BUSINESS ACADEMY AARHUS
UNIVERSITY OF APPLIED SCIENCES

Curriculum 2016

Joint national part

Bachelor in Product Development and Integrative Technology

Professionsbachelor i produktudvikling og teknisk integration

Revised October 2016

Content

1. Scope of the curriculum

This joint curriculum for the Bachelor programme Product Development and Integrative Technology is valid for the following institutions (educational network).

- Copenhagen School of Design and Technology (KEA)
- University College of Northern Denmark
- Lillebaelt Academy
- VIA University College
- Business Academy Aarhus

Any adjustments to the joint part of the curriculum will be carried out in the network on the basis of ongoing evaluations.

For the programme, the following laws and Ministerial Orders apply:

- Ministerial Order for Academies of Professional Higher Education
- Ministerial Order for Academy Profession degree programmes and Bachelor degree programmes (LEP law).
- Ministerial Order for Academy Profession degree programmes and Bachelor degree programmes (LEP Ministerial Order).
- Ministerial Order for examinations in higher educational business programmes
- Ministerial Order for Admission to Academy Profession degree programmes and Bachelor degree programmes (the Admissions Order)
- Ministerial Order for the marking scale and other types of evaluation for programmes connected to the Ministry of Higher Education and Science (the Marking Scale Order).
- Ministerial Order for the Bachelor Degree Programme in Product Development and Integrative Technology.

The applicable laws and ministerial orders are available on www.retsinfo.dk (in Danish only).

The purpose of the Bachelor's Degree Programme in Product Development and Integrative Technology is to provide graduates with the qualifications needed to independently and professionally integrate different technologies and forms of knowledge in connection with the development and construction of technical systems and products in industrial, production and installation companies, both nationally and internationally. In addition, the graduate should be able to manage interdisciplinary technical, management tasks.

The programme is a full-time, self-contained top-up for the Academy Profession Degree programmes within:

- Service Engineering (AP degree in Service Engineering)
- IT Network and Electronics Technology (AP degree in IT Technology)
- Production Technologist (AP degree in Production Technology)
- Energy Technology (AP degree in Energy Technology)
- Automation (AP degree in Automation Engineering)

The programme is worth 90 ECTS credits. 60 ECTS corresponds to a fulltime student's work for 1 year. The programme is a level-6 programme in the Danish Qualification's Framework for Lifelong Learning

Graduates are entitled to use the title:
Professionsbachelor i produktudvikling og teknisk integration.

The English title is:
Bachelor in Product Development and Integrative Technology

1.1. Effective date

This curriculum comes into effect on 1 August 2015 and applies to all students who are admitted to the programme from the study start in August 2015.

1.2. Transitional scheme

There are no transitional arrangements. Students that started before 1 August 2015 must follow the previous curriculum.

2. Admission to the programme

2.1. Requirements for the programme and subject distribution.

Admission with an Academy Profession Degree:
Automation Engineering
Energy Technology
Service Engineer, Electrical
Service Engineer, Plumbing
IT Network and Electronics Technology
Production Technology

No specific admission requirement:

Access via other relevant Academy Profession Degrees:
Automotive Technology
Environmental Technology

No specific admission requirements

3. Programme elements and programme modules

Programme elements	**ECTS credits**		
	Teaching	**Internship**	**in total**
Compulsory programme elements	55	15	70
Elective programme elements	5		5
Bachelor Project	15		15
in total	75	15	90

Table 1: Programme elements and the distribution of ECTS credits.

3.1. Timing of the programme elements in the programme

Programme for PDIT			
1st semester	Theoretical product development (15 ECTS)	Professional product development and design (15 ECTS)	
2nd semester	Sustainable product development (7 ECTS)	Interdisciplinary product development and design (18 ECTS)	Elective element (5 ECTS)
3rd semester	Internship (15 ECTS)	Bachelor project (15 ECTS)	

Table 2: Programme for PDIT

4. Core areas

The programme includes three core elements - hereafter referred to as interdisciplinary core elements - which cover all the study programmes, and three core areas that are unique to each of the programme's three study programmes (see the overview in table 3 below).
The programme comprises the following interdisciplinary core elements:

1. Technological project work 15 ECTS
2. Theory of science and methodology 10 ECTS
3. Integrative Technology 15 ECTS

In total 40 ECTS

The programme has the following core elements within each of the three study programmes, respectively: IT and Electronics, Installation and Automation as well as Development of Products and Production:

1. Innovative technology and product development 5 ECTS
2. Construction and project planning 5 ECTS
3. Environment and sustainability 5 ECTS

In total 15 ECTS.

Compulsory programme elements	Theoretical product development	Professional product development and design	Interdisciplinary product development and design	Sustainability in product development	In total
Interdisciplinary core elements					
Technological project work	5	4	4	2	**15**
Theory of science and methodology	5	2	2	1	**10**
Integrative Technology	5		9	1	**15**
In total	**15**	**6**	**15**	**4**	**40**
Core elements within each study programme					
Innovative technology and product development		4	1		**5**
Construction and project planning		4	1		**5**
Environment and sustainability		1	1	3	**5**
In total	**0**	**9**	**3**	**3**	**15**
In total 55 ECTS.	**15**	**15**	**18**	**7**	**55**

Table 3: Shows the relationships between the interdisciplinary core elements, core elements within each study programme and the compulsory programme elements on the programme.

4.1. Core elements Technological project work

Content
The core elements aim at providing the students with knowledge, skills and competencies within a problem-orientated and project based form of work and learning in the implementation of technological projects.

ECTS scale
15 ECTS

Learning objectives

Knowledge
The student will gain knowledge about:

- the methodological structure of technological project work
- at a basic level, management, project management, project control and project organisation in connection with the implementation of projects in companies

- the product development process in all of its phases – this includes being able to document the project's economic impact both during manufacture/construction and operation.

Skills
The student will get the skills to:

- evaluate the quality of technological project work in relation to results, validity, reliability, and relevance
- identify and contribute to the achievement of own learning needs during the project work
- understand the meaning of concepts and use in relation to the development of specialist language and technology
- define and implement appropriate product development in terms of both business and technology
- write project reports in accordance with standard, formal rules including rules for quotes and bibliographies.

Competencies
The student will learn to:

- create a project design for a technological project based on choice and an analysis of a problem
- communicate practice-orientated and professional issues as well as solutions to peers, users and partners in a business context
- use language as a communication tool in a reflected manner
- conceptualise open technological issues in order to define a solution
- use relevant IT tools for communication.

4.2. Core element theory of science and methodology

Content
This core element aims to give the student knowledge, skills and competencies within philosophy of science and methods for use in connection with the collection, processing and development of knowledge within the profession.
In addition, this element aims to strengthen the students' awareness of methods in relation to development based problem and task solving in practice.

ECTS scale
10 ECTS

Learning objectives

Knowledge
The student will gain knowledge about:

- prevailing scientific approaches relevant for illustrating the practice of the profession
- scientific methods including induction, deduction and hypothetical deductive methods
- different forms of knowledge used in the practice of the profession, including explicit and tacit knowledge and the development of technological solutions with in the profession
- the link between research and technological development.

Skills
The student will get the skills to:

- carry out minor analyses within the scope of the profession drawing on basic knowledge of quantitative and qualitative methods, including reliability and validity.

Competencies
The student will learn to:

- use scientific articles, reports and theses in connection with the processing of problems.

4.3. Core element integrative technology

Content
This core element aims to provide the students with background knowledge for working with integrative technology based on the graduate's role as integrator across the organisation and prevalent disciplinary boundaries and in relation to the company's surrounding, including competitors, customers and suppliers.

ECTS weight
15 ECTS

Learning objectives

Knowledge
The student will gain knowledge about:

- essential practical and theoretical aspects of integration in connection with products and systems, including the relationships between technology, technique, knowledge, organisation and product.

Skills
The student will get the skills to:

- identify essential practical and theoretical aspects of integration in connection with products and systems, including the relationships between technology, technique, knowledge, organisation and product
- understand business in relation to working with integrative technology
- understand product development and innovation in connection with the company's organisation
- identify and analyse significant aspects of a product's design, manufacture and use.

Competencies
The student will learn to:

- implement a needs and functional analysis for the purpose of product and technology development, also in connection with modifications of products and systems
- apply knowledge about the integration of multiple technologies to solve customer specific tasks.

5. Core elements within the study programme

5.1. Core element innovative technology and product development within the study programme

Content
The core element is intended to provide the students with knowledge, skills and competencies in the development of products and complex technical solutions by transforming and applying technical knowledge, methods, and analytical and practical skills once students have completed the Academy Profession Degree.

ECTS scale
5 ECTS

For the study programme: IT and electronics

Learning objectives

Knowledge
The student will gain knowledge about:

- theory and method and be able to reflect on practice within the field of innovation, product development and design of electronic systems, computer systems and network solutions
- the use and choice of the latest technologies in the field of electronic systems, computer systems and network solutions.

Skills
The student will get the skills to:

- identify needs for new solutions and participate in the development of new technologies in the profession
- use advanced electronic components, computerised components and network components in connection with product development.

Competencies
The student will learn to:

- define and implement appropriate product development of electronic systems, computerised systems and network solutions in terms of both business and technology
- perform the planning of development work
- plan and conduct testing of the product/solution (proof of concept).

For the study programme: Installation and automation

Learning objectives

Knowledge
The student will gain knowledge about:

- the theory and method and will be able to reflect on the practice within the fields of innovation and development of automated systems and installation solutions

- the use and choice of the latest technologies in automated systems installation systems, and technologies with interfaces to mechanical systems.

Skills
The student will get the skills to:

- identify needs for new solutions and participate in the development of new technologies with a view to optimising the installation solutions and automated systems
- use advanced components in developing installation solutions and automated systems.

Competencies
The student will learn to:

- define and implement appropriate development of installation solutions and automated systems in terms of both business and technology
- perform the planning of development work
- plan and conduct tests of the developed system/installation solutions (proof of concept).

For the study programme: Development of products and production

Learning objectives

Knowledge
The student will gain knowledge about:

- theory and method as well as be able to reflect on practice within the field of innovation, product development and design of industrial products as well as in the development of production systems
- and be able to explain the application and choice of materials and technologies in connection with the development and design of industrial products and within the development of production systems

Skills
The student will get the skills to:

- identify needs for new solutions and participate in the development of new products and new technology in the profession
- use advanced components in connection with new products and new technology in the profession.

Competencies
The student will learn to:

- define and implement appropriate development of products and production systems in terms of both business and technology
- perform the planning of development work
- plan and conduct testing of the product/solution (proof of concept).

5.2. Core element construction and project planning within the study programme

Content
This core element will give the students knowledge, skills and competencies within the construction of products, machines and appliances, as well project planning of complex technical systems and installations.

ECTS scale
5 ECTS

For the study programme: IT and electronics

Learning objectives

Knowledge
The student will gain knowledge about:

- the theory and method and will be able to reflect on the practice within the fields of electronics and data design and network project planning.

Skills
The student will get the skills to:

- apply CAD/CAE tools in connection with the design and analysis of electronic and computerised systems
- analyse, plan and realise implementation processes associated with the use of new technologies as well as identify their strengths and weaknesses.

Competencies
The student will learn to:

- choose plausible/relevant/possible methods of dimensioning which correspond to the requirements set out in the project
- engage in professional collaboration across the company's organisation regarding the construction of electronic and computerised systems, as well as the project planning of complex networks
- communicate professional problems and solutions to peers, clients and partners within the field of electronics and data design as well as network project planning.

For the study programme: Installation and automation

Learning objectives

Knowledge
The student will gain knowledge about:

- the theory and method and will be able to reflect on the practice within project planning and the optimisation of automated systems and installation solutions

Skills
The student will get the skills to:

- apply CAD/CAE tools in connection with the project planning of automated systems and installation solutions
- analyse, plan and realise implementation processes associated with the use of new components and technologies in installations and automated systems and to identify their strengths and weaknesses in the relation to operational conditions.

Competencies
The student will learn to:

- choose plausible/relevant/possible methods of dimensioning which correspond to the requirements set out in the project
- engage in professional collaboration across a company's organisation regarding project planning of installations and automated systems
- communicate professional problems and approaches to peers and partners and advise clients in connection with the project planning of installations and automated plants.

For the study programme: Development of products and production

Learning objectives

Knowledge
The student will gain knowledge about:

- theory and method as well as be able to reflect on practice within the construction of industrial products and the development of production systems

Skills
The student will get the skills to:

- apply CAD/CAE tools in connection with the design and construction of industrial products and the planning of production systems
- use ERP systems and contribute to their development/modification
- analyse, plan and realise implementation processes associated with the production linked to the use of new technologies and identify their strengths and weaknesses in the relation to operational conditions.

Competencies
The student will learn to:

- choose plausible/relevant/possible methods of dimensioning which correspond to the requirements set out in the project
- engage in professional collaboration across the company's organisation and carry out coordination tasks in relation to the construction of industrial projects and project planning of production systems
- communicate professional problems and solutions to peers, clients and partners within the field of construction of industrial projects and project planning of production systems.

5.3. Core element environment and sustainability within the study programme

Content
This core element intends to give students knowledge, skills and competencies within the development of sustainable and energy-efficient products and technological solutions in the light of the integration of several technologies.

ECTS scale
5 ECTS

For the study programme: IT and electronics

Learning objectives

Knowledge
The student will gain knowledge about:

- environmental and sustainability aspects of network installations and electronic and computerised structures, including energy consumption, EMC, power and environmental conditions regarding materials and components.
- how environmental and sustainability aspects affect a company's business
- management, planning and evaluation tools in the environmental field, including environmental management, environmental management systems and sustainability philosophies
- the EU's energy labelling rules.

Skills
The student will get the skills to:

- implement a Life Cycle Assessment (LCA) of network installations and the electronic and computerised products and devise procedures that ensure optimal environmental performance
- include environmental and sustainability considerations into product development.

Competencies
The student will learn to:

- carry out analyses and make changes in electronic and computerised instruments and network components/products by applying the latest technologies to reduce energy consumption and environmental impact in general
- apply knowledge of CSR (Corporate Social Responsibility) as well as the climate and environment in the development, construction and production of sustainable products and technical solutions
- apply knowledge about the life cycle of a product in the construction work or project planning.

For the study programme: Installation and automation

Learning objectives

Knowledge
The student will gain knowledge about:

- the environmental and sustainability aspects of installations and automated systems, including energy consumption, EMC, power and environmental conditions regarding materials and components
- how environmental and sustainability aspects affect a company's business
- management, planning and evaluation tools in the environmental field, including environmental management, environmental management systems and sustainability philosophies
- the EU's energy labelling rules.

Skills
The student will get the skills to:

- implement a Life Cycle Assessment (LCA) of installations and automated systems and devise procedures that ensure optimal environmental performance
- include environmental and sustainability considerations into product development.

Competencies
The student will learn to:

- carry out analyses and make changes in existing installations and automated systems by applying the latest technologies and components to reduce energy consumption and environmental impact in general
- apply knowledge of CSR (Corporate Social Responsibility) as well as the climate and environment in the development, construction and production of sustainable products and technical solutions
- apply knowledge about the life cycle of a product in the construction work or project planning.

For the study programme: Development of products and production

Learning objectives

Knowledge
The student will gain knowledge about:

- environmental and sustainability aspects of industrial products
- production systems, environment and sustainability aspects, including energy consumption, waste and environmental conditions relating to cleaning and the use of materials and processing aids in production
- how environmental and sustainability aspects affect a company's business
- management, planning and evaluation tools in the environmental field, including environmental management, environmental management systems and sustainability philosophies
- the EU's energy labelling rules.

Skills
The student will get the skills to:

- implement a Life Cycle Assessment (LCA) of industrial products and devise procedures that ensure optimal environmental performance
- include environmental and sustainability considerations into product development.

Competencies
The student will learn to:

- carry out analyses and make changes in existing products and production plants by applying the latest technologies and components to reduce energy consumption and environmental impact in general
- apply knowledge of CSR (Corporate Social Responsibility) as well as the climate and environment in the development, construction and production of sustainable products and technical solutions
- apply knowledge about the life cycle of a product in the construction work or project planning.

6. Compulsory programme elements within the programme's interdisciplinary core elements and the study programme's core elements

To support the programme's aim to ensure integrated product development between the specialisations/professions, the core elements within these study programmes are integrated into the interdisciplinary core elements of the programme.

To ensure that the individual study programmes are clearly defined, the learning objectives have been separated so that it is possible to see each study programme separately.

Compulsory programme elements:
The programme's compulsory programme elements across the study programmes are (as also shown in table 3):

1. Theoretical product development (15 ECTS)
2. Professional product development and design (15 ECTS)
3. Interdisciplinary product development and design (18 ECTS)
4. Sustainability in product development (7 ECTS)

In total 55 ECTS.

The four compulsory programme elements are completed with an exam. For the exam, the programme elements interdisciplinary core elements and the core elements connected to the study programme are examined separately.

6.1. Compulsory programme element: Theoretical product development

Content
The first project on the programme is carried out on the basis of three themes. The project should generally create an overall foundation that allows the student to transform their Academy Profession background to an individual learning process, which aims at obtaining a bachelor's degree.

ECTS scale
15 ECTS, of which

- 5 ECTS from the core element technological project work
- 5 ECTS from the core element theory of science and method
- 5 ECTS from the core element integrative technology

Learning objectives

Knowledge
The student will gain knowledge about:

- the methodological structure of technological project work
- management, project management, project control and project organisation in connection with the implementation of projects in companies
- prevailing scientific approaches relevant for illustrating the practice of the profession
- scientific methods including induction, deduction and hypothetical deductive methods
- the link between research and technological development
- essential practical and theoretical aspects of integration in connection with products and systems, including the relationships between technology, technique, knowledge, organisation and product.

Skills
The student will get the skills to:

- identify and contribute to the achievement of own learning needs during the project work
- write project reports in accordance with standard, formal rules including rules for quotes and bibliographies
- understand product development and innovation in connection with the company's organisation
- understand business in relation to working with integrative technology.

Competencies
The student will learn to:

- create a project design for a technological project based on choice and an analysis of a problem
- use relevant IT tools for communication.

Assessment
The compulsory programme element theoretical product development and design is completed with an exam.
The exam is assessed according to the 7-point scale and constitutes 15 ECTS.
The learning objective for the programme element is identical to the learning objective for the exam.

Please see the institutional part of the curriculum for a description of the exams' form and organisation.

6.2. Compulsory programme element: Professional product development and design

Content
The programme element is intended to give the students knowledge, skills and competencies in the development of products and complex technical solutions by transforming and applying technical knowledge, methods, and analytical and practical skills once students have completed the Academy Profession Degree. Further, the students must be able to include interdisciplinary issues in the preparation of a solution within their own area.

ECTS weight
15 ECTS, of which:

- 4 ECTS from the core element technological project work
- 2 ECTS from the core element theory of science and method

Furthermore, there are 5 ECTS from the study programme's core elements, which are the same across the three study programmes:

- 4 ECTS from the core element innovation and product development
- 4 ECTS from the core element construction and project planning
- 1 ECTS from the core element environment and sustainability.

Learning objectives

Knowledge
The student will gain knowledge about:

- different forms of knowledge used in the practice of the profession, including explicit and tacit knowledge
- methodologies learnt within the idea development, idea generation and innovation.

Furthermore, for the **study programme IT and electronics**:

- theory and method as well as reflect on practice within the field of innovation, product development and design of electronic systems, computer systems and network solutions.
- the use and choice of the latest technologies in the field of electronic systems, computer systems and network solutions.

Furthermore, for the **study programme installation and automation**:

- the theory and method and will be able to reflect on the practice within the fields of innovation and development of automated systems and installation solutions
- the use and choice of the latest technologies in automated systems installation systems, technologies with interfaces to mechanical systems.

Furthermore, for the **study programme development of products and production:**

- theory and method as well as be able to reflect on practice within the field of innovation, product development and design of industrial products as well as in the development of production systems

- and be able to explain the application and choice of materials and technologies in connection with the development and design of industrial products and within the development of production systems

Skills
The student will get the skills to:

- define and implement appropriate product development in terms of both business and technology
- identify needs for new solutions and participate in the development of new technologies in the profession
- conceptualise open technological issues in order to define a solution
- implement a needs and functional analysis for the purpose of product and technology development, also in connection with modifications of products and systems
- include environmental and sustainability considerations into product development.

Furthermore, for the **study programme IT and electronics**:

- use advanced electronic components, computerised components and network components in connection with product development.

Furthermore, for the **study programme installation and automation**:

- use advanced components in developing installation solutions and automated systems.

Furthermore, for the **study programme development of products and production:**

- use advanced components in connection with the development of products and production systems in connection with product development.

Competencies
The student will learn to:

- understand the meaning of concepts and use in relation to the development of specialist language and technology
- carry out minor analyses within the scope of the profession drawing on basic knowledge of quantitative and qualitative methods, including reliability and validity
- communicate practice-orientated and professional issues as well as solutions to peers, users and partners in a business context
- perform the planning of development work
- implement the planning of the product/solution.

Assessment
The compulsory programme element professional product development and design is completed with an exam.
The exam is assessed according to the 7-point scale.
The learning objective for the programme element is identical to the learning objective for the exam.
Please see the institutional part of the curriculum for a description of the exams' form and organisation.

6.3. Compulsory programme element: Interdisciplinary product development and design

Content
The programme element is intended to give the students knowledge, skills and competencies in the development of products and complex technical solutions by transforming and applying technical knowledge, methods, and analytical and practical skills. The emphasis is on the interdisciplinary and practical application of core elements for a complex issue.

ECTS weight
18 ECTS, of which:

- 4 ECTS from the core element technological project work
- 2 ECTS from the core element theory of science and method
- 9 ECTS from the core element integrative technology

Furthermore, there are 3 ECTS from the study programme's core elements, which are the same across the three study programmes:

- 1 ECTS from the core element innovation and product development
- 1 ECTS from the core element construction and project planning
- 1 ECTS from the core element environment and sustainability.

Learning objectives

Knowledge
The student will gain knowledge about:

- the product development process in all of its phases – this includes being able to document the project's economic impact both during manufacture/construction and operation
- the link between research and technological development.

Furthermore, for the **study programme IT and electronics**:

- the theory and method and will be able to reflect on the practice within the fields of electronics and data design and network project planning.

Furthermore, for the **study programme installation and automation**:

- the theory and method and will be able to reflect on the practice within project planning and the optimisation of automated systems and installation solutions.

Furthermore, for the **study programme development of products and production:**

- theory and method as well as be able to reflect on practice within the construction of industrial products and the development of production systems

Skills
The student will get the skills to:

- identify and analyse significant aspects of a product's design, manufacture and use
- identify essential practical and theoretical aspects of integration in connection with products and systems, including the relationships between technology, technique, knowledge, organisation and product

- evaluate the quality of technological project work in relation to results, validity, reliability, and relevance.

Furthermore, for the **study programme IT and electronics**:

- analyse, plan and realise implementation processes associated with the use of new technologies as well as identify their strengths and weaknesses
- apply CAD/CAE tools in connection with the design and analysis of electronic and computerised systems.

Furthermore, for the **study programme installation and automation**:

- analyse, plan and realise implementation processes associated with the use of new components and technologies in installations and automated systems and to identify their strengths and weaknesses in the relation to operational conditions
- apply CAD/CAE tools in connection with the project planning of automated systems and installation solutions

Furthermore, for the **study programme development of products and production:**

- analyse, plan and realise implementation processes associated with the production linked to the use of new technologies and identify their strengths and weaknesses in the relation to operational conditions
- apply CAD/CAE tools in connection with the design and construction of industrial products and the planning of production systems
- use of ERP systems and contribute to their development/modification.

Competencies
The student will learn to:

- use scientific articles, reports and theses in connection with the processing of problems
- implement parts of a design process in relation to the phase the project is in, and according to the demands in the project formulation – this includes being able to document the economic impact of the project phase during manufacturing/construction and operation
- choose plausible/relevant/possible methods of dimensioning which correspond to the requirements set out in the project
- engage in professional collaboration across the company's, organisation and perform coordination tasks
- apply knowledge about the integration of multiple technologies to solve customer specific tasks.

Furthermore, for the **study programme IT and electronics**:

- communicate professional problems and solutions to peers, clients and partners within the field of electronics and data design as well as network project planning
- define and implement appropriate product development in terms of both business and technology.

Furthermore, for the **study programme installation and automation**:

- communicate professional problems and approaches to peers and partners and advise clients in connection with the project planning of installations and automated plants
- define and implement appropriate development of installation solutions and automated systems in terms of both business and technology.

Furthermore, for the **study programme development of products and production:**

- communicate professional problems and solutions to peers, clients and partners within the field of construction of industrial projects and project planning of production systems
- define and implement appropriate development of products and production systems in terms of both business and technology.

Assessment
The compulsory programme element interdisciplinary product development and design is completed with an exam.
The exam is assessed according to the 7-point scale.
The learning objective for the programme element is identical to the learning objective for the exam.
Please see the institutional part of the curriculum for a description of the exams' form and organisation.

6.4. Compulsory programme element: Sustainability in product development

Content
This programme element intends to give students knowledge, skills and competencies within the development of sustainable and energy-efficient products and technological solutions in the light of the integration of several technologies. The element is completed as one or more joint projects across the programme's study programmes, based on the environmental and sustainability aspects, which have been part of the previous learning elements.

ECTS weight
7 ECTS, of which:

- 2 ECTS from the core element technological project work
- 1 ECTS from the core element theory of science and method
- 1 ECTS from the core element integrative technology

Furthermore, there are 3 ECTS from the study programme's core elements, which are the same across the three study programmes:

- 3 ECTS from the core element environment and sustainability.

Learning objectives

Knowledge
The student will gain knowledge about:

For the **study programme IT and electronics**:

- environmental and sustainability aspects of network installations and electronic and computerised structures, including energy consumption, EMC, power and environmental conditions regarding materials and components.

For the **study programme installation and automation**:

- environmental and sustainability aspects of installations and automated systems, including energy consumption, EMC, power and environmental conditions regarding materials and components.

For the **study programme development of products and production:**

- production systems, environment and sustainability aspects, including energy consumption, waste and environmental conditions relating to cleaning and the use of materials and processing aids in production.

Skills

The student will get the skills to:

- implement a Life Cycle Assessment (LCA)

Competencies

The student will learn to:

- apply knowledge of CSR (Corporate Social Responsibility) as well as the climate and environment in the development, construction and production of sustainable products and technical solutions
- apply knowledge about the life cycle of a product in the construction work or project planning
- use language as a communication tool in a reflected manner.

Furthermore, for the **study programme IT and electronics**:

- carry out analyses and make changes in electronic, computerised instruments and network components/products by applying the latest technologies to reduce energy consumption and environmental impact in general.

Furthermore, for the **study programme installation and automation**:

- carry out analyses and make changes in existing installations and automated systems by applying the latest technologies and components to reduce energy consumption and environmental impact in general.

Furthermore, for the **study programme development of products and production:**

- carry out analyses and make changes in existing products and production plants by applying the latest technologies and components to reduce energy consumption and environmental impact in general.

Assessment

The compulsory programme element sustainability in product development is completed with an exam.
The exam is assessed according to the 7-point scale.
The learning objective for the programme element is identical to the learning objective for the exam.
Please see the institutional part of the curriculum for a description of the exams' form and organisation.

7. Internship

The internship is organised in a way that, combined with the remaining parts of the course programme, will contribute to the student developing practical competencies. The internship

must help the student become capable of using the programme's methods, theories and tools in solving practical tasks within the programme's core elements.

The learning objectives and content description for the internship are formulated by the student in cooperation with the Academy and the company in compliance with the following internship objectives for the programme.

ECTS scale
15 ECTS

Learning objectives

Knowledge
The student will gain knowledge about:

- the company's concrete business economic and organisational conditions
- the overall company description – including products and markets
- the context into which the internship is incorporated in relation to the company
- the role of the intern in relation to the company.

Skills
The student will get the skills to:

- plan and implement systematic development tasks within the company, and incorporate interdisciplinary elements in the process
- choose and apply appropriate theoretical and analytical working methods which are related to development within the profession
- communicate issues and propose solutions for the company and its stakeholders.

Competencies
The student will learn to:

- handle complex practical and professional situations in relation to the company
- identify their own learning needs, and acquire new knowledge, skills and competencies
- independently participate in academic and interdisciplinary cooperation in a professional manner.

Assessment
The assessment is based on the specific learning objectives agreed on between the relevant parties – the student, the company (ies) and the programme supervisor.
The internship is completed with an exam. Please see the institutional part of the curriculum for a description of the exams' form and organisation.

8. Bachelor Project

ECTS weight
15 ECTS

The bachelor project must document that the student has reached the programme's objectives in relation to the programme's combined learning outcomes. The student must demonstrate the

abilities, in an analytic and methodological basis, to be able to work with complex and real-life issues in relation to a specific task within the programme's objectives.

Learning objectives
The final bachelor's degree project must document that the programme's objectives have been achieved, cf appendix 1, Ministerial Order for Bachelor's Degree Programme in Product Development and Integrative Technology. The goals for the learning outcomes include the knowledge, skills and competencies, which a Bachelor in Product Development and Integrative Technology must achieve during the programme.

Knowledge
The graduate is able to:

- reflect on the theory and practice of the profession within the field of product development and integrative technology on the basis of a technology concept, which includes the elements technique, knowledge, organisation and product,
- combine relevant theory of science with technical and technological issues within the field of product development and integrative technology,
- understand the various disciplines of the programme in relation to product development, construction and technical project planning as well as technical integration in various types of companies and
- understand the importance of ethical issues in the context of product development and integrative technology with particular focus on the environment, safety and sustainability.

The graduate within the **study programme IT and electronics** also has:

- subject-specific knowledge of methods and theory for the development, project planning and application of IT and network solutions as well as electronic and computerised systems.

The graduate within the **study programme installation and automation** also has:

- subject-specific knowledge about methods and theory for development, project planning and implementation for complex building and industrial installations as well as the optimisation and operation of automated systems

The graduate with the **study programme development of products and production** also has:

- subject-specific knowledge about methods and theory for development, project planning and implementation within the design and construction of industrial projects as well as optimisation and operation of production systems

Skills
The graduate is able to:

- evaluate, select and apply methods and tools for product development, construction and technical project planning as well as technical integration,
- apply methods for the development of products and complex technical solutions within the profession,
- evaluate and include issues within the fields of energy, the environment, ethics and sustainability in a concrete and practical manner for the development of products and technical solutions,
- collect and communicate relevant knowledge within research and development and evaluate and apply results in product development and integral technology and

- communicate technical issues and probable solutions to customers, partners, suppliers and internally in the company.

The graduate with the **study programme IT and electronics** can also:

- evaluate, select and justify the use of methodology in the field of complex IT and network solutions as well as electronic and computerised systems.

The graduate within the **study programme installation and automation** can also:

- evaluate, select and justify the use of methodology within complex building and industrial installations and the optimisation and operation of automated systems.

The graduate with the **study programme development of products and production** can also:

- evaluate, select and justify the use of methodology within design, design and construction of industrial products and the optimisation and operation of production systems.

Competencies

The graduate is able to:

- manage product development, construction and technical project planning by involving internal and external business partners and customers in relation to the product's or service's development, manufacture, use and disposal or cessation,
- independently and in collaboration with others, manage complex development-orientated situations across disciplines and the companies organisation,
- handle technical interdisciplinary management tasks, including project management, and
- identify own learning needs and prepare a strategy or plan to satisfy the need for knowledge, skills or competencies.

The graduate with the **study programme IT and electronics** can also:

- cooperate with other professional groups in connection with complex IT and networking solutions as well as electronic and computerised systems, which should be integrated in interdisciplinary projects, and
- further develop own professional, interdisciplinary and methodological knowledge, skills and competences in the area of complex IT and networking solutions as well as electronic and computerised systems in relation to the development of interdisciplinary technical solutions.

The graduate within the **study programme installation and automation** can also:

- cooperate with other professional groups in connection with complex building and industrial installations as well as the optimisation and operation of automated systems and
- further develop own professional, interdisciplinary and methodological knowledge, skills and competencies in the area of complex building and industrial installations and within optimisation and operation of automated systems in relation to interdisciplinary technical solutions.

The graduate with the **study programme development of products and production** can also:

- cooperate with other professional groups in connection with the design, the design and construction of industrial products, and the optimisation and operation of production systems which need to be integrated in interdisciplinary projects and
- further develop own professional, interdisciplinary and methodological knowledge, skills and competencies in the area design, the design and construction of industrial products

and within optimisation and operation of production systems in relation to interdisciplinary technical solutions.

Assessment
The examination is external and is assessed according to the 7-point scale.

The examination consists of a project report and an oral defence. A single mark is given. The exam can only be taken after the final intern examination and all other exams of the programme have been passed.
Please see the institutional part of the curriculum for a description of the exams' form and organisation.

9. Credit

Passed programme elements are equivalent to similar programme elements taken at other educational institutions offering this programme.
The students are obliged to inform us of any completed educational elements from another Danish or foreign higher education programme or any jobs which are likely to provide credit. The Academy approves, in each instance, credit on the basis of completed programme elements and any jobs which meet the objectives of the subjects, the educational part and the internship parts. The decision is taken according to an academic assessment.

9.1. Prior credit approval

The student has the right to credit for parts of a programme on the basis of already achieved qualifications and competencies. Credit is granted by the individual educational institution on the basis of documented, completed teaching and employment, which are comparable with the subjects, the programme parts and the internship in which the credit is applied for.

10. Rules of exemption

The Academy can, in exceptional circumstances, grant dispensation to the regulations of the curriculum set by the institutions. All the business academies which offer a Bachelor programme in Product Development and Integrative Technology cooperate for a uniform exemption practice.

11. Approval

This joint part of the curriculum has been endorsed and approved by the education network for professional Bachelor degree programmes in Product Development and Integrative Technology.