiles			3		3
0754KU403	Recycling and Recycled Products			3		3
0754TT405	Product Development and Research Project			6		6
0754VO403	Products for Demanding Conditions			3		3
TEMAT16-1018	**THESIS**					**15**
TEMAT16-1019	**WORK PLACEMENT**					**30**
TEMAT16-1020	**COMPLEMENTARY COMPETENCE**					**60**
TEMAT16-1021	**Operations Control**					**15**
0750ET103	Management Skills			3		3
0750LY103	Tools of Quality and Environmental Management			3		3
0750MA103	Marketing			3		3
0750TO103	Production Control			3		3
0750YR103	Money Transactions of a Company			3		3
TEMAT16-1022	**Common Professional Studies 2**					**15**
0750AE203	Professional English			3		3
0750MO203	Methodology Studies			3		3
0750TA204	Industrial automation 1			4		4
0750TI203	Mathematical Statistics 1			3		3
0750YR202	Entrepreneurship Studies			2		2
TEMAT16-1023	**Wood Construction**					**15**
0751PS306	Design of Timber Structures				6	6
0751PT303	Production of Timber Structures				3	3
0751RA303	Joinery Technology				3	3
0751TR303	Engineered Wood Products for Construction				3	3
TEMAT16-1024	**Environmental Efficiency**					**15**
0747EK03	Life Cycle Analysis			3		3
0745MJ03	Material Efficiency, Recycling and Waste Management			3		3
0745EH03	Energy Efficiency			3		3
0745YHV03	Environmental Responsibilities of a Company			3		3
0747YB03	Environmental Issues in the Management and Environmental Quality Systems			3		3
TEMAT16-1025	**ELECTIVE STUDIES**					**15**
TE00AY52	Swedish Supplementary Studies	3				3
TE00AY38	English Supplementary Studies		3			3
TE00AZ18	Finnish supplementary studies	3				3

TEMAT16-1000 CORE COMPETENCE: 180 ECTS

TEMAT16-1001 CORE STUDIES: 75 ECTS

TEMAT16-1002 Orientation: 15 ECTS

Learning outcomes of the study module
The student
- can describe organisations in their field, as well as their operational environment and operation
- knows how to utilise a computer as a tool in professional studies
- is able to utilise mathematics as a tool in professional studies
- is able to describe the basics of physics and chemistry and is able to perform basic calculations
- is able to make technical drawings and use appropriate symbols in them.

Courses included in the study module
- Learning and Professional Growth 3 cr
- ICT Skills 3 cr
- Mathematics Basics 3 cr
- Physics and Chemistry Basics 3 cr
- Technical Drawing Basics 3 cr

0750OA103 Learning and Professional Growth: 3 ECTS

Learning outcomes
The students
- know how to utilise the facilities provided by the university of applied sciences
- are able to find information about their rights and obligations as students of Lahti University of Applied Sciences (LUAS)
- are able to operate in the learning environment of LUAS
- are able to make their own individual study plans
- are able to choose their specialisation with the help of the curriculum
- are able to compare different industries and choose their major.

0750IC103 ICT Skills: 3 ECTS

Learning outcomes
The students
- can use the ICT system of the Faculty of Technology, as well as the software used, and are aware of the possibilities provided by different systems
- can use the computer as a tool in support of their professional studies.

0701FK103 Physics and Chemistry Basics: 3 ECTS

Learning outcomes
The students
- develop and strengthen their basic skills in physics and chemistry
- can do basic calculations connected with physics and chemistry.

0701MP103 Mathematics Basics: 3 ECTS

Learning outcomes

The students
- can handle mathematical expressions, solve equations, and draw graphs of functions
- develop and deepen their skills in algebra so that they can continue their studies of mathematics
- are able to apply mathematical tools particularly when studying natural sciences and professional subjects.

0750TP103 Technical Drawing Basics: 3 ECTS

Learning outcomes
The student
- knows the basics of technical drawing
- can read technical drawings
- can make and modify drawings needed in industry.

TEMAT16-1003 Common Professional Studies 1: 15 ECTS

Learning outcomes of the study module
The students
- are able to apply their knowledge of materials and their end uses in product design
- can work according to the principles of project work and are able to do cooperation with experts in different fields
- can apply information literacy in problem solving
- can write according to the principles of scientific writing
- can report on the outcome of their work and express themselves in semi-formal style.

Courses included in the study module
- Material Science Basics5 cr
- Project 1 5 cr
- Communicating Your Expertise 5 cr

0750MP205 Material Science Basics: 5 ECTS

Learning outcomes
The students
- can utilise different materials in different kinds of end uses
- can choose materials suitable for different applications and use this knowledge in product design
- are able to choose their specialisation.

0750P1205 Project 1: 5 ECTS

Learning outcomes
The student
- is able to plan and implement a project together with a team
- can examine the materials used in upholstered furniture and study the recyclability of the materials
- can work according to the principles of project work
- is able to document and present the outcome of the project.

0750TI201 Scientific Writing: 1 ECTS

Learning outcomes
The student
- knows what is required of the structure and language of a thesis
- is able to produce argumentative text
- knows how to use sources effectively.

TE00AW76 Information Literacy: 1 ECTS

Learning outcomes
The students are able to
- identify their need for information and understand the importance of information seeking at different stages of their studies
- evaluate information and its sources critically
- use information ethically
- find the information needed in their studies efficiently, using multiple sources
- use different information sources and services effectively.

TE00AW75 Communicating Your Expertise: 3 ECTS

Learning outcomes
The students are able to
- evaluate and interpret the meanings of different messages, and develop their communication skills
- apply oral and written communication skills appropriately and interactively in customer situations
- use team work skills in meetings and negotiations
- plan and produce grammatically correct customer documents and scientific articles.

TEMAT16-1004 Core Studies 1: 15 ECTS

Learning outcomes of the study module
The students
- are able to apply certain mathematical methods in their studies of natural sciences, mechanics and electrical engineering
- are able to read technical drawings and to make and modify drawings needed in industry with CAD software
- understand the connection between chemistry and professional subjects
- know the general regulations on work safety and know the safety aspects of using laboratory equipment
- can use the equipment in an appropriate way
- understand the significance of the Swedish language in their studies and are able to use the language in different situations.

Courses included in the study module
- Geometry and Trigonometry 3 cr
- CAD Drawing 3 cr
- Chemistry for Materials Engineering 3 cr
- Swedish 3 cr
- Work Safety and Safe Use of Machinery 3 cr

0750GT303 Geometry and Trigonometry: 3 ECTS

Learning outcomes
The student can
- use trigonometric functions to solve polygons
- solve the length of a circular arc and its parts, as well as their areas
- draw graphs of trigonometric functions and solve trigonometric equations
- apply the basics of geometry and trigonometry in natural sciences and professional studies.

0750CD303 CAD Drawing: 3 ECTS

Learning outcomes
The students
- know the basics of CAD drawing
- can read technical drawings
- can use CAD software to make and modify technical drawings.

0750MK303 Chemistry for Materials Engineering: 3 ECTS

Learning outcomes
The students
- can perform basic calculations in chemistry
- can apply this knowledge in the assignments in their professional studies.

TE00AW72 Swedish, written: 1.5 ECTS

Learning outcomes
The students can
- express and justify their opinions
- manage in different kinds of phone situations
- write email messages
- understand and use the terminology of their field
- tell the main things about their education, work experience and tasks for example in job interviews
- present a company in their field
- find information on their field in Swedish e.g. on the Internet
- use online dictionaries.

TE00AW73 Swedish, spoken: 1.5 ECTS

Learning outcomes
The students can
- express and justify their opinions
- manage in different kinds of phone situations
- understand and use the terminology of their field
- tell the main things about their education, work experience and tasks for example in job interviews
- present a company in their field.

0750TK303 Work Safety and Safe Use of Machinery: 3 ECTS

Learning outcomes
The students
- can describe the regulations in the law concerning the safety and health of a work environment
- can find and use notices concerning safe operation of harmful and hazardous substances
- can use the machinery in the workshop according to safety regulations
- know how to operate the machines and devices in the workshops safely and using appropriate working methods.

TEMAT16-1005 Core Studies 2: 15 ECTS

Learning outcomes of the study module
The student
- is able to apply mathematical methods for example in kinematics and the professional studies of the degree programme
- knows the basics of product costing and the factors influencing product pricing or alternatively gets a deeper insight into polymer chemistry
- can use calculations with quantities, mechanics, strength of materials and physical quantities in practical situations
- can evaluate the significance of language skills as part of the qualifications of an engineer
- can use the SolidWorks software for drawing, product design and 3D modelling
- can estimate the correlation between a chemical structure and machanical properties.

Courses included in the study module
- Vectors and Matrices 3 cr
- Selling Basics 3 cr or
- Polymer Chemistry 3 cr
- Mechanics 3 cr
- English Language and Communication 3 cr
- 3D-CAD Design 3 cr

TE00AW77 English Language and Communication: 3 ECTS

Learning outcomes
The students can
- tell about themselves and their education
- see the difference between colloquial and neutral style and choose an appropriate style for different situations
- communicate in neutral style orally and in writing (phone calls, email, letters)
- give an oral presentation on a topic related with their field
- be aware of cultural differences and understand how they affect communication
- interact in different work-related situations and do small talk
- present a company operating in their field
- use the basic terminology of their field.

0750ME403 Mechanics: 3 ECTS

Learning outcomes
The student
- knows the basics of calculation with quantities and the basics of mechanics and strength of materials
- knows the most important quantities needed in physics studies, and also knows how to apply them in practice.

0750ST403 3D-CAD Design: 3 ECTS

Learning outcomes
The students
- command the basic principles of using the SolidWorks software for computer-aided drawing, product design and 3D modelling
- know how to take manufacture and assembly into account in designing a product in their field
- can interpret and make technical drawings
- can compile part lists and visualise assembly drawings.

TE00AX29 Business Mathematics: 3 ECTS

Learning outcomes
The student knows
- the principles of calculating percentages
- the basics of calculating interests
- how to apply series when calculating capital.

Contents
This course is compulsory for students of wood technology, but optional for students of polymer and fibre technology.

0750VM403 Vectors and Matrices: 3 ECTS

Learning outcomes
The students can
- perform basic vector calculations
- divide a vector into components
- use scalar and cross products
- apply vector algebra in their professional studies.

0754PK403 Polymer Chemistry: 3 ECTS

Learning outcomes
The students
- can use the concepts of organic chemistry
- can describe reaction types
- can describe the principles and methods of polymerisation
- can explain how and whypolymers and plastics disintegrate.

Contents

The course is compulsory for students of polymer and fibre technology, but optional for students of wood technology.

TEMAT16-1006 Core Studies 3: 15 ECTS

Learning outcomes of the study module
The student
- knows the basic concepts of mathematical analysis and is able to apply them in other studies
- commands the basics of thermology and is able to apply them in professional studies
- understands the dangers caused by electricity and the different protections in use
- knows how to use physical measuring devices and write an appropriate report on the results
- is able to calculate strengths and estimate the strength of structural parts.

Courses included in the study module
- Differential and Integral Calculus 3 cr
- Electrical Engineering and Automation 3 cr
- Physics for Materials Engineering 6 cr
- Strength of Materials 1 3 cr

0750DI503 Differential and Integral Calculus: 3 ECTS

Learning outcomes
The student
- can draw graphs for power, polynome and rational functions
- knows the principles of limit value and how to calculate it
- knows the definition of derivative and how to form the equation for a tangent line drawn on a curve
- finds the extreme values of a function
- can solve problems with extreme values
- knows the concepts of integral function and definite integral
- can apply integration in the calculation of areas and volumes
- can apply derivative and integral in professional studies.

0750LO503 Strength of Materials 1: 3 ECTS

Learning outcomes
The student
- can describe and estimate how the mechanical properties of materials and loads affect the dimensioning of a structure
- knows how to draw a simplified free-body diagram of the required part of a structure
- can calculate the supporting forces and stresses caused by static loads
- can calculate shear forces and the bending moment in a beam, as well as to give dimensions for a rod under tensile stress.

0750SA503 Electrical Engineering and Automation: 3 ECTS

Learning outcomes
The student
- can describe the dangers caused by electricity and the different protections in use

- can find information on and compare the obligations that owners and users have concerning electrical devices in the work life
- can describe the structure of an electricity network and perform basic calculations
- can describe the structure of distribution systems of energy for industry, the principles of trading with electricity and estimate the importance of energy efficiency
- can estimate the importance of service and maintenance procedures for electrical devices
- can describe the automation system of the process industry
- is able to identify the main components and operating principles of automation.

TE00AX28 Physics for Materials Engineering: 6 ECTS

Learning outcomes
The student
- knows how to make physical measurements and write an appropriate report on the results
- is able to process results including error inspection
- can make a graphical presentation
- knows how to utilise information technology when making the report
- can describe physics as an experimental science
- can describe the basics of thermology and moisture
- knows the thermological properties of different states
- can describe the basics of electrical engineering
- can perform calculations with direct current
- knows the basics of electrical measurement methods.

TEMAT16-1007 PROFESSIONAL STUDIES: 60 ECTS

TEMAT16-1008 WOOD TECHNOLOGY: 60 ECTS

TEMAT16-1009 Wood Technology Basics: 15 ECTS

Learning outcomes of the study module
The student
- can estimate the use of wood as energy and the ecological impact of the use of wood
- can utilise the principles of the design process when designing products
- can take the special properties of wood into account in product
design
- can use the standard woodworking machines and work independently with them.

Courses included in the study module
- Wood as Raw Material 4 cr
- Wood Industry Basics 3 cr
- Wood Product Project 5 cr
- Product Design Basics 3 cr

0751PA104 Wood as Raw Material: 4 ECTS

Learning outcomes
The student

- can describe the properties of wood
- can estimate the use of wood as a renewable natural material
- knows how to take into account the special characteristics of wood when designing products.

0751PP103 Wood Industry Basics: 3 ECTS

Learning outcomes
The student
- can describe the objectives of forestry and the environmental aspects involved
- can estimate appropriate uses for different types of wood materials
- can describe the production sectors of the wood products industry
- can estimate the use of wood for energy and ecological impacts of the use of wood

0751PR105 Wood Product Project: 5 ECTS

Learning outcomes
The student
- can work in a design team
- can use the standard woodworking machines and work with them
- can make products of wood independently.

0751TP103 Product Design Basics: 3 ECTS

Learning outcomes
The student
- can describe the basic principles of design processes and is able to apply them in a product development process
- can use skills of creating ideas and problem solving, as well as self-expression and creative thinking
- can work according to the principles of team work.

TEMAT16-1010 Manufacturing Technology 1: 15 ECTS

Learning outcomes of the study module
The students
- can describe the quality aspects of log raw material in the sawmill industry, the production technology of sawmilling, sawn and planed products, and methods of further processing
- can describe how wood is dried in practice and knows the basics of how wood dries
- can describe the environment where the furniture industry operates, as well as the products and production methods of the furniture
industry
- know how to utilise the product design process in designing and can produce added value to a design team’s work through their knowledge and skills.

Courses included in the study module
- Furniture Technology 4 cr
- Drying and Heat Treatment of Wood 3 cr
- Project 2 – Product Development Project 5 cr

- Production and Processing of Sawn Goods 3 cr

0751HU204 Furniture Technology: 4 ECTS

Learning outcomes
The students
- can describe the environment where the furniture industry operates
- can describe the products and production techniques of the furniture industry
- can describe the materials and fittings used in the furniture industry, as well as their quality requirements.

0751PL203 Drying and Heat Treatment of Wood: 3 ECTS

Learning outcomes
The students
- can describe how wood is dried in practice and knows the basics of how wood dries
- can dry sawn timber to the required moisture content
- knows the process of heat treating wood.

0751PR205 Project 2 – Product Development Project: 5 ECTS

Learning outcomes
The students
- can operate according to the phases of a product design process
- are able to integrate design and technical design
- can utilise the product design process in designing
- can contribute to the work of a design team through their knowledge and skills.

0751SJ203 Production and Processing of Sawn Goods: 3 ECTS

Learning outcomes
The students
- can describe the quality aspects of log raw material in the sawmill industry, the production technology of sawmilling, sawn and planed products, and methods of further processing
- can describe the production and quality control, and operational economy of a sawmill.

TEMAT16-1011 Manufacturing Technology 2: 15 ECTS

Learning outcomes of the study module
The students
- can describe the basic phenomena taking place when gluing wood and know the most common glues used to glue wood, as well as the gluing
techniques used
- can compare the properties of surface treatment materials and select suitable methods to spread and dry them
- can select suitable machining techniques for different stages of product manufacture
- are able to use a CNC-controlled router in woodworking, and to utilise CAM at work.

Courses included in the study module
- CNC and CAM Technology 5 cr
- Gluing Techniques 3 cr
- Surface Treatment 3 cr
- Woodworking and Production Technology 4 cr

0751CC305 CNC and CAM Technology: 5 ECTS

Learning outcomes
The student
- can use a CNC router in woodworking as efficiently as possible
- knows how to utilise CAM in woodworking
- can apply flexible automation techniques in the production systems of piece goods manufacture.

0751LI303 Gluing Techniques: 3 ECTS

Learning outcomes
The student
- can describe the basic phenomena taking place when gluing wood
- can descibe and compare the most common glues used with wood
- can use different gluing techniques
- can select a suitable glue for different applications
- can make test plans
- can examine and test the properties of glued bonds.

0751PI303 Surface Treatment: 3 ECTS

Learning outcomes
The student
- can carry out the pretreatment of a wooden surface
- can compare the properties of surface treatment materials
- can compare the properties of spreading and drying methods
- can take into account environmental and work safety aspects
- knows how to use curtain coating methods
- can calculate the cost factors of surface treatment.

0751PT304 Woodworking and Production Technology: 4 ECTS

Learning outcomes
The students
- know the basics of woodworking
- can discuss cutting tools and tool materials with suppliers
- can make choices between machining techniques when the aim is at economy and good-quality surface
- are able to choose suitable machining techniques for different stages of product manufacture
- can plan industrial production processes for different joinery products
- can discuss the properties required of a machine with machine suppliers.

TEMAT16-1012 Manufacturing Technology 3: 15 ECTS

Learning outcomes of the study module
The students
- can describe the raw materials and products of the plywood industry, as well as their end uses, manufacturing technology and further
processing
- can describe how particle board and other boards made of chips and fibres are manufactured
- can utilise the methods of plant layout designing, are able to make layout designs, and to make cost calculations for investments
- can do research dealing with wood products and/or their raw materials, as a commission from companies or others.

Courses included in the study module
- Wood-Based Panels Technology 3 cr
- Project 3 – Research and Development Project 5 cr
- Designing Plant Layout 4 cr
- Plywood Technology 3 cr

0751LE403 Wood-Based Panels Technology: 3 ECTS

Learning outcomes
The student
- knows how particle board and other boards made of chips and fibres are manufactured
- knows the properties and end uses of wood-based panels.

0751PR405 Project 3 – Research and Development Project: 5 ECTS

Learning outcomes
The students
- can carry out research projects based on scientific requirements
- can carry out commissions as projects
- can plan, control and manage a project.

0751TE404 Designing Plant Layout: 4 ECTS

Learning outcomes
The student
- can utilise the methods of designing plant layouts
- knows how to make layout plans
- can calculate profits and costs of an investment, as well as its profitability.

0751VA403 Plywood Technology: 3 ECTS

Learning outcomes
The student
- knows the plywood production process

- knows the raw materials and products of the plywood industry, as well as their end uses
- knows the further processing methods of plywood.

TEMAT16-1013 POLYMER AND FIBRE TECHNOLOGY: 60 ECTS

TEMAT16-1014 Polymer Materials: 15 ECTS

Learning outcomes of the study module
The students
- can compare typical properties and applications of different material groups
- are able to select materials for different products, taking into account environmental and economic aspects
- can use project methods in their work.

Courses included in the study module
- Plastic Materials 3 cr
- Fibre Materials 3 cr
- Composite Materials 3 cr
- Material Project 6 cr

0754KM103 Fibre Materials: 3 ECTS

Learning outcomes
The student
- can compare different fibre materials, their properties and applications
- is able to select materials for different fibre products.

0754MM103 Plastic Materials: 3 ECTS

Learning outcomes
The student
- can compare plastics based on their properties
- can describe how the properties of plastics depend on time and temperature
- can make material selections for different end uses.

0754MP106 Material Project: 6 ECTS

Learning outcomes
The student
- is able to design a polymer-based product
- is able to choose suitable materials
- is able to produce a scale model of the product using 3D printing
- can carry out a project as a commission from industry.

0754YM103 Composite Materials: 3 ECTS

Learning outcomes

The student
- can compare the plastic matrices and reinforcements used in plastic composites, as well as the properties of composites
- can describe different manufacturing techniques
- can evaluate the potential applications of composite materials
- can describe what factors affect the cost structure.

TEMAT16-1015 Manufacturing Polymer Products: 15 ECTS

Learning outcomes of the study module
The student
- can describe the manufacturing methods of polymer materials
- can operate the machines used in the manufacture of products made of polymer materials
- can use different processing methods used with plastic and fibre materials
- is able to utilise modern design techniques.

Courses included in the study module
- Moulds and Tools 3 cr
- Product Design 3 cr
- Manufacturing Technology 5 cr
- Product Development Project 4 cr

0754MT203 Moulds and Tools: 3 ECTS

Learning outcomes
The student
- knows the operating principles of injection moulds and extrusion nozzles (films, pipes, fibres)
- can design a simple tool independently
- can use modern engineering design methods in his work
- can take economic and ecological aspects into account.

0754TK204 Product Development Project: 4 ECTS

Learning outcomes
The student
- is able to create contacts with the business world and other interest groups
- can act in product development and research projects in a responsible way
- knows how to look for solutions to practical challenges
- is able to act in tasks related with leading a project.

0754TS203 Product Design: 3 ECTS

Learning outcomes
The student
- can carry out tasks related with the design and development of a polymer-based product
- knows how to take into account special requirements of different materials in product design
- can select manufacturing methods according to the structure, materials and cost structure of the product.

0754VT205 Manufacturing Technology: 5 ECTS

Learning outcomes
The student
- can describe the basics of injection moulding and extrusion
- can also describe some less common production techniques
- can describe how polymer materials behave in different circumstances and processes
- can identify how different methods are used to meet the requirements set for the product and which materials can be processed with each method
- can determine the process variables of different processing techniques and how they affect the end result
- can evaluate the cost structure of the main processing techniques and calculate an economical size of series for the most common techniques.

TEMAT16-1016 Properties and Further Processing of Polymer Products: 15 ECTS

Learning outcomes of the study module
The student
- can describe the basic principles of smart materials and is able to apply them for different end uses
- is able to carry out measurements on the properties of materials and evaluate the reliability of the tests, and knows how to find reference material in literature
- knows how to make appropriate reports on the tests
- can select a suitable finishing and jointing method.

Courses included in the study module
- Smart Materials 3 cr
- Finishing and Jointing 3 cr
- Properties and Testing Them 5 cr
- Product Development and Research Project 4 cr

0754JK303 Finishing and Jointing: 3 ECTS

Learning outcomes
The student
- can explain the significance of finishing treatment of products
- can compare the finishing methods and describe the properties they produce
- is able to consider how product design is related with jointing requirements
- can select a suitable jointing technique for different products
- can describe the basic principles of different jointing techniques.

0754OT305 Properties and Testing Them: 5 ECTS

Learning outcomes
The student
- can identify the basic measurements used in polymer and fibre technology
- can carry out measurements dealing with material properties and compose appropriate reports on the measurements
- can operate machines used in the processing of plastics and fibres, as well as testing equipment

for polymer materials.

0754TT304 Product Development and Research Project: 4 ECTS

Learning outcomes
The student
- is able to create contacts with the business world and other interest groups
- is able to act in product development and research projects in a responsible way
- is able to search for solutions to practical challenges
- knows how to carry out tasks related with project management.

0754ÄM303 Smart Materials: 3 ECTS

Learning outcomes
The student
- can describe the basic principles of smart materials
- can estimate the potentials of smart materials now and in the future
- is able to search for information in different sources.

TEMAT16-1017 Applications of Polymer Products: 15 ECTS

Learning outcomes of the study module
The student
- can identify materials used in nonwoven fabrics and technical textiles, and can describe their manufacturing processes
- can analyse the material efficiency and recycling of a company
- knows how to utilise waste materials in making new products
- can evaluate materials that are suitable for demanding conditions
- can read research work and articles on the topic
- is able to carry out a product development and research project together with others.

Courses included in the study module
- Nonwoven Fabrics and Technical Textiles 3 cr
- Recycling and Recycled Products 3 cr
- Products for Demanding Conditions 3 cr
- Product Development and Research Project 6 cr

0754KK403 Nonwoven Fabrics and Technical Textiles: 3 ECTS

Learning outcomes
The student
- can compare materials used in nonwoven fabrics and technical textiles, as well as their properties
- can present manufacturing processes of nonwoven fabrics
- is able to evaluate the properties and testing of nonwoven fabrics and technical textiles
- can discuss end uses for nonwoven fabrics and technical textiles
- can follow what is happening in the business related with the field.

0754KU403 Recycling and Recycled Products: 3 ECTS

Learning outcomes
The student
- can study and explain how recycling of materials can reduce the consumption of virgin raw materials and energy
- can compare different materials and evaluate how they affect recycling or how they can be recycled
- is able to sort waste into different components, in view of recycling
- knows how to utilise waste materials for making new products
- can follow what is happening in the business related with recycling.

0754TT405 Product Development and Research Project: 6 ECTS

Learning outcomes
The student
- is able to acquire a project topic from business or some other interest group member
- knows how to make a project plan
- is able to carry out a project according to plan
- is able to act in a project in a responsible way
- is able to analyse research results and report on them
- can estimate possible needs for further research.

0754VO403 Products for Demanding Conditions: 3 ECTS

Learning outcomes
The student
- can study and describe what is meant by demanding conditions
- can compare materials suitable for demanding conditions, and their applications
- is able to make material choices for products intended for demanding conditions
- can read research and articles on the topic.

TEMAT16-1018 THESIS: 15 ECTS

TEMAT16-1019 WORK PLACEMENT: 30 ECTS

TEMAT16-1020 COMPLEMENTARY COMPETENCE: 60 ECTS

TEMAT16-1021 Operations Control: 15 ECTS

Learning outcomes of the study module
The student
- can describe the business principles of a company
- is able to make a business plan for a company
- understands the significance of production control in the economic performance of the company
- can desribe the components of management and explain what they signify for a company.

As part of the module of Operations Control, students make a business plan for a company, which is

connected with entrepreneurship studies and gives 2 credts.

Courses included in the study module
- Money Transactions of a Company 3 cr
- Marketing 3 cr
- Production Control 3 cr
- Management Skills 3 cr
- Tools of Quality and Environmental Management 3 cr

0750ET103 Management Skills: 3 ECTS

Learning outcomes
The students
- can evaluate different kinds of management methods and their significance to the whole company
- know the basic concepts of the labor law
- can evaluate job satisfaction and motivation factors.

0750LY103 Tools of Quality and Environmental Management: 3 ECTS

Learning outcomes
Students are able to
- describe the basic principles of a quality and environmental management system (ISO 9000 / 14001) and explain their significance to the whole business
- use a variety of quality tools to monitor and improve business.

0750MA103 Marketing: 3 ECTS

Learning outcomes
The student are able to
- find and define different target groups
- reach different target groups
- understand customers needs
- apply and implement a variety of marketing methods.

0750TO103 Production Control: 3 ECTS

Learning outcomes
The student are able to
- evaluate different factors affecting the lead time
- evaluate and apply different methods of production management
- define the different parts of the supply chain, and their significance.

0750YR103 Money Transactions of a Company: 3 ECTS

Learning outcomes
The students
- know the basics of a company’s money transactions and their significance in business

- know cost structure and its significance in business.

TEMAT16-1022 Common Professional Studies 2: 15 ECTS

Courses included in the study module
- Mathematical Statistics 1, 3 cr
- Industrial Automation 1, 4 cr
- Methodology Studies 3 cr
- Professional English 3 cr
- Entrepreneurship Studies 2 cr

0750AE203 Professional English: 3 ECTS

Learning outcomes
The students can
- use the terminology of their field and understand professional texts
- discuss topics related with their field
- communicate in job application situations
- present their own project orally and in writing
- write a professional report and a thesis abstract.

0750MO203 Methodology Studies: 3 ECTS

Learning outcomes
The student
- knows the thesis process
- understands the nature of the thesis as research work
- knows the main research methods
- is able to make a research plan and write an essay on the topic of the thesis
- is able to search for information on the topic of the thesis.

0750TA204 Industrial automation 1: 4 ECTS

Learning outcomes
The student learns the basics of electrical automation, pneumatics and hydraulics. In addition, the student acquires a knowledge of sensors and their applications in automation. After completing the course, the student knows and is able to use pneumatic and hydraulic components. The student also knows how to do practical lab work in pneumatics and hydraulics and is also able to design these systems. The student acquires such a level in designing and implementing pneumatic connections that he/she is able to do it also in the work life.

0750TI203 Mathematical Statistics 1: 3 ECTS

Learning outcomes
The student
- can present, handle and analyse empirical statistical data
- knows the basic concepts of combinatorics

- knows the concept of probability and how to apply it
- can use the main probability distributions.

0750YR202 Entrepreneurship Studies: 2 ECTS

Learning outcomes
The student
- can describe the basics of entrepreneurship and Finnish business
- is able to evaluate a business idea and its potential to succeed
- is able to describe a company’s business plan and present it to an interest group.

TEMAT16-1023 Wood Construction: 15 ECTS

Learning outcomes of the study module
The student
- can design joinery products and production processes that are energy and cost efficient
- can design structures that are functional from the points of view of structural physics and production
- can apply technical joinery products in correct end uses in a cost efficient way
- can design and dimension timber structures and make construction drawings.

Courses included in the study module
- Design of Timber Structures 6 cr
- Production of Timber Structures 3 cr
- Joinery Technology 3 cr
- Engineered Wood Products for Construction 3 cr

0751PS306 Design of Timber Structures: 6 ECTS

Learning outcomes
The student
- knows how to use wood in suitable building applications and combine wood with other construction materials
- is able to dimension the most common timber structures
- is able to make structural drawings
- knows the principles of repairing wood structures
- knows construction physics connected with timber structures
- thermology, energy efficiency, u value
- moisture
- oscillation, resonance, vibration
- noise, decibels and sound insulation of structures
- room acoustics
- radon
- lighting, photometry.

0751PT303 Production of Timber Structures: 3 ECTS

Learning outcomes

The student
- can design structures that are functional from the points of view of structural physics and production
- knows the basic methods of prefabrication
- is able to divide a building into prefabricated units.

0751RA303 Joinery Technology: 3 ECTS

Learning outcomes
The student
- can design joinery products and production processes that are energy and cost efficient.

0751TR303 Engineered Wood Products for Construction: 3 ECTS

Learning outcomes
The student
- knows the properties and manufacturing techniques of glued structural parts
- can select different types of joints for different end uses
- knows how to dimension a wooden beam
- knows how to use engineered wood products for suitable end uses in a cost-effective way.

TEMAT16-1024 Environmental Efficiency: 15 ECTS

Learning outcomes of the study module
The student
- can describe waste as part of the material cycle and as a business opportunity
- can examine how the amount of waste can be reduced
- is able to work as a member of a development and planning team
- can report and present the results of a project
- can do self-evaluation
- can make a waste management plan for a company or public organisation
- can carry out auditing
- can create ideas for new business opportunities
- can use the concepts of energy efficiency and describe their background
- can make suggestions for improving the energy efficiency of the community structure
- can plan communication and marketing
- can describe the requirements of environmental legislation concerning companies.

Courses included in the study module
- Life Cycle Analysis, 3 cr
- Material Efficiency, Recycling and Waste Management 3 cr
- Energy Efficiency 3 op
- Environmental Legislation Concerning Companies 3 sr
- Environmental Issues in the Management, Communications and Marketing of a Company 3 cr

0747EK03 Life Cycle Analysis: 3 ECTS

Learning outcomes

The student
- knows life cycle analysis, and the basics and use of eco and material efficiency as a tool for developing the operation, products and services of a company.

0745MJ03 Material Efficiency, Recycling and Waste Management: 3 ECTS

Learning outcomes
The student
- understands waste as part of the material cycle and a business opportunity, but with the primary aim of decreasing the
amount of waste
- is able to work as a member of a development and planning team, to report and present the results, and do self-evaluation
- develops the operation of a company or public organisation by making a waste management plan, carrying out auditing, and
by creating ideas for new business opportunities.

0745EH03 Energy Efficiency: 3 ECTS

Learning outcomes
The student
- knows the concepts and background of energy efficiency
- understands the means by which the energy efficiency of a community can be improved
- knows how to study the energy efficiency of a building and to make suggestions for improvement
- understands how and by whom energy consultation is given, and who the customers are and why.

0745YHV03 Environmental Responsibilities of a Company: 3 ECTS

Learning outcomes
The student
- has an overview of the contents of environmental legislation
- knows how to find information on legislation and how it is applied in different cases
- knows the requirements of environmental legislation for land use planning, business and the use of natural resources in Finland
- knows the Finnish system of environmental administration.

0747YB03 Environmental Issues in the Management and Environmental Quality Systems: 3 ECTS

Learning outcomes
The student
- can estimate the significance of communication from the point of view of profitability and cooperation
- can estimate the significance of communication for work satisfaction
- can describe how communication and the organisation structure are connected
- is able to carry out a company’s internal and external communication according to plan
- is able to select appropriate communication means and channels
- is able to write a company’s business messages and bulletins, taking the receiver into account

- is able to write texts that help to build a positive business image.

TEMAT16-1025 ELECTIVE STUDIES: 15 ECTS

TE00AY52 Swedish Supplementary Studies: 3 ECTS

Learning outcomes
The students
- know the basic structures of Swedish so well that they manage in the subsequent Swedish studies
- know basic vocabulary needed for example in social interaction.

TE00AY38 English Supplementary Studies: 3 ECTS

Learning outcomes
The students can
- use the basic structures of English so well that they succeed in the compulsory language studies of the degree programme
- understand everyday English well
- talk and write about familiar topics.

TE00AZ18 Finnish supplementary studies: 3 ECTS

Learning outcomes
The students
- command the main aspects of language planning
- develop their competence in writing.