KØBENHAVNS ERHVERVSAKADEMI

Curriculum

The Bachelor's Degree Programme in Product Development and Integrative Technology (PTI)

Last revised: July 2015

Effective date: 1 August 2015

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1. Curriculum framework

This is an English translation of the curriculum (studieordning). In the event of a discrepancy between the translation and the Danish version, the Danish text published on kea.dk is valid.

The common part of the curriculum for the Bachelor's Degree Programme in Product Development and Integrative Technology has been prepared jointly by the following institutions (the educational network).

- Copenhagen School of Design and Technology
- University College of Northern Denmark
- Lillebaelt Academy
- VIA University College

Adjustments in the common part of the curriculum are made by the educational network on the basis of ongoing evaluations.

The following acts and ministerial orders apply to the programme:

- Danish (Consolidated) Act on Academies of Professional Higher Education
- Danish (Consolidated) Act on Academy Profession Programmes and Professional Bachelor Programmes
- Ministerial Order on Academy Profession Programmes and Professional Bachelor Programmes
- Ministerial Order on Examinations on Professionally Oriented Higher Education Programmes
- Ministerial Order on Admission to and Enrolment on Academy Profession Programmes and Professional Bachelor Programmes (the Admissions Order)
- Ministerial Order on the Grading Scale and Other Forms of Assessment of Study Programmes Offered under the Ministry of Higher Education and Science (the Grading Scale Order)
- Ministerial Order on the Bachelor's Degree Programme in Product Development and Integrative Technology

Applicable acts and ministerial orders are published on www.retsinfo.dk.

The purpose of the Bachelor's Degree Programme in Product Development and Integrative Technology is to provide the 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. Furthermore, graduates must be able to handle interdisciplinary technical, managerial tasks.

The programme is a full-time, independent top-up programme onto which students can be admitted if they have completed one of the following academy profession programmes:

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

The programme corresponds to 90 ECTS credits. 60 ECTS credits are equivalent to one year of full-time study. The programme is a level-6 programme in the Danish Qualifications Framework for Lifelong Learning.

Having completed the programme, graduates are entitled to use the Danish title:
Professionsbachelor i produktudvikling og teknisk integration

The English title is:
Bachelor of Product Development and Integrative Technology
The Danish programme title is *Professionsbacheloruddannelsen i Produktudvikling og Teknisk integration.*

1.1. Effective date
This curriculum comes into effect on 1 August 2015 and applies to all students admitted to the programme from the commencement of studies in August 2015.

1.2. Transitional arrangements
There are no transitional arrangements. Students who started before 1 August 2015 follow the study programme rules set out in previously applicable curricula.

1.3. Reading instructions
All text marked with blue relates to the institution-specific part of the curriculum, i.e. topics specifically applicable to KEA. Black text relates to the common part of the curriculum.

2. Admission

2.1. Educational requirements and distribution of subjects

Admission via academy profession programme:
AP Graduate in Automation Engineering
AP Graduate in Energy Technology
AP Graduate in Service Engineering (high-voltage technology)
AP Graduate in Service Engineering (plumbing technology)
AP Graduate in IT Technology
AP Graduate in Production Technology
No specific admission requirements

Admission via other relevant academy profession programme:
No specific admission requirements

2.2. Academic criteria for the selection of applicants

No common criteria have been defined for admission to the top-up programme by the educational network. If the number of applications received by KEA exceeds the number of places available on the programme, admission will be granted on the basis of a personal interview which is to establish whether the applicant has the necessary motivation and qualifications to complete the programme. If personal interviews cannot be conducted, admission will be granted based on average grade.

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 distribution of ECTS credits

3.1. Sequencing of programme elements, internship and exams

Course of study for PTI			
First semester	Theoretical Product Development (15 ECTS)	Professional Product Development and Design (15 ECTS)	
Second semester	Sustainable Product Development (7 ECTS)	Interdisciplinary Product Development and Design (18 ECTS)	Elective programme element (5 ECTS)
Third semester	Internship (15 ECTS)	Bachelor project (15 ECTS)	

Table 2: Course of study for PTI.

3.2. Core areas

The programme contains three core areas (hereinafter referred to as interdisciplinary core areas) covering all the specialisations on the programme and three core areas that are unique to each of the three specialisations on the programme, see overview in Table 3.

The programme contains the following interdisciplinary core areas:

1. Technological Project Work (15 ECTS)
2. Theory of Science and Method (10 ECTS)
3. Integrative Technology (15 ECTS)

A total of 40 ECTS

The programme covers the following core areas within each of the three specialisations:

Core areas within the **IT and Electronics** specialisation:

1. Innovative Technology and Product Development (5 ECTS)
2. Construction and Project Planning (5 ECTS)

3. Environment and Sustainability (5 ECTS)

A total of 15 ECTS

Core areas within the **Installation and Automation** specialisation:
1. Innovative Technology and Product Development (5 ECTS)
2. Construction and Project Planning (5 ECTS)
3. Environment and Sustainability (5 ECTS)

A total of 15 ECTS

Core areas within the **Development of Products and Productions** specialisation:
1. Innovative Technology and Product Development (5 ECTS)
2. Construction and Project Planning (5 ECTS)
3. Environment and Sustainability (5 ECTS)

A total of 15 ECTS

Compulsory programme elements	Theoretical Product Development	Professional Product Development and Design	Interdisciplinary Product Development and Design	Sustainability in Product Development	
Core areas					
Technological Project Work	5	4	4	2	**15**
Theory of Science and Method	5	2	2	1	**10**
Integrative Technology	5		9	1	**15**
A total of 40 ECTS	**15**	**6**	**15**	**4**	**40**
Core areas within each specialisation					
Innovative Technology and Product Development		4	1		**5**
Construction and Project Planning		4	1		**5**
Environment and Sustainability		1	1	3	**5**
A total of 15 ECTS	**0**	**9**	**3**	**3**	**15**
A total of 55 ECTS	**15**	**15**	**18**	**7**	**55**

Table 3: Shows the correlation between interdisciplinary core areas, core areas within each specialisation and compulsory programme elements on the programme.

3.2.1 Core area Technological Project Work

Contents
The core area is intended to provide students with knowledge, skills and competencies related to problem-based and project-oriented types of work and learning in connection with technological projects.

No. of ECTS

15 ECTS

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Explain the methodological structure of technological project work
- Explain, at a basic level, management, project management, project control and project organisation in connection with the implementation of projects in companies
- Explain every phase of a product development process – including to document the financial impact of the project during both production/construction and operation

Skills
The student has acquired the skills needed to:

- Assess the quality of technological project work in relation to results, validity, reliability and relevance
- Identify and contribute to the fulfilment of own learning needs during the project work
- Understand the meaning and use of concepts 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 according to standard formal rules, including rules for quotes and references

Competencies
The student has acquired the competencies needed to:

- Create a project design for a technological project on the basis of choice and analysis of a problem
- Communicate practice-oriented and professional issues and solution models to colleagues, users and partners in a business context
- Use language as a communication tool in a reflective manner
- Conceptualise open, technological issues with a view to defining the solution space
- Apply relevant IT-based tools in the communication

3.2.2. Core area Theory of Science and Method

Contents
The core area is intended to provide students with knowledge, skills and competencies in relation to the theory of science and methods for use in connection with the collection, processing and development of knowledge within the profession.
The area also aims at strengthening the students' awareness of method in relation to development-based solving of problems and tasks in practice.

No. of ECTS
10 ECTS

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Explain prevailing scientific approaches relevant for illustrating the practice of the profession
- Explain scientific methods, including induction, deduction and hypothetical deductive methods
- Account for different forms of knowledge used in the practice of the profession, including explicit and tacit knowledge and the development of technological solutions within the scope of the profession
- Explain the correlation between research and technological development

Skills
The student has acquired the skills needed to:

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

Competencies

The student has acquired the competencies needed to:

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

3.2.3. Core area Integrative Technology

Contents
The core area is intended to provide students with background knowledge for working with integrative technology on the basis of the graduate's role as integrator across the organisation and prevalent disciplinary boundaries and in relation to the company's surroundings, including competitors, customers and suppliers.

No. of ECTS
15 ECTS

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

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

Skills
The student has acquired the skills needed to:

- Identify essential practical and theoretical aspects of the integration in connection with products and systems, including the relations between technology, technique, knowledge, organisation and product
- Demonstrate business understanding in relation to working with integrative technology
- Understand product development and innovation in connection with the company's organisation
- Identify and analyse significant issues in relation to the design, manufacture and use of a product

Competencies
The student has acquired the competencies needed to:

- Carry out needs and functional analyses for the purpose of product and technology development, including in connection with modifications to products and systems
- Apply knowledge about the integration of several technologies for solving customer-specific tasks

3.2.4. Core area Innovative Technology and Product Development within the specialisations

Contents
The core are is intended to provide students with knowledge, skills and competencies in connection with the development of products and complex technical solutions by transforming and applying technical knowledge, methods and analytical and practical skills in the context of the completed academy profession programme.
No. of ECTS
5 ECTS

3.2.4.1. IT and Electronics specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the theory and methodology and reflect on the practice within the fields of innovation, product development and design of electronic systems, computerised systems and network solutions
- Explain the application and choice of the latest technologies within electronic systems, computerised systems and network solutions

Skills
The student has acquired the skills needed to:

- Identify the need for new solutions and contribute to the development of new technology within the profession
- Use advanced electronic components, computerised components and network components in connection with product development

Competencies
The student has acquired the competencies needed to:

- Define and implement the appropriate product development of electronic systems, computerised systems and network solutions in terms of both business and technology
- Perform the planning of the development work
- Plan and carry out tests of the product/solution (proof of concept)

3.2.4.2. Installation and Automation specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the theory and methodology and reflect on the practice within the fields of innovation and development of automatic systems and installation solutions
- Explain the application and choice of the latest technologies within automatic systems and installation solutions, including technologies with interfaces to mechanical systems

Skills
The student has acquired the skills needed to:

- Identify the need for new solutions and contribute to the development of new technology with a view to optimising installation solutions and automatic systems
- Use advanced components in connection with the development of installation solutions and automatic systems

Competencies
The student has acquired the competencies needed to:

- Define and implement the appropriate development of installation solutions and automatic systems in terms of both business and technology
- Perform the planning of the development work
- Plan and carry out tests of the developed system/installation solution (proof of concept)

3.2.4.3. Development of Products and Productions specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the theory and methodology and reflect on the practice within the fields of innovation, product development and design of industrial products and within the development of production systems
- 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 has acquired the skills needed to:

- Identify the need for new solutions and contribute to the development of new products and technology within the profession
- Use advanced components in connection with new products and technology within the profession

Competencies

The student has acquired the competencies needed to:

- Define and implement the appropriate development of products and production systems in terms of both business and technology
- Perform the planning of the development work
- Plan and carry out tests of the product/solution (proof of concept).

3.2.5. Core area Construction and Project Planning within the specialisation

Contents
The core area is intended to provide students with knowledge, skills and competencies within the construction of products, machines and instruments and the project planning of complex technical systems and installations

No. of ECTS
5 ECTS

3.2.5.1. IT and Electronics specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the theory and methodology and reflect on the practice within the fields of electronics and data construction as well as network project planning

Skills
The student has acquired the skills needed to:

- Apply CAD/CAE tools in connection with the design and analysis of electronic and computerised systems
- Analyse, plan and realise implementation processes linked to the use of new technologies and to identify their strengths and weaknesses

Competencies
The student has acquired the competencies needed to:

- Choose plausible/relevant/possible methods of dimensioning corresponding to the requirements set out in the project description
- Engage in professional collaboration across companies' organisation regarding the construction of electronic and computerised systems as well as project planning of complex networks
- Communicate professional problems and solutions to colleagues, clients and partners within the fields of electronics and data construction as well as network project planning

3.2.5.2. Installation and Automation specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the theory and methodology and reflect on the practice within project planning and optimisation of automatic systems and installation solutions

Skills
The student has acquired the skills needed to:

- Apply CAD/CAE tools in connection with project planning of automatic systems and installation solutions

- Analyse, plan and realise implementation processes linked to the use of new components and technologies in installations and automatic systems and to identify their strengths and weaknesses in relation to operational conditions

Competencies
The student has acquired the competencies needed to:
- Choose plausible/relevant/possible methods of dimensioning corresponding to the requirements set out in the project description
- Engage in professional collaboration across companies' organisation regarding project planning of installations and automatic systems
- Communicate professional problems and solutions to colleagues and partners and advise clients in connection with the project planning of installations and automatic systems

3.2.5.3. Development of Products and Productions specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:
- Account for the theory and methodology and reflect on the practice within the construction of industrial products and the development of production systems

Skills
The student has acquired the skills needed to:
- Apply CAD/CAE tools in connection with the design and construction of industrial products and the project planning of production systems
- Use ERP systems and contribute to their development/change
- Analyse, plan and realise implementation processes in the production linked to the use of new technologies and identify their strengths and weaknesses in relation to optimal operational conditions

Competencies
The student has acquired the competencies needed to:
- Choose plausible/relevant/possible methods of dimensioning corresponding to the requirements set out in the project description
- Engage in professional collaboration across the company's organisation and carry out coordination tasks in relation to the construction of industrial products and project planning of production systems
- Communicate professional problems and solutions to colleagues, clients and partners within the fields of construction of industrial projects and network project planning of production systems

3.2.6. Core area Environment and Sustainability within the specialisations

Contents
The core area is intended to provide students with knowledge, skills and competencies within the development of sustainable and energy-efficient products and technological solutions in the light of the integration of various technologies.

No. of ECTS
5 ECTS

3.2.6.1. IT and Electronics specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the environmental and sustainability aspects of network installations and electronic and computerised structures, including energy consumption, EMC, power and environmental conditions regarding materials and components
- Understand how the environmental and sustainability aspect affects a company's business
- Demonstrate general knowledge about management, planning and assessment tools in the environmental area, including environmental management, environmental management systems and philosophies of sustainability
- Account for EU's rules governing energy labelling

Skills
The student has acquired the skills needed to:
- Carry out a life cycle assessment (LCA) of network installations and electronic and computerised products and to establish practices ensuring optimal environmental performance
- Incorporate environmental and sustainability concerns into the product development

Competencies
The student has acquired the competencies needed to:
- Carry out analyses and changes of electronic and computerised instruments and network components/products by using the latest technologies to reduce energy consumption and the environmental impact in general
- Apply knowledge about Corporate Social Responsibility (CSR) and about the climate and the environment in the development, construction and manufacture of sustainable products and technical solutions
- Apply knowledge about the life cycle of a product in the construction work or in the project planning

3.2.6.2. Installation and Automation specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:
- Account for the environmental and sustainability aspects of installations and automatic systems, including energy consumption, EMC, power and environmental conditions regarding materials and components
- Understand how the environmental and sustainability aspect affects a company's business
- Demonstrate general knowledge about management, planning and assessment tools in the environmental area, including environmental management, environmental management systems and philosophies of sustainability
- Account for EU's rules governing energy labelling

Skills
The student acquires the skills needed to:
- Carry out a life cycle assessment (LCA) of installations and automatic systems and establish practices ensuring optimal environmental performance
- Incorporate environmental and sustainability concerns into the product development

Competencies
The student acquires the competencies needed to:
- Carry out analyses and changes of existing installations and automatic systems by using the latest technologies and components to reduce energy consumption and the environmental impact in general
- Apply knowledge about Corporate Social Responsibility (CSR) and about the climate and the environment in the development, construction and manufacture of sustainable products and technical solutions
- Apply knowledge about the life cycle of a product in the construction work or in the project planning

3.2.6.3. Development of Products and Productions specialisation

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the general environmental and sustainability aspects of industrial products
- Account for the environmental and sustainability aspects of production systems, including energy consumption, waste and environmental conditions regarding the cleaning and use of materials and processing aids in the production
- Understand how the environmental and sustainability aspect affects a company's business
- Demonstrate general knowledge about management, planning and assessment tools in the environmental area, including environmental management, environmental management systems and philosophies of sustainability
- Account for EU's rules governing energy labelling

Skills
The student has acquired the skills needed to:

- Carry out a life cycle assessment (LCA) of industrial products and establish practices ensuring optimal environmental performance
- Incorporate environmental and sustainability concerns into the product development

Competencies
The student has acquired the competencies needed to:

- Perform analyses and changes of existing products and production plants by using the latest technologies and components to reduce energy consumption and the environmental impact in general
- Apply knowledge about Corporate Social Responsibility (CSR) and about the climate and the environment in the development, construction and manufacture of sustainable products and technical solutions
- Apply knowledge about the life cycle of a product in the construction work or in the project planning

3.3. Compulsory programme elements within the core areas

To support the aim of the programme to ensure integrated product development between the specialisations of the professions, the core areas within the specialisations are integrated into the interdisciplinary programme elements, taking place in parallel with the learning objectives for the interdisciplinary core areas of the programme.

To ensure that the individual specialisations are visible and clearly defined, the learning objectives have been separated to make it possible to examine the specialisations individually.

Compulsory programme elements:
See Table 3 for an overview of compulsory programme elements.

Theoretical Product Development	(15 ECTS)
Professional Product Development and Design	(6 ECTS)
Interdisciplinary Product Development and Design	(15 ECTS)
Environment and Sustainability	(4 ECTS)

A total of 40 ECTS

Incorporation of the core areas within the specialisations into the compulsory programme elements

IT and Electronics specialisation

Professional Product Development and Design	(9 ECTS)
Interdisciplinary Product Development and Design	(3 ECTS)

Environment and Sustainability	(3 ECTS)

A total of 15 ECTS

Installation and Automation specialisation

Professional Product Development and Design	(9 ECTS)
Interdisciplinary Product Development and Design	(3 ECTS)
Environment and Sustainability	(3 ECTS)

A total of 15 ECTS

Development of Products and Productions specialisation

Professional Product Development and Design	(9 ECTS)
Interdisciplinary Product Development and Design	(3 ECTS)
Environment and Sustainability	(3 ECTS)

A total of 15 ECTS

All compulsory programme elements conclude with an exam. The exam is related to the interdisciplinary core areas of the programme elements and the core areas linked to the specialisations separately.

3.3.1. Compulsory programme element: Theoretical Product Development

Contents
The first project on the programme is carried out based on three topics. The project is generally intended to pave the way for the students' transforming their professional academy background into an individual learning process with the aim of obtaining a professional bachelor's degree. It is crucial that the academy profession background of each individual student is recognised as a complete study programme fully qualifying the student to participate in the professional bachelor programme.

It is equally important that the student regards the professional bachelor programme as a top-up programme qualitatively adding new professional dimensions to the skills and competencies achieved, as appears from the Danish Qualifications Framework for Higher Education.

No. of ECTS
15 ECTS, including

- 5 ECTS from the core area Technological Project Work
- 5 ECTS from the core area Theory of Science and Method
- 5 ECTS from core area Integrative Technology

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

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

Skills

The student has acquired the skills needed to:

- Identify and contribute to the fulfilment of own learning needs during the project work
- Write project reports according to standard formal rules, including rules for quotes and references
- Understand product development and innovation in connection with the company's organisation
- Demonstrate business understanding in relation to working with integrative technology

Competencies
The student has acquired the competencies needed to:

- Create a project design for a technological project on the basis of choice and analysis of a problem
- Apply relevant IT-based tools in the communication

Assessment
The compulsory programme element Theoretical Product Development concludes with an exam.

The exam is assessed according to the 7-point grading scale and corresponds to 15 ECTS.

The learning objectives for the programme element are identical to the learning objectives for the exam.

For exam form and structure etc., reference is made to the institutional part of the curriculum.

3.3.2. Compulsory programme element: Professional Product Development and Design

Contents
The programme element is intended to provide students with knowledge, skills and competencies within the development of products and complex technical solutions by transforming and applying technical knowledge, methods as well as analytical and practical skills in the context of the completed academy profession programme. Furthermore, students must be able to include interdisciplinary issues in the drafting of a solution within their own area.

No. of ECTS
15 ECTS, including

- 4 ECTS from the core area Technological Project Work
- 2 ECTS from the core area Theory of Science and Method

Furthermore only for the **IT and Electronics** specialisation

- 4 ECTS from the core area Innovative Technology and Product Development
- 4 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Furthermore only for the **Installation and Automation** specialisation

- 4 ECTS from the core area Innovative Technology and Product Development
- 4 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Furthermore only for the **Development of Products and Productions** specialisation

- 4 ECTS from the core area Innovative Technology and Product Development
- 4 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

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

Within the **IT and Electronics** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the theory and methodology and reflect on the practice within innovation, product development and design of electronic systems, computerised systems and network solutions
- Explain the application and choice of the latest technologies within electronic systems, computerised systems and network solutions

Within the **Installation and Automation** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the theory and methodology and reflect on the practice within the fields of innovation and development of automatic systems and installation solutions
- Explain the application and choice of the latest technologies within automatic systems and installation solutions, including technologies with interfaces to mechanical systems

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the theory and methodology and reflect on the practice within innovation, product development and design of industrial products and the development of production systems
- 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 has acquired the skills needed to:
- Define and implement appropriate product development in terms of both business and technology
- Identify the need for new solutions and contribute to the development of new technology within the profession
- Conceptualise open, technological issues with a view to defining the solution space
- Carry out needs and functional analyses for the purpose of product and technology development, including in connection with modifications to products and systems
- Incorporate environmental and sustainability concerns into the product development

Within the **IT and Electronics** specialisation, the student has furthermore acquired the skills needed to
- Apply advanced electronic components, computerised components and network components in connection with product development

Within the **Installation and Automation** specialisation, the student has furthermore acquired the skills needed to
- Use advanced components in connection with the development of installation solutions and automatic systems

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the skills needed to
- Use advanced components in connection with the development of products and production systems in relation to product development

Competencies
The student has acquired the competencies needed to:
- Understand the meaning and use of concepts in relation to the development of specialist language and technology
- Carry out minor analyses within the scope of the profession drawing on basic knowledge about quantitative and qualitative methods, including reliability and validity
- Communicate practice-oriented and professional issues and solution models to colleagues, users and partners in a business context

- Perform the planning of the development work
- Carry out the planning of the product/solution

Assessment
The compulsory programme elements concludes with an exam.

The exam is assessed according to the 7-point grading scale.

The learning objectives for the programme element are identical to the learning objectives for the exam.

For exam form and structure etc., reference is made to the institutional part of the curriculum.

3.3.3. Compulsory programme element: Interdisciplinary Product Development and Design

Contents
The programme element is intended to provide students with knowledge, skills and competencies within the development of products and complex technical solutions by transforming and applying technical knowledge, methods and analytical and practical skills. Emphasis is placed on the interdisciplinary and practical application of the core areas in connection with a complex issue.

No. of ECTS
18 ECTS credits, including
- 4 ECTS from the core area Technological Project Work
- 2 ECTS from the core area Theory of Science and Method
- 9 ECTS from core area Integrative Technology

Furthermore only for the IT and Electronics specialisation
- 1 ECTS from the core area Innovative Technology and Product Development
- 1 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Furthermore only for the Installation and Automation specialisation
- 1 ECTS from the core area Innovative Technology and Product Development
- 1 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Furthermore only for the Development of Products and Productions specialisation
- 1 ECTS from the core area Innovative Technology and Product Development
- 1 ECTS from the core area Construction and Projecting
- 1 ECTS from the core area Environment and Sustainability

Learning objectives

Knowledge
The student has acquired the knowledge needed to:
- Explain every phase of a product development process – including documenting the economic impact of the project during both manufacturing/construction and operation
- Explain the correlation between research and technological development

Within the **IT and Electronics** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the theory and methodology and reflect on the practice within the fields of electronics and data construction as well as network project planning

Within the **Installation and Automation** specialisation, the student has furthermore acquired the knowledge needed to

- Account for the theory and methodology and reflect on the practice within project planning and optimisation of automatic systems and installation solutions

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the knowledge needed to

- Account for the theory and methodology and reflect on the practice within the construction of industrial products and the development of production systems

Skills

The student has acquired the skills needed to:

- Identify and analyse significant issues in relation to the design, manufacture and use of a product
- Identify essential practical and theoretical aspects of the integration in connection with products and systems, including the relations between technology, technique, knowledge, organisation and product
- Assess the quality of technological project work in relation to results, validity, reliability and relevance

Within the **IT and Electronics** specialisation, the student has furthermore acquired the skills needed to

- Analyse, plan and realise implementation processes linked to the use of new technologies and to identify their strengths and weaknesses
- Apply CAD/CAE tools in connection with the design and analysis of electronic and computerised systems

Within the **Installation and Automation** specialisation, the student has furthermore acquired the skills needed to

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

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the skills needed to

- Analyse, plan and realise implementation processes in the production linked to the use of new technologies and identify their strengths and weaknesses in relation to optimal operational conditions
- Apply CAD/CAE tools in connection with the design and construction of industrial products and the project planning of production systems
- Use ERP systems and contribute to their development/change

Competencies

The student has acquired the competencies needed to:

- Use scientific articles, reports and theses in connection with the processing of problems
- Complete parts of a project planning process in relation to the current project phase, subject to requirements set out in the project formulation – including documenting the economic impact of the project phase during both manufacturing/construction and operation
- Choose plausible/relevant/possible methods of dimensioning corresponding to the requirements set out in the project description
- Engage in professional collaboration across companies' organisation and carry out coordination tasks
- Apply knowledge about the integration of several technologies for solving customer-specific tasks

Within the **IT and Electronics** specialisation, the student has furthermore acquired the competencies needed to

- Communicate professional problems and solutions to colleagues, clients and partners within the fields of electronics and data construction as well as network project planning
- Define and implement appropriate product development in terms of both business and technology

Within the **Installation and Automation** specialisation, the student has furthermore acquired the competencies needed to

- Communicate professional problems and solutions to colleagues and partners and advise clients in connection with the project planning of installations and automatic systems
- Define and implement the appropriate development of installation solutions and automatic systems in terms of both business and technology

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the competencies needed to

- Communicate professional problems and solutions to colleagues, clients and partners within the fields of construction of industrial projects and network project planning of production systems
- Define and implement the appropriate development of products and production systems in terms of both business and technology

Assessment
The compulsory programme elements concludes with an exam.

The exam is assessed according to the 7-point grading scale.

The learning objectives for the programme element are identical to the learning objectives for the exam.

For exam form and structure etc., reference is made to the institutional part of the curriculum.

3.3.4. Compulsory programme element: Sustainability in Product Development

Contents
The programme element is intended to provide students with knowledge, skills and competencies within the development of sustainable and energy-efficient products and technological solutions in the light of the integration of various technologies. The element is completed as one or more common projects across the specialisations on the programme based on the environmental and sustainability aspects which have formed part of the preceding learning elements.

No. of ECTS
7 ECTS credits, including:

- 2 ECTS from the core area Technological Project Work
- 1 ECTS from the core area Theory of Science and Method
- 1 ECTS from core area Integrative Technology

Furthermore only for the IT and Electronics specialisation

- 3 ECTS from the core area Environment and Sustainability

Furthermore only for the Installation and Automation specialisation

- 3 ECTS from the core area Environment and Sustainability

Furthermore only for the Development of Products and Productions specialisation

- 3 ECTS from the core area Environment and Sustainability

Learning objectives

Knowledge
The student has acquired the knowledge needed to:

- Account for the general environmental and sustainability aspects of industrial products
- Account for EU's rules governing energy labelling
- Understand how the environmental and sustainability aspect affects a company's business

- Demonstrate general knowledge about management, planning and assessment tools in the environmental area, including environmental management, environmental management systems and philosophies of sustainability

Within the **IT and Electronics** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the environmental and sustainability aspects of network installations and electronic and computerised structures, including energy consumption, EMC, power and environmental conditions regarding materials and components

Within the **Installation and Automation** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the environmental and sustainability aspects of installations and automatic systems, including energy consumption, EMC, power and environmental conditions regarding materials and components

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the knowledge needed to
- Account for the environmental and sustainability aspects of production systems, including energy consumption, waste and environmental conditions regarding the cleaning and use of materials and processing aids in the production

Skills
The student has acquired the skills needed to:
- Carry out a life cycle assessment (LCA)

Competencies
The student has acquired the competencies needed to:
- Apply knowledge about Corporate Social Responsibility (CSR) and about the climate and the environment in the development, construction and manufacture of sustainable products and technical solutions
- Apply knowledge about the life cycle of a product in the construction work or in the project planning
- Use language as a communication tool in a reflective manner

Within the **IT and Electronics** specialisation, the student has furthermore acquired the competencies needed to
- Carry out analyses and changes of electronic, computerised instruments and network components/products by using the latest technologies to reduce energy consumption and the environmental impact in general

Within the **Installation and Automation** specialisation, the student has furthermore acquired the competencies needed to
- Carry out analyses and changes of existing installations and automatic systems by using the latest technologies and components to reduce energy consumption and the environmental impact in general

Within the **Development of Products and Productions** specialisation, the student has furthermore acquired the competencies needed to
- Perform analyses and changes of existing products and production plants by using the latest technologies and components to reduce energy consumption and the environmental impact in general

Assessment
The compulsory programme elements concludes with an exam.

The exam is assessed according to the 7-point grading scale.

The learning objectives for the programme element are identical to the learning objectives for the exam.

For exam form and structure etc., reference is made to the institutional part of the curriculum.

3.4. Elective programme elements (elective subjects)

No. of ECTS
5 ECTS

The elective programme elements take place at the end of the second semester. For a more detailed description of the elective programme elements, including content, number of ECTS, learning objectives and number of exams, reference is made to the electives catalogue.

3.5. Internship

The internship period is organised in such a way as to ensure that the internship, together with the rest of the programme, contributes to the student developing practical competencies. The objective of the internship period is to enable the student to apply programme methods, theories and tools through the performance of specific practical tasks within the core areas of the programme.

The learning objectives and content description for the internship are drawn up by the student in collaboration with the institution and the company in compliance with the following internship objectives for the programme.

No. of ECTS
15 ECTS

Learning objectives

Knowledge
The student has acquired general knowledge of

- The specific company's financial and organisational situation
- 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 has acquired the skills needed to, under supervision:

- Plan and carry out systematic development tasks in the company, incorporating interdisciplinary elements into the process
- Select and apply appropriate theoretical and analytical working methods related to development within the trade
- Communicate issues and propose solutions to the company and its stakeholders

Competencies
The student has acquired the competencies needed to, at a general level and under supervision

- Handle complex, practical and professional situations in relation to the company
- Identify own learning needs and acquire new knowledge, skills and competencies
- Independently participate in academic and interdisciplinary collaboration in a professional manner

Assessment
The specific learning objectives agreed between the parties to the agreement – the student and the company/companies – and approved by the institution form the basis for assessment of the exam.

The internship concludes with an exam. For information about the exam form and structure, reference is made to the section 5 of the institutional part of the curriculum.

3.6. Rules for completion of the internship

KEA offers five types of internship:

1. Work placement internship
2. Project-oriented internship
3. Virtual internship
4. Entrepreneurial internship
5. International internship

1. In connection with work placement internships, the student is physically present at the workplace and is an integral part of the company's everyday life. The student is involved in the day-to-day tasks and/or works with agreed projects.

2. Project-oriented internships are based on a clearly defined project agreed with a company. Although the project is carried out in close collaboration with the company, the student is not physically present at the workplace every day. A time schedule for the project and a plan for regular meetings between the student and the company must be prepared in advance.

3. Virtual internships are based on a clearly defined project agreed with a company. Unlike project-oriented internships where the student and the company meet physically, communication takes place via digital media. In addition to the actual project, the student is expected to focus on the virtual communication form. Part of the learning process is for the student to acquire skills in communicating virtually in a professional and reflective manner.

4. Entrepreneurial internships are based on the student having a relevant and specific business idea centred on a product or concept which may potentially develop into a profitable business. Focus is on professionalising the business idea through dialogue with the relevant players and user groups and integrating collected feedback into the product or concept development. The student is expected to have at least one relevant external contact person to act as a mentor.

5. International internships are work placements with a company located outside of Denmark.

It is the responsibility of the student's supervisor/lecturer to assess whether the student's specific plan for the internship is relevant in relation the programme and thus can be approved.

Approval of internship contract

The lecturer/supervisor must also assess whether the company and the tasks are relevant in relation to the programme and the student's profile. Relevant internship tasks and fulfilment of the contract should be discussed with the other lecturers on an ongoing basis to establish a common understanding of the area. The head of education and the internship coordinator may also be involved in the discussion.

Tasks

To enable the lecturer to assess the relevance of the internship, the student and the company must agree on tasks and include them in the internship contract.
The student is responsible for engaging in dialogue with the company concerning tasks, while the lecturer can be involved if any issues arise.
The description of the tasks must be as specific and precise as possible using complete sentences.

Learning objectives

Based on the tasks agreed with the company, the student must prepare a number of individual learning objectives. A large part of the learning objectives for the internship are achieved by participating in the day-to-day work, especially if the student also participates in some of the rare tasks. In addition to participating in the company's day-to-day tasks, receiving instruction and supervision by the internship supervisor and

others at the workplace, the institution will give the student a number of tasks that must be carried out, and the internship completes with an exam. Both form part of the study/working period.

3.6.1. Approval of the workplace

Formal requirements for the workplace

Tasks
An internship company must be able to provide the student with enough study-related tasks to fill the majority of working hours. The tasks are expected to fall within the areas that a graduate would be working with.

Contact person
There must be a fixed contact person/supervisor in the company to which the intern can talk throughout the entire internship period.

Professional sparring
The internship is a learning process, and the company must therefore be able to offer the student regular professional sparring and evaluation of the performance. It is generally a requirement that there is at least one employee with a degree within the relevant study area or with equivalent competence gained through education or many years of practical experience.

Working conditions.
The internship must provide an acceptable physical and mental framework for work on equal footing with the other employees.

Working hours
A working week is generally 37 hours placed within normal working hours. The company and the intern may, however, agree that a number of hours be placed in the evening or during the weekend.

Company size
The company is generally expected to have at least two employees and an independent business addresses. The internship supervisor may grant an exemption from this requirement if it is deemed that the company meets the other five requirements.

3.7. Instruction and working methods

The Bachelor's Degree Programme in Product Development and Integrative Technology (professional bachelor programme) applies a variety of teaching and working methods, including:

- Class teaching
- Group work
- Case-based exercises
- Games and roleplaying
- Company excursions
- Interdisciplinary project-based teaching
- Problem-based learning
- Interdisciplinary knowledge sharing
- Student presentations
- Cooperative learning
- Digital learning technologies and learning environments
- Workshops
- Self-study

The teaching and working methods are adapted to the individual programme elements with the aim of promoting the possibilities of developing the students' knowledge, skills and competencies. The aim is also to establish a foundation for pursuing qualifying further education.

The teaching and working methods on the programme take a profession-oriented approach by combining teaching and practical training. The teaching activities alternate between theory and practical exercises.

The scope of the teaching is based on the programme being a full-time study programme.

3.8. Differentiated teaching
Not applicable for this study programme.

3.9. Reading texts in a foreign language
Some of the material as well as the teaching will be in English.

4. Internationalisation

4.1. Study abroad
Parts of the programme can be completed abroad, including internships and elective subjects, as long as the course takes place at a level equivalent to or higher than the qualifications framework level of the ongoing programme.
Pursuant to the Ministerial Order on Academy Profession Programmes and Professional Bachelor Programmes, "*[s]uccessfully completed programme elements are equivalent to the corresponding programme elements at other educational institutions offering the programme.*"

Furthermore, "*[t]he student is obliged to provide information on completed programme elements from another Danish or foreign higher education programme and on employment for which it is assumed that credit transfer will be granted. On a case-by-case basis or based on rules laid down in the curriculum, [KEA] approves credit transfer based on completed programme elements and employment comparable to subjects, programme components and internships. The decision is based on an academic evaluation.*"

Also, "*[i]n case of preliminary approval of a study stay in Denmark or abroad, the student is obliged, after completing the study stay, to document the programme elements completed during the approved study stay. Upon obtaining the preliminary approval, the student must consent to the institution requesting the necessary information after the student has completed the study stay.*"

KEA's centre for international coordination provides assistance in connection with the planning of study abroad periods: http://www.kea.dk/en/contact/kea-global/

4.2. Agreements with foreign educational institutions on parallel programmes
There are currently no agreements on cooperation and parallel programmes with foreign educational institutions.

5. Tests and exams on the programme

5.1. Exams on the programme

Sequencing of exams	Exam	90 ECTS distributed on the exams	Assessment
First semester	Theoretical Product Development	15	7-point grading scale
	Professional Product Development and Design	15	7-point grading scale
Second semester	Sustainability in Product Development	7	7-point grading scale
	Interdisciplinary Product Development and Design	18	7-point grading scale
	Exam in elective subject	5	7-point grading scale
Third semester	Internship exam	15	7-point grading scale
	Final bachelor project	15	7-point grading scale

Table 4: Overview of all exams on the programme and the semesters in which they are conducted

5.1.1. Exam forms

The form of examination depends on the academic content in the programme element being tested, and efforts are made to ensure variation in the forms of examination, reflecting the content and working methods of the subject.

5.1.2. Prerequisites, compulsory attendance and submission

There is no compulsory attendance on the programme. An essential part of the programme is, however, integration – to integrate competence with technical skills in interaction with others. Therefore, among other things, the programme is based on group project work, and satisfactory results can only be gained by participating in these projects. For that reason, we recommend that students participate in the teaching, including handing in and presenting assignments and projects.

For the Theoretical Product Development subject in the first semester, it is a prerequisite that three subprojects are submitted in time as described under exam prerequisites (see below). Failing to comply with the exam prerequisites means that the student cannot participate in the exam and will have used one attempt to pass the exam.

In connection with exam forms involving assessment on the basis of written work, the written work must be submitted in time and meet the formal requirements for participation in the exam. If this condition is not fulfilled, the student cannot participate in the exam until the condition has been fulfilled, and the student will have used one attempt to pass the exam.

Compulsory attendance – KEA Week:

Students at KEA have a duty to participate actively in KEA Week, which is an annual joint event with a topic that is academically relevant to all students at KEA.

Students who do not participate in the entire event must instead participate in a learning activity and complete an indicative test covering the relevant topic. The test is a multiple-choice test based on literature etc. dealing with the same topic as the KEA Week of the year. The test is conducted approximately two weeks after KEA Week has ended and following completion of the related learning activity. The aim of the

test is to demonstrate whether the student has gained knowledge about essential theories and concepts and acquired competencies within the KEA Week topic.
Students who do not participate in KEA Week or in the learning activity, including the related test, will not have met the requirement regarding compulsory attendance at KEA Week and will consequently have used one exam attempt at the next ordinary exam (i.e. not re-exam) on the study programme. Students cannot sit an exam on the programme until they have completed the substitution assignment of the learning activity and the related indicative test.
The above does not apply if students are prevented from participating in KEA Week and the learning activity, including the related test, due to participation in internships, writing the final project, documented illness or maternity/paternity leave.

Exams with prerequisites

Theoretical Product Development, first semester
The compulsory programme element Theoretical Product Development concludes with a written assignment for each of the programme modules: Technological Project Work, Theory of Science and Method and Integrative Technology. A total of three written assignments form the basis for an overall grade according to the 7-point grading scale. The three written assignments carry equal weight in the assessment.
Prerequisites One written assignment is handed in for each of the programme modules Technological Project Work, Theory of Science and Method and Integrative Technology; a total of three subprojects forming the basis for an overall grade according to the 7-point grading scale. The project reports are submitted at the beginning of the first semester. The written work constitutes the basis for both assessment and examination and must: • Meet the formal requirements, see below • Be submitted in due time, see the exam schedule available on the intranet Failure to comply with the formal requirements or submit the written assignments in due time means that the student cannot not participate in the exam and will have used one attempt to pass the exam.
Formal requirements A subproject report must be 8 standard pages +/- 10%. Appendices in the form of, e.g., drawings, diagrams and the like, are excluded. A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.
Exam procedure The exam is an internal, individual written exam assessed according to the 7-point grading scale. The assignment is equivalent to 15 ECTS One grade is awarded based on an overall evaluation of the written material.
Assessment criteria The assessment criteria for the exam correspond to the learning objectives for the compulsory element: Theoretical Product Development. The learning objectives are set out in the common part of the curriculum.
Sequencing of exams

Submission of assignments according to the exam schedule.

Professional Product Development and Design, first semester

The compulsory programme element Professional Product Development and Design concludes with an oral project exam.

Prerequisites

*The **'Professional Product Development and Design Project'** in the first semester forms the basis for both the assessment and the exam and must:*

- Meet the formal requirements, see below
- Be submitted in due time, see the exam schedule available on the intranet

Failure to comply with the formal requirements or submit the written project constituting the written part of the exam in due time means that the student may not participate in the exam and will have used one attempt to pass the exam.

Formal requirements

The project report must, as a minimum, contain the following:

- Front page, including title
- Table of contents
- Introduction, including problem statement
- Method
- Analysis
- Proposed solutions
- Conclusion
- Perspectives
- Bibliography (including all sources referenced in the project)
- Appendices (only appendices central to the report)

The subproject report must be 40 standard pages (+/- 10%). Appendices in the form of, e.g., drawings, diagrams and the like, are excluded.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Exam procedure

The exam takes the form of an external, individual oral exam based on a written group project and is assessed according to the 7-point grading scale.

A maximum of four students may constitute a group.

The assignment is equivalent to 15 ECTS

One grade is awarded based on an overall assessment of the written assignment and the oral exam.

The presentation of the project may not exceed 12 minutes followed by an individual examination of the student(s). 30 minutes are allocated per student, including grading.

Assessment criteria

The assessment criteria for the exam correspond to the learning objectives for the

compulsory element: Professional Product Development and Design.

The learning objectives for the programme element are set out in the common curriculum.

Sequencing of exams
The exam takes place at the end of the first semester. Further information on time and place as well as submission of the written group project will be published on the intranet.

Exam language
English

Sustainability in Product Development, second semester

The programme element Sustainability in Product Development completes with a written exam/synopsis which aims to test the student's acquisition of the learning objectives.

Prerequisites
The written work constitutes the basis for both assessment and examination and must:

- Meet the formal requirements, see below
- Be submitted in due time, see the exam schedule available on the intranet

Failure to comply with the formal requirements or submit the written project constituting the written part of the exam in due time means that the student cannot participate in the exam and will have used one attempt to pass the exam.

Formal requirements
The synopsis must contain:

- Front page
- Table of contents
- Introduction
- Problem statement, purpose and scope
- Choice of method and/or theory/empiri (discussion of the material, theories and methods relevant to the work on the issues)
- Subconclusions (on the work on the individual issues)
- Conclusion/perspectives (summarising conclusion related to the problem statement, including formulation of further questions for investigation)
- Bibliography (including all sources referenced in the project)
- Appendices (only appendices central to the assignment)

Synopsis of 3-5 pages. Appendices in the form of, e.g., drawings, diagrams and the like, are excluded.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Exam procedure
The exam is an internal, individual written exam assessed according to the 7-point grading scale.

The exam is equivalent to 7 ECTS

Assessment criteria
The assessment criteria for the exam correspond to the learning objectives for the compulsory element: Sustainability in Product Development

Sequencing of exams
The exam takes place in the middle of the second semester. Further information on time and place and the submission of written material will be published on Fronter.

Interdisciplinary Product Development and Design, second semester

The compulsory programme element Interdisciplinary Product Development and Design concludes with an oral project exam.

Prerequisites
*The **'Interdisciplinary Product Development and Design Project'** in the third semester forms the basis for both the assessment and the exam and must:*

- Meet the formal requirements, see below
- Be submitted in due time, see the exam schedule available on the intranet

Failure to comply with the formal requirements or submit the written project constituting the written part of the exam in due time means that the student cannot participate in the exam and will have used one attempt to pass the exam.

Formal requirements
The project report must, as a minimum, contain the following:

- Front page, including title
- Table of contents
- Introduction, including problem statement
- Method
- Analysis
- Proposed solutions
- Conclusion
- Perspectives
- Bibliography (including all sources referenced in the project)
- Appendices (only appendices central to the report)

The subproject report must be 40 standard pages (+/- 10%). Appendices in the form of, e.g., drawings, diagrams and the like, are excluded.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be assessed.

Exam procedure
The exam takes the form of an external, individual oral exam based on a written group project and is assessed according to the 7-point grading scale.

A maximum of four students may constitute a group.

The exam is equivalent to 18 ECTS.

One grade is awarded based on an overall assessment of the written assignment and the oral exam.

The presentation of the project may not exceed 12 minutes followed by an individual

examination of the student.

30 minutes are allocated per student, including grading.

Assessment criteria
The assessment criteria for the exam are equivalent to the learning objectives for the compulsory programme element: Interdisciplinary Product Development and Design

The learning objectives for the programme element are set out in the common curriculum.

Sequencing of exams
The exam takes place at the end of the second semester. Further information on time and place as well as submission of the written group project will be published on the intranet, Fronter.

Exam language
Danish or English, depending on the composition of the group

Elective programme element, second semester
[See electives catalogue]
Prerequisites [See electives catalogue]
Formal requirements [See electives catalogue]
Exam procedure The exam is equivalent to 5 ECTS.
Assessment criteria The assessment criteria for the exam correspond to the learning objectives for the compulsory programme elements.
Sequencing of exams The exam takes place at the end of the second semester. Further information on time and place will be published on educational institution's intranet.

Internship exam, third semester
During the internship, students work with academically relevant issues within the core areas of the programme and acquire knowledge about relevant professional functions. Given that KEA offers five different forms of internship, the student's internship period can be organised in a flexible and differentiated manner, forming the basis for the student's final exam project. In connection with the internship, the student can be linked to one or more companies. The student and the supervisor/contact person jointly define specific objectives for the student's internship based on the learning objectives for the internship, see the common part of the curriculum.

This subsequently serves as a guide for planning the student's work during the internship period.

The internship period is comparable with a full-time job with the requirements for working hours, performance, commitment and flexibility that product developers are expected to be able to fulfil in their first job.

Prerequisites
To participate in the exam, the following prerequisites apply:

- The internship report constituting the basis for both the assessment and the examination must comply with the formal requirements, see below
- The internship report must be submitted in due time, see the exam schedule available on the intranet

Failure to comply with the formal requirements or submit the written report in due time means that the student cannot participate in the exam and will have used one attempt to pass the exam.

Formal requirements
An internship report must be submitted.

The internship report must include the following:

- Description of the company (what does the company engage in)
- Description of specific work tasks
- Reflections on achieving the specific learning objectives set out in the internship contract

The report may not exceed 20 standard pages (+/- 10%).

Exam procedure
The exam is an internal, individual written exam assessed according to the 7-point grading scale.

The assignment is equivalent to 15 ECTS

Assessment criteria
Assessment criteria for the exam = learning objectives for: Internship.

Sequencing of exams
The exam takes place upon completion of the internship. Further information on time and place as well as submission of the internship report will be published on the intranet.

Bachelor project, third semester
For details about the requirements for the final bachelor project and the learning objectives, reference is made to the common part of the curriculum for the programme.

Prerequisites A written project constituting the basis for both the assessment and the examination is subject to the following: • The student must have finished/completed the internship in order to commence the bachelor project • It must comply with the formal requirements for the final exam project • It must be submitted in due time, see the exam sched

ule available on the intranet Incorrect submission of the written project constituting the written part of the exam means that the student cannot participate in the exam and will have used one attempt to pass the exam.
Formal requirements The report should, as a minimum, contain the following: • Front page • Preface • Table of contents • Introduction • Problem statement • Theory and method • Analysis and discussion • Concl

usion
- If relevant, perspectives
- List of references
- Appendices

The final bachelor project may not exceed 60 standard pages. If the bachelor project is prepared in a group, a maximum of 10 standard pages may be added for each additional group member. Regardless of the number of group members, however, the project may not exceed 80 standard pages.

A standard page is 2,400 characters, including spaces and footnotes. Front page, table of contents, bibliography and appendices are not included. Appendices will not be

assessed. The exam cannot be conducted until the final internship exam and all other exams on the programme have been passed.
Exam procedure The exam takes the form of an external, individual oral exam based on the written group/individual project. One individual grade is awarded based on an overall assessment of the written project and the oral exam. The exam is assessed according to the 7-point grading scale. A maximum of four students may constitute a group.

The presentation of the project by the student(s) may not exceed 15 minutes. Subsequently, the students are examined individually. 40 minutes are allocated per student, including grading. The assignment is equivalent to 15 ECTS
Assessment criteria The assessment criteria correspond to the learning objectives for the exam = the learning objectives for the final bachelor project, see section 5.5. See also 5.5.1. for the weighting of writing and spelling skills in the assessment of the final bachelor project.
Sequencing of exams The exam takes place at the end of the third semester. Further

information on time and place is available on Fronter.

5.1.3. Exam procedure

See section 5.1.2. for a detailed overview of the exams procedure and prerequisites.

Prerequisites

In connection with all exams, the written material must be submitted in due time and comply with the applicable rules and formal requirements. If the material is not submitted in due time or does not comply with the rules, the exam will not be conducted, and the student will have used one exam attempt.

Grading

All exams, apart from the commencement of studies exam, are assessed according to the 7-point grading scale.
In connection with exams awarding one overall grade, the mean value is calculated, and the result is then rounded up. Grade 02, however, cannot be obtained by rounding up, so the average grade must be higher than 02.

First semester	
Theoretical Product Development	• Internal, individual written exam. One subproject must be submitted for each of the core areas: Technological Project Work, Theory of Science and Method and Integrative Technology. • One grade is awarded for the written work based on an overall assessment of the three subprojects. The projects carry equal weight in the assessment.
Professional Product Development and Design	• External, individual oral exam based on a written group project. • One grade is awarded based on an overall assessment of the written assignment and the oral exam. • The presentation of the project may not exceed 12 minutes followed by an individual examination of the student. • 30 minutes are allocated per student, including grading.
Second semester	
Sustainability in Product Development	• Internal, individual written exam (synopsis). • Grades are awarded based on the assessment of the written work.
Interdisciplinary Product Development and Design	• External, individual oral exam based on a written group project. • One grade is awarded based on an overall assessment of the written assignment and the oral exam. • The presentation of the project may not exceed 12 minutes followed by an individual examination of the student. • 30 minutes are allocated per student, including grading.
Elective subjects	• Reference is made to the electives catalogue for the

	exam procedure
Third semester	
Internship	• Internal, individual written exam (internship report). • Grades are awarded on the basis of an assessment of the written work.
Bachelor project	• External, individual oral exam based on a written group/individual project. • An overall grade is awarded for the report in accordance with the 7-point grading scale. • The presentation of the project by the student(s) may not exceed 15 minutes. Subsequently, the students are examined individually. 40 minutes are allocated per student, including grading.

Table 5: Exam procedure.

5.1.4. Exams with external assessment

Sequencing of exams	Exams	ECTS
First semester	Professional Product Development and Design	15
Second semester	Interdisciplinary Product Development and Design	18
Third semester	Bachelor project	15
In total		48

Table 6: Exams with external assessment.

5.2. Sequencing of exams on the programme
see 3.1. or 5.1.

5.3. First-year exam
Not applicable for the Product Development and Integrative Technology programme.

5.4. Requirements for written assignments and projects
See the prerequisites for the individual exam under section 5.1.2.

5.5. Requirements for the final bachelor project

No. of ECTS
15 ECTS

The bachelor project must document that the student has reached the final examination level viewed in relation to the intended learning outcomes for the programme. The student must demonstrate the ability to, on an analytical and methodological basis, work with and communicate a complex and practice-oriented issue concerning a specific assignment related to the objectives of the programme.

Learning objectives
The final bachelor project must document that the programme's final examination level has been reached, see Annex 1 of the Ministerial Order on the Bachelor's Degree Programme in Product Development and Integrative Technology. The intended learning outcomes include the knowledge, skills and competencies which a graduate in Product Development and Integrative Technology must achieve during the programme.

Knowledge
The graduate has acquired the knowledge needed to

- Reflect on the theory and practice of the profession within the fields of product development and integrative technology on the basis of a technology concept comprising the elements technique, knowledge, organisation and product
- Combine relevant theory of science with technical and technological issues in 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 different types of companies
- Understand the importance of ethical problems in connection with product development and integrative technology with particular focus on the environment, safety and sustainability

Graduates within the **IT and Electronics** specialisation have furthermore acquired

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

Graduates within the **Installation and Automation** specialisation have furthermore acquired

- Subject-specific knowledge about methods and theory for development, project planning and application in relation to complex building and industrial installations as well as optimisation and operation of automatic systems

Graduates within the **Development of Products and Productions** specialisation have furthermore acquired

- Subject-specific knowledge about methods and theory for development, project planning and application in connection with the design and construction of industrial projects as well as optimisation and operation of production systems

Skills
The graduate has acquired the skills needed to

- Assess, 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
- Assess and incorporate issues within the fields of energy, the environment, ethics and sustainability into the development of products and technical solutions in a concrete and practical manner
- Collect and communicate relevant knowledge within research and development, and assess and apply the results in connection with product development and integral technology
- Communicate technical issues and possible solutions to customers, business partners and suppliers as well as internally in the company

Graduates within the **IT and Electronics** specialisation have furthermore acquired the skills to

- Assess, select and motivate the application of methods in the field of complex IT and network solutions and electronic and computerised systems

Graduates within the **Installation and Automation** specialisation have furthermore acquired the skills to

- Assess, select and motivate the application of methods within complex building and industrial installations as well as optimisation and operation of automatic systems

Graduates within the **Development of Products and Productions** specialisation have furthermore acquired the skills to

- Assess, select and motivate the application of methods within the design and construction of industrial products as well as optimisation and operation of production systems

Competencies
The graduate has acquired the competencies needed to

- Handle product development, construction and technical projecting with the involvement of internal and external business partners and customers in relation to the development, manufacture, use and disposal or termination of the product or service

- Independently and in collaboration with others handle complex development-oriented situations across disciplines and the organisation of the company
- Handle technical interdisciplinary management tasks, including project management
- Identify own learning needs and prepare a strategy or plan to satisfy the need for knowledge, skills or competencies

Graduates within the **IT and Electronics** specialisation have furthermore acquired the competencies to

- Collaborate with other professions in connection with complex IT and network solutions and with electronic and computerised systems to be integrated in interdisciplinary projects
- Further develop own academic, interdisciplinary and methodological knowledge, skills and competencies within complex IT and network solutions and within electronic and computerised systems in relation to the development of interdisciplinary technical solutions

Graduates within the **Installation and Automation** specialisation have furthermore acquired the competencies to

- Cooperate with other professions in connection with complex building and industrial installations as well as optimisation and operation of automatic systems
- Further develop own academic, interdisciplinary and methodological knowledge and competencies within complex building and industrial installations and within optimisation and operation of automatic systems in relation to interdisciplinary technical solutions

Graduates within the **Development of Products and Productions** specialisation have furthermore acquired the competencies to

- Cooperate with other professions in connection with the design and construction of industrial products as well as optimisation and operation of production systems to be integrated into interdisciplinary projects
- Further develop own academic, interdisciplinary and methodological knowledge, skills and competencies within the design and construction of industrial products and within optimisation and operation of production systems in relation to the development of interdisciplinary technical solutions

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

See section 5.1.2. for assessment criteria and formal requirements for the final bachelor project.

See section 5.1.3. for an overview of the exam procedure and prerequisites.

5.5.1. How important are writing and spelling skills in terms of the assessment?

In connection with the assessment of the bachelor project, in addition to the academic content, emphasis must also be placed on the students' writing and spelling skills in a communication context. Writing skills weigh 10%, while academic content weighs 90%.

KEA may grant exemptions from the requirement concerning writing and spelling skills for students who are able to document a relevant and specific impairment.

Writing and spelling skills may be included in the assessment of other exams.

5.6. Use of materials and aids
All materials and aids, including electronic materials and aids, are permitted, unless otherwise stated in connection with the individual exam. Furthermore, KEA may restrict the students' access to using electronic materials and aids for capacity reasons.

5.7. Special examination conditions
For examinees with physical or mental impairment and examinees with similar difficulties, an agreement can be made on special examination conditions if deemed necessary in order to provide the students concerned with equal opportunities in the exam situation. Special examination conditions must, however, not change the standard of the exam. Examinees with a background other than Danish are allowed to use a dictionary at exams without aids.

Applications for special examination conditions must be in writing and be submitted to the head of education no later than one month prior to the date of the exam. Documentation of the disability must be enclosed with the application. If additional exam time is granted, as a general rule, 25% will be added to the exam and preparation time.

5.8. Make-up exams and re-exams
Students who have been unable to complete an exam due to documented illness or death of an immediate family member will be given the opportunity to take the exam as soon as possible. According to the Ministerial Order on Examinations on Professionally Oriented Higher Education Programmes (the Examination Order), "*[i]f the examination in question is an examination in the final examination period, students must be given the opportunity to take the examination in the same examination period or immediately thereafter.*" The make-up exam may be identical to the next ordinary exam. Students are responsible for keeping up to date on when the make-up exam is conducted.

If an exam includes several parts, and a grade is awarded for each part, students may only sit an exam comprising the part(s) not completed. This also applies to exams where the individual grades are added up to one grade.

Illness must be documented in the form of a medical certificate, and KEA must receive the medical certificate no later than three working days after the date of the exam. If illness is not documented, the student will have used one exam attempt.

5.9. Examination language
In connection with programmes offered in Danish, exams are generally conducted in Danish as well. Exams can also conducted in Swedish or Norwegian rather than Danish. If programmes or individual subjects are offered in English, exams will be conducted in this language. If a student wants to take the exam in a different language, a written application must be submitted to the head of education no later than two months prior to the date of the exam, and there must be reasonable grounds for doing so.

5.10. Commencement of studies exam
Not applicable for Product Development and Integrative Technology (PTI).

5.11. Use of own works and the works of others
Projects and other material in connection with exams must be prepared by the students independently.
If students unlawfully use other people's work as their own (plagiarism) or use their own previously assessed work without references, they will be expelled from the exam.
Students may also be expelled after the exam.

Expulsion from an exam due to cheating means that any grade already awarded will be withdrawn, and the student will have used one exam attempt.

For information about plagiarism, see www.stopplagiat.nu

5.12. Cheating and disruptive behaviour during exams

Cheating at exams will be handled in accordance with the rules set out in the Ministerial Order on Examinations on Professionally Oriented Higher Education Programmes (the Examination Order). Students who cheat at an exam will be expelled from the exam.
According to the Examination Order, "... *the institution may in case of aggravating circumstances decide to suspend students from the institution for a long or short period of time. In such event, students must be issued with a written warning stating that if the act is repeated, they may be expelled permanently.*"

Cheating includes:

– Obtaining unlawful help during the exam
– Providing unlawful help to other students during the exam
– Using other people's work as one's own (plagiarism – see www.stopplagiat.nu)
– Using own previously assessed work without references
– Using materials and aids not permitted for the exam in question

Expulsion from an exam due to cheating means that the awarded grade will be withdrawn, and the student will have used one exam attempt.

If students exhibit ***disruptive behaviour*** during an exam, KEA may expel them from the exam. In less serious cases, KEA will first warn the students.

6. Other rules governing the programme

6.1. Rules on compulsory attendance

There is no compulsory attendance on the programme.

6.2. Credit transfer

Pursuant to the Ministerial Order on Academy Profession Programmes and Professional Bachelor Programmes, "*[s]uccessfully completed programme elements are equivalent to the corresponding programme elements at other educational institutions offering the programme.*
Furthermore, "*[t]he student is obliged to provide information on completed programme elements from another Danish or foreign higher education programme and on employment for which it is assumed that credit transfer will be granted. On a case-by-case basis [...], the educational institution approves credit transfer based on completed programme elements and employment comparable to subjects, programme components and internships. The decision is based on an academic evaluation.*"

6.3. Preliminary approval of credit transfer

The student is entitled to receive credit transfer for parts of a programme based on previously obtained qualifications and competencies. Credit transfer is granted by the individual educational institution on the basis of documented course participation or employment equivalent to the subjects, programme components and internships for which credit transfer is applied.

6.3.1. Credit transfer agreements in respect of subjects covered by the common part of the curriculum

No credit transfer agreements.

6.3.2. Credit transfer agreements in respect of subjects covered by the institution-specific part of the curriculum

No credit transfer agreements.

6.5. Criteria for assessment of study activity

If students are inactive or less active in their studies, as defined in section 5.1.2, they will be called in to an interview. The purpose of the interview is to reach an agreement between the student and KEA on how the student will catch up and participate actively during the remaining part of the semester. If the student does not attend the interview, the head of education may decide to propose to the Danish Agency for Higher Education that the student stop receiving state education grants due to insufficient study activity. The Danish Agency for Higher Education may then decide to withdraw the entitlement to state education grants.

6.6. Disenrolment due to insufficient study activity

Enrolment on the programme can be terminated for students who have not passed at least one exam within a consecutive period of at least one year in accordance with the rules laid down in Part 10 of the Ministerial Order on Admission to and Enrolment on Academy Profession Programmes and Professional Bachelor Programmes. In this context, study activity is defined as exam activity where the student, as a minimum, has been awarded the grade 02.

6.7. Exemption rules

KEA may, due to exceptional circumstances, grant exemptions from those rules in this curriculum that are solely laid down by the educational institution. The institutions collaborate on establishing uniform exemption guidelines.

Students' insufficient study activity is not considered a special circumstance.

Applications for exemption must be in writing and be submitted to the head of education. The application must be reasoned and include an account of the measures which the student has taken and intends to take to remedy the situation.

6.8. Appeals

Examination appeals will be handled in accordance with the rules set out in Parts 10-11 of the Ministerial Order on Examinations on Professionally Oriented Higher Education Programmes (the Examination Order).

When should an appeal be submitted? Appeals relating to examinations and grading must be submitted within two weeks of the assessment (grade) being announced or published.

How should an appeal be submitted? Appeals must be submitted to KEA individually and in writing stating the reasons for the appeal. Appeals submitted jointly by several students may be rejected.

What may appeals concern? You can submit an appeal concerning the basis for examination, the examination process or the assessment (grade).

Who handles the appeal? Appeals are normally handled by KEA. This does not, however, apply to appeals concerning the basis for examination if the exam is organised by the Danish Agency for Higher Education. In such cases, the appeal is forwarded to the Agency together with the statement made by KEA.

Opportunity to appeal against academic issues: If an appeal regarding academic issues is not upheld, you can appeal against the decision to a board of appeals appointed by KEA. Appeals must be in writing and reasoned. The appeal must be submitted to KEA no later than two weeks after being informed about the decision.

Opportunity to submit an appeal regarding legal issues: You can submit an appeal regarding legal issues in relation to any decisions made in connection with re-assessment of the exam (i.e. following re-exam offered by KEA) or in connection with decisions made by the board of appeals. The appeal must be submitted to KEA within two weeks of being informed about the decision. KEA subsequently makes a decision.

Appeals concerning other legal issues in decisions made by KEA in accordance with the Examination Order may be submitted to the Danish Agency for Higher Education. The appeal must be submitted to KEA within two weeks of being informed about the decision. The appeal must be addressed to

the Danish Agency for Higher Education but be submitted to KEA, which then issues a statement before forwarding the appeal to the Agency.

What are academic and legal issues?
Academic issues:
Is the assessment correct based on an academic evaluation of your performance? Have you been examined based on the correct syllabus? Have parts of the assignment not been assessed or been misunderstood by the examiner and the co-examiner? Are there any issues concerning the examination conditions?

Legal issues: Legal issues in connection with the examination or the consideration of an appeal include:

- Legal incapacity
- Incorrect application of the rules of law
- No consultation of the parties involved
- No information available
- Application of incorrect procedure
- No procedure for appeals in connection with a decision