

Curriculum for the
Academy Profession Degree Programme
in Production Technology
National section



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Please note: This document was translated for information purposes only. The study programme is not taught in English.

1. Background for the curriculum

The purpose of the Academy Profession Degree Programme in Production Technology is to qualify graduates to be able to independently plan, organise and carry out tasks within production, product development as well as technical sales and purchases in business and industrial enterprises.

The programme is a full-time study, the official length being 120 ECTS credits. Under the qualifications framework for Danish higher education, the programme is placed at the academy profession level, corresponding to level five of the qualifications framework for lifelong learning.

The Academy Profession Degree Programme in Production Technology gives graduates the right to bear the title AP Graduate in Production Technology. The Danish title is Produktionsteknolog AK.

The Danish name of the study programme is Erhvervsuddannelsen inden for produktion (Produktionsteknolog AK).

1.1 The latest version of the following acts and ministerial orders apply to the study programme:

- Act on Academies of Professional Higher Education (Danish title: Bekendtgørelse af lov om erhvervsakademier for videregående uddannelser)
- Act on Academy Profession Programmes and Professional Bachelor Programmes (Danish title: Bekendtgørelse af lov om erhvervsakademiuddannelser og professionsbacheloruddannelser (also known as LEP-loven))
- Ministerial Order on Academy Profession Programmes and Professional Bachelor Programmes (Danish title: Bekendtgørelse af lov om erhvervsakademiuddannelser og professionsbacheloruddannelser (also known as LEP-bekendtgørelsen))
- Ministerial Order on Examinations on Professionally Oriented Higher Education Programmes (Danish title: Bekendtgørelse om prøver i erhvervsrettede videregående uddannelser (also known as eksamensbekendtgørelsen))
- Ministerial Order on Admission to Academy Profession Programmes and Professional Bachelor Programmes. (Danish title: Bekendtgørelse om adgang til erhvervsakademiuddannelser og professionsbacheloruddannelser (also known as Adgangsbekendtgørelsen))
- Ministerial Order on the Grading Scale and Other Forms of Assessment (Danish title: Bekendtgørelse om karakterskala og anden bedømmelse)
- Ministerial Order on the Academy Profession Programme in Production Technology (Danish title: Bekendtgørelse om erhvervsakademiuddannelse inden for produktion)

National section / institutional section of the curriculum

This Curriculum is made up of a national section, which has been adopted by the Education Network for the Academy Profession Degree Programme in Production Technology study programme, and an institutional section laid down by the educational institution alone.

1.2 Requirements to educational background, passed course units and possible entrance exam

Admission with an upper secondary education:

Specific admission requirements: Mathematics corresponding to Danish C level

Admission with vocational education and training (VET):

Shoeing smith, CNC engineer (step 2), bicycle and motorcycle mechanic (with specialisations), construction and agricultural machinist (with specialisations), instrument mechanic (with specialisations), air mechanic, industrial technician (with specialisations), car body mechanic, refrigeration engineer (step 2), woodcutting machinist (step 2), mechanic (step 2), metalsmith (with specialisations), plastic process technician (step 2), process operator (step 2), ship mechanic (step 2), ship engineer (step 2), ship technician (step 2), chimney sweep (step 2), smith (with specialisations), furniture maker (with specialisations), foundry technician (step 2), technical designer, wind turbine technician (with specialisations), toolmaker (step 2)

No specific admission requirements

Admission with (other) relevant vocational or technical education and training:

Specific admission requirements: English corresponding to Danish C level, mathematics corresponding to Danish C level

Admission with other kinds of qualification:

Entrance exam for the engineering education *No specific admission requirements*

1.3 Academic criteria for the selection of applicants

Not applicable

2. Educational components and modules of the programme

2.1 Order of the educational components, internship and examinations during the course of the programme

Programme structure and composition				
Core fields of study	Compulsory educational component: "From product development to production"	Compulsory educational component: "Automation"		
	1st year of study 1st and 2nd semester	3rd semester		4th semester
Scientific method, 8 ECTS	8			
Product development, 9 ECTS	9			
Construction, 11 ECTS	11			
Technical documentation 6 ECTS	6			
Materials and production processes 9 ECTS	9			
Business knowledge 10 ECTS	10			
Production technology 7 ECTS	7			
Automation 5 ECTS		5		
Elective educational components 25 ECTS			25	
Internship 15 ECTS				15
Final degree project 15 ECTS				15
ECTS credits Total 120 ECTS	60	5	25	30

3. Core areas of study

The study programme includes the following core areas of study, cf. the Ministerial Order:

- Scientific method (8 ECTS)
- Product development (9 ECTS)
- Construction (11 ECTS)
- Technical documentation (6 ECTS)
- Materials and production processes (9 ECTS)
- Business knowledge (10 ECTS)
- Production technology (7 ECTS)
- Automation (5 ECTS)

3.1 Scientific method – 8 ECTS

The function of the Scientific method core area is to qualify the students to apply their work and solutions in a technical-natural science context (Rational Decision Making Model).

Knowledge

The students should have acquired knowledge of

- method as a concept with a view to acquiring centrally applied methods within the core areas of the study programme;
- methods to structure their own work, including
 - problem statement and research question
 - knowledge gathering
 - data processing
 - project planning;
- methods to structure their own work and results, including
 - setting up reports
 - presentation techniques
 - models (e.g. 3D, Mock-ups, prototypes ...); and
- the approach to and choice of methods of various cultures, industries and subject areas.

Skills

The students should be able to

- describe centrally applied methods within the core areas of the study programme;
- apply methods to structure their own work as regards
 - time
 - resources
 - data basis
 - work context;
- critically assess own results;
- enter into interdisciplinary teams; and
- convey own work and results through
 - substantiating, and referring to, methods used
 - report writing
 - presentations
 - models (e.g. 3D, Mock-ups, prototypes ...).

Competences

The students should be able to

- select and handle relevant methods within the core areas of the study programme in a development-oriented and practice-related context with a view to solving identified issues;
- Take a professional approach, and in practice relate, to as well as involve relevant professional competences and persons;
- gather new knowledge of and keep up to date with methods within the core areas of the study programme;
- in a practice-related context include framework conditions in the choice of methodical approach to knowledge-gathering and solutions;
- show consideration for the cultural and professional starting point of various stakeholders in the choice of methodical approach;
- use commonly used IT tools for knowledge gathering, documentation and presentation; and
- participate professionally in interdisciplinary teams.

3.2 Product development – 9 ECTS

The function of the Product development core area is to qualify the students to take part in the planning and implementation of the product development process in connection with the development of products, processes and derived services.

Knowledge

The students should have acquired knowledge of

- methods for systematic development of products, processes and services;
- creative methods for idea generation;
- needs analysis;
- market and business understanding;
- aesthetics and design;
- visualisation methods; and
- requirements specification.

Skills

In the product development process the students should be able to

- sketch;
- prepare functional analysis;
- include knowledge of market and needs;
- substantiate and select ideas expressed through concept proposals – conveyed virtually or physically;
- include a stakeholder and user perspective; and
- account for results related to different phases in a product development process to relevant recipients.

Competences

The students should be able to

- take part in development work and idea-generating processes in a systematic product-development process in consideration of the other core areas of the study programme;

- take part in and contribute to interdisciplinary teamwork;
- make independent choices and decisions;
- convey results from the different phases of the product development process to relevant target groups; and
- acquire and convert new knowledge within the core area.

3.3 Construction – 11 ECTS

The function of the Construction core area is to qualify the students to dimension and construct a physical product based on the identified specifications and load conditions, and in due consideration of input and output from the other core areas.

Knowledge

The students should have acquired knowledge of

- statics and strength of materials;
- dimensioning of constructions;
- commonly used machine elements and concepts; and
- 3D models and basic FEM analysis.

The students should have an understanding of and be able to reflect on the following theoretical and methodical subject areas:

- Dimensioning of products and coherence with other decision-making processes in a development process
- The influence of tolerancing on production processes, price and the use of a product

Skills

The students should be able to

- make calculations of estimates on statically determinated constructions;
- demonstrate a practical sense of the design of physical products in relation to their capacity in terms of strength;
- identify the various forms of stress arising in a loaded construction;
- identify critical points in the construction and calculate strength and subsequent dimensioning of the construction;
- involve standard solutions in the design of the construction;
- use 3D programs to model simple constructions;
- calculate and determine relevant tolerances for the given construction;
- make a risk analysis; and
- convey and document calculation results for use in the technical documentation.

Competences

The students should be able to

- enter into a professional dialogue about dimensioning of simple statically determinated constructions as well as include inputs from and outputs to the other core areas in their work, in special consideration of
 - choice of material

- producibility
- assembly
- function
- risk analysis (for CE marking);
- account for their dimensioning and construction solutions in a structured way; and
- independently acquire new knowledge within the core area.

3.4 Technical documentation – 6 ECTS

The function of the Technical documentation core area is to qualify the students to prepare technical documentation with correct approval criteria according to current norms and standards.

Knowledge

The students should have acquired knowledge of

- the structure and coherence in the design of a 3D model;
- technical drawing types and hierarchy in relation to their subsequent use;
- current standards and directives:
 - Technical drawing, line thicknesses, layout of views and drawing layout
 - CE marking
 - Current file standards for export for CAM;
- the overall technical file as well as its structure, purpose and scope;
- the significance of technical documentation forms in a global and legal context; and
- the technical drawing as a means of communication.

Skills

The students should be able to

- use 3D CAD software to construct a 3D CAD model at part and assembly level;
- convert sketches and concept descriptions as well as construction calculations into a 3D CAD model;
- apply 3D CAD software to make technical production drawings in accordance with current norms and standards as well as subsequent use; and
- make illustrations based on 3D models.

Competences

The students should be able to

- be in charge of and handle significant parts of the technical documentation in a development process in an interdisciplinary cooperation, in consideration of inputs to and outputs from the other core areas; and
- independently keep up to date within 3D modelling and documentation standards.

3.5 Materials and production processes – 9 ECTS

The function of the Materials and production processes core area is to qualify the students to make an informed choice of materials and production processes based on discipline-specific and interdisciplinary parameters.

Knowledge

The students should have acquired knowledge of

- physical properties and suitable production processes for
 - metals, in particular steel and aluminium
 - plastics, elastomers and composites
 - wood
 - ceramics
 - new materials;
- surface treatment and heat treatment of various materials;
- joining technologies;
- machining processes;
- choice of material from a sustainability perspective; and
- materials testing.

The students should have acquired an understanding of and be able to reflect on

- materials properties and their significance in a product development process; and
- production processes and their significance to the quality and price of the final product.

Skills

The students should be able to

- select materials based on materials properties and design requirements;
- point out production processes based on realisability in respect of given practice for the material;
- include financial considerations in the choice of materials and processes;
- assess material as well as production process based on environmental considerations;

The students should be able to assess issues and contribute to solutions within

- pointing out, assessing and recommending suitable production processes;
- identification of relevant materials properties in respect of the function of a product and based on that assess and select suitable materials; and
- assessment of the connection between materials, production processes and sustainability.

Competences

The students should be able to

- enter into a discipline-specific dialogue about the choice of materials and production processes in consideration of the framework given by the other core areas;
- in a consistent way account for and convey their choice of materials and processes; and
- independently acquire new knowledge of materials properties and production processes.

3.6 Business knowledge – 10 ECTS

The function of the Materials and production processes core area is to qualify the students to understand and work with the company's control systems.

Knowledge

The students should have acquired knowledge of

- business economics;
- production management systems;
- quality management;
- business organisation;
- environment, safety and work environment and current legislation; and
- internationalisation.

Skills

The students should be able to

- include economics as an important part of the decision-making basis for own solutions, including
 - assess the consequence for profit and loss account and balance sheet
 - contribute to making calculations
 - set up and assess budgets;
- process and assess statistical data material in connection with quality measurements;
- prepare instructions and procedures for quality management systems; and
- graphically illustrate material and information flows in the company.

Competences

The students should be able to

- enter into cooperation about the company's control and planning with the other core areas;
- contribute to preparing a company's business plan;
- create a total overview of the company's production and management systems; and
- independently acquire new knowledge about the core area.

3.7 Production technology – 7 ECTS

The function of the Production technology core area is to qualify the students to make a production-related preparation as well as plan and utilise a company's production assets.

Knowledge

The students should have acquired knowledge of

- manufacturing and production processes
- production principles, including
 - production layout
 - process and flow of goods;
- production basis;
- stock building and stock control;
- production-related time basis;
- allocation of production resources;
- cost prices;
- physical work environment in relation to the production; and
- methods for check measurement.

Skills

The students should be able to

- make a production layout;
- convert the construction basis to production basis;
- calculate cost prices; and
- compare alternative solutions for economics and resource consumption.

Competences

The students should be able to

- enter into a discipline-specific dialogue with the other core areas about product and production optimisation;
- prepare production plans based on the production basis and methodical planning tools; and
- independently acquire new knowledge about the core area.

3.8 Automation – 5 ECTS

The function of the Automation core area is to qualify the students to include automation in their own solutions within construction of products as well as planning of production in a given company.

Knowledge

The students should have acquired knowledge of

- control terminology, theories and methods used in automation;
- planning of pneumatics and hydraulics;
- commonly used electronic control solutions;
- mechanical components used in connection with pneumatics and hydraulics; and
- the structure of work pieces in relation to automated production.

Skills

The students should be able to

- make a simple control circuit;
- draw up a specification for an automation solution; and
- suggest improvements of a product in order to make it suited for automated production.

Competences

The students should be able to

- make a simple specification for use in developing automatic solutions in a production;
- include the consideration for a future automatic production of a given work piece or product in the design of constructions;
- independently acquire new knowledge within the core area; and
- assess automation potential based on a systems view of production plant.

4. Compulsory educational components

The study programme's compulsory educational components are:

- Basic construction and operation
- Automation

4.1 From product development to production (60 ECTS)

The "Basic construction and operation" compulsory educational component consists of the following core areas:

- Scientific method (8 ECTS)
- Product development (9 ECTS)
- Construction (11 ECTS)
- Technical documentation (6 ECTS)
- Materials and production processes (9 ECTS)
- Business knowledge (10 ECTS)
- Production technology (7 ECTS)

A total of 60 ECTS credits

The learning outcomes of the compulsory educational component are formed by and identical to the Knowledge, Skills and Competences of the core areas.

The compulsory educational component is examined at the

- **1st-year examination**, which covers the compulsory educational component "From product development to production" worth 60 ECTS credits. The learning outcomes for the educational component are identical to the learning outcomes for the examination.

4.2 Automation (5 ECTS)

The "Automation" compulsory educational component is identical to the Automation core area and has the same content, ECTS credits and learning outcomes.

The compulsory educational component is examined at the

- **Automation examination**, which covers the "Automation" educational component worth 5 ECTS. The learning outcomes for the educational component are identical to the learning outcomes for the examination.

5. Internship

The internship is organised in such a way that the students develop practical competences, in combination with the other parts of the programme. The purpose of the internship is to enable the students to use the study programme's methods, theories and tools by performing specific practical tasks and assignments within the study programme's core areas and the elective educational components which the students have attended.

ECTS credits

The internship constitutes 15 ECTS credits.

5.1 Internship learning outcomes

Knowledge

The students should have acquired knowledge of

- the specific company's overall financial circumstances and organisation;
- the overall company description – including products and markets;
- the context of the internship in relation to the company; and
- the role of the intern in relation to the company.

Skills

At an overall level and under guidance the students should be able to

- plan and implement own tasks in the company;
- use versatile acquired technical and analytical working methods related to employment in the profession; and
- assess and convey practice-oriented issues and set up possible solutions in the company.

Competences

At an overall level and under guidance the students should be able to

- manage and structure complex practical and discipline-related situations in relation to the company;
- acquire new knowledge, skills and competences related to the occupation
- take a professional approach to professional and interdisciplinary collaboration with others.

The internship is concluded by an assessment according to the 7-point grading scale.

6. The final degree project

The final degree project will be assessed at an individual, externally assessed examination. The exam consists of a written project report, a presentation and an oral examination.

The assessment will be made based on a total assessment of the project and the oral performance. One individual overall grade is given.

The purpose of the examination is to demonstrate whether the student has generally achieved the learning outcomes of the study programme as defined in appendix 1 of the Ministerial Order on the Academy Profession Degree Programme in Production Technology.

The final degree project may be based on a practical issue, and the problem statement and research question must be prepared by the student in collaboration with the educational institution and an external partner, if any. The educational institution must approve the problem statement and the research question.

The maximum allowed length of the report is 90,000 characters including spaces.

7. Overview of exams

Examination	ECTS distribution (a total of 120 ECTS credits)	Assessment
1st-year exam	60	7-point grading scale
Automation exam	5	7-point grading scale
Elective component exam(s) (dependent on the individual institutions, cf. the institutional section of this Curriculum)	25	7-point grading scale
Internship exam	15	7-point grading scale
Final exam	15	7-point grading scale

8. Credit transfer

Passed educational components are equivalent to the corresponding educational components offered by other educational institutions that offer the programme. The students must provide information on completed educational components from another Danish or international further education and on employment assumed to result in credit transfer. The educational institution will grant transfer credit in each individual case based on completed/passed educational components and occupations that match course units, parts of the study programme or parts of the internship. The decision is based on a professional assessment.

8.1 Pre-approved credit transfer

The students can apply for pre-approved credit transfer. Upon pre-approval of a study period in Denmark or abroad the students must, after conclusion of their study, document the completed educational components of the approved study. When applying for pre-approval, students must consent to allow the educational institution to collect any required information upon the students' completion of the study-abroad period. For the final approval of pre-approved credit transfer, the educational component is considered completed if it is passed in accordance with the regulations applying to the study programme.

8.2 Credit transfer agreements

None

9. Exemption

The institution may grant exemption from the rules in this institutional section of the curriculum that are laid down solely by the institution, when found substantiated in exceptional circumstances. The educational institutions co-operate on a uniform exemption practice.

10. Effective date and transition regulations

This national section of the Curriculum comes into effect on 15 August 2015 and applies to all students who are and will be registered for the programme and to all examinations commenced on said date or thereafter. Any transition regulations applying to students registered for studies prior to August 2015 can be found in the institutional section of this Curriculum.