AALBORG UNIVERSITET

MASTER OF SCIENCE (MSC) IN ENGINEERING (DESIGN OF MECHANICAL SYSTEMS) 2017

MASTER OF SCIENCE (MSC) IN ENGINEERING
AALBORG

MODULES INCLUDED IN THE CURRICULUM

TABLE OF CONTENTS

STRESS AND DEFORMATION ANALYSES OF LOAD CARRYING STRUCTURAL ELEMENT

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of theoretical and experimental determination of the stress and deformation states occurring in a structural element when carrying a mechanical load.
- Have attained an understanding for methods of analysis and experimental methods and the characteristics of their applications and limitations

SKILLS

- Be able to set up the governing equations for the theory of elasticity.
- Be able to demonstrate the properties of the strain and stress tensors.
- Be able to account for the implementation and practical use of the analytical, numerical, and experimental methods applied in the project.
- Be able to give a critical evaluation of the methods applied for stress and deformation analyses and the results obtained.
- Be able to use correct terminology.
- Be able to compare theoretical and experimental results.
- Be able to critically evaluate applied methods and their results.

COMPETENCES

- Be able to analyze a load carrying element on the basis of model considerations, using continuum mechanics, and by applying numerical methods including the finite element method.
- Be able to investigate the behavior of a structural element under mechanical loading with experimental techniques such as strain gauges and digital image measurement techniques.
- Be able to compare theoretical and experimental results carefully, and critically evaluate the methods applied and the results obtained.
- Be able to apply the background and the insight obtained, on intuitive design optimization, and suggest geometrical changes or a redesign including change of material.

TYPE OF INSTRUCTION

The module is carried out as group-based problem-oriented project work. The group work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project is carried out in groups with normally no more than 6 members.

EXTENT AND EXPECTED WORKLOAD

Since it is a 15 ECTS course module the expected workload is 450 hours for the student.

EXAM

EXAMS

Name of exam	Stress and Deformation Analyses of Load Carrying Structural Element
Type of exam	Oral exam based on a project

ECTS	15
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Spændings- og deformationsanalyse af kraftoverførende konstruktion
Module code	M-DMS-K1-1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

SOLID MECHANICS WITH MICROSTRUCTURE

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an understanding of basic mechanical properties of engineering materials and modeling procedures used to quantify these properties, as well as the ways in which these properties characterize material response.

SKILLS

- Be able to understand basic continuum mechanical theories and apply them to simple structural components.
- Be able to substantiate different observable deformation modes by underlying physical mechanisms.
- Be able to document knowledge related to the application of selected analytical/numerical methods for materials characterization.

COMPETENCES

- Have gained an awareness of various responses exhibited by solid engineering materials when subjected to mechanical loadings and an explanation of the physical mechanisms associated with design-limiting behavior of engineering materials.
- Have gained an understanding of predictive analytical and computational frameworks that provide quantitative skills to deal with materials-limiting problems in engineering design.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Solid Mechanics with Microstructure
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Materialemekanik
Module code	M-DMS-K1-3
Module type	Course

Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

FRACTURE MECHANICS AND FATIGUE

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained a comprehensive understanding of fracture mechanics.
- Have gained knowledge in applying classical methods in designing against fatigue fracture by studying notches and their effect, by studying strain-fatigue, and by analysing eigen-stress states.
- Have gained an understanding of how to apply fracture mechanics in the assessment of reliability of practical designs and machine elements.

SKILLS

- Be able to assess the stability of cracks using Griffith's and Irwin's fracture criteria, energy release rate, and toughness concepts
- Be able to apply linear elastic solutions for sharp cracks and obtain the stress intensity factor.
- Be able to assess mixed mode loading and apply crack growth direction hypotheses
- Be able to assess crack growth by fatigue, partial damage and load spectra.
- Be able to assess crack initiation, notches and their effect.
- Be able to determine life time and apply methods for improving the fatigue strength and life time of machine elements and welded details.

COMPETENCES

- Be able to understand and apply linear elastic concepts in assessing the stability of cracked structures under static and fatigue loading.
- Be able to distinguish between different fatigue regimes, i.e. elastic or plastic, and un-cracked or pre-cracked, and apply correct methodology to each case in relevant structures.
- Be able to determine the lifetime of welded components, and explain fatigue in welded components on the basis of fracture mechanical concepts.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Fracture Mechanics and Fatigue
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Brudmekanik og udmattelse
Module code	M-DMS-K1-4
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Jan Schjødt-Thomsen, Jens Henrik Andreasen

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

FINITE ELEMENT METHODS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Be able to use the finite element method in static stress analysis.
- Have knowledge of element technology, such as bar, beam, solid and shell elements.
- Be able to apply methods for error estimation and adaptive mesh generation.
- Be able to solve structural dynamics and vibrations problems using methods such as free vibrations, modal methods and direct time integration methods.
- Be able to apply nonlinear finite element methods including solution of systems of nonlinear equations, geometrically nonlinear problems, contact problems, and nonlinear material models.
- Be able to perform linearised buckling analysis.
- Be able to solve exercises using a commercial finite element program (e.g., ANSYS).

SKILLS

- Demonstrate a basic understanding of concepts, theory and applications of finite element analysis from a mechanical engineering view point.
- Be able to perform linear and nonlinear static and dynamic stress analysis including the use of commercial finite element software.

COMPETENCES

- Be able to apply the concepts, theories and techniques covered in the area of linear and nonlinear finite element analysis on practical problems.
- Be able to apply the concepts and theories to the solution of relevant problems using commercial software programs.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Finite Element Methods
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Elementmetoder
Module code	M-DMS-K1-5
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Erik Lund

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

ENGINEERING DESIGN OF MECHANICAL SYSTEMS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 1st Semester.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.

SKILLS

- Be able to apply advanced engineering design on mechanical systems and structures.
- Be able to use advanced materials for structural design.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Be able to apply synthesis and analysis in the design process, and demonstrate their interdependence.
- Be able to apply systematic rational design methods.

COMPETENCES

- Be able to design solutions for a load carrying mechanical system or structure, with an industrial partner or with industrial relevance.
- Be able to consider a problem of sufficient complexity to encompass the use of advanced analytical, numerical or experimental analysis tools for predicting the performance of the mechanical system or structure during operation.
- Be able to analyse challenging designs from a structural point of view, where lightweight design, use of advanced materials like composite materials, design problems involving fatigue, and mechanical systems with complicated dynamic behaviour during operation may be considered.
- Be able to document a final design with respect to performance using virtual prototypes or analytical models, and include manufacturing considerations.

TYPE OF INSTRUCTION

The module is carried out as group-based problem-oriented project work. The group work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project is carried out in groups with normally no more than 6 members.

EXTENT AND EXPECTED WORKLOAD

Since it is a 15 ECTS course module the expected workload is 450 hours for the student.

EXAM

EXAMS

Name of exam	Engineering Design of Mechanical Systems

Type of exam	Oral exam based on a project
ECTS	15
Assessment	7-point grading scale
Type of grading	External examination

FACTS ABOUT THE MODULE

Danish title	Konstruktion af mekaniske systemer
Module code	M-DMS-K2-1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

ENGINEERING OPTIMIZATION – CONCEPTS, METHODS AND APPLICATIONS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 1st Semester.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of important concepts and methods of optimization for efficient solution of optimization problems within different areas of engineering, including design optimization of mechanical systems.

SKILLS

- Be able to use optimization concepts and topics.
- Be able to use numerical methods of unconstrained optimization.
- Be able to use numerical (mathematical programming) methods for optimization of multi-dimensional functions with constraints.
- Be able to solve multicriterion optimization problems.
- Be able to apply other methods of optimization, such as integer problems, response surface methods, genetic algorithms, etc.
- Be able to perform general applications of optimization methods: parameter identification, optimization as an analysis tool for problems governed by an extremum principle, surrogate and metamodelling problems.

COMPETENCES

- Be able to apply the concepts, theories and methods for solution of engineering optimization problems.
- Be able to account for the considerations involved in the process of formulating and modeling an engineering optimization problem, choosing an advantageous method of solution, and implementing it in practice.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Engineering Optimization – Concepts, Methods and Applications
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale

Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Ingeniørmæssig optimering – begreber, metoder og anvendelser
Module code	M-DMS-K2-2
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Erik Lund

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

MECHANICS OF COMPOSITE MATERIALS AND STRUCTURES

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 1st Semester.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of the overall topical area of composite materials including their properties, manufacturing, analysis and design.
- Be able to document understanding of the following concepts and theories:
  - Applications of composites.
  - Fibers and polymer resin materials: Types and properties.
  - Manufacturing methods, their processing characteristics and influence on the mechanical properties of composites.
  - Laminae and laminates: Micro-mechanical models, modeling of the laminae, classical lamination theory (CLT).
  - Analysis of composite structures: Beam, plate and shell modeling.
  - Thermal effects.
  - Fracture and failure.
  - Sandwich structures.
  - Adhesive bonded and mechanical joints, load introduction aspects, 3D effects and general principles for design.
  - Finite element analysis of laminated composite structures.

SKILLS

- Be able to apply concepts, theories and methods for analysis and design of composite materials and complex structures made from composite materials to real-life problems.

COMPETENCES

- Be able to undertake development and product design using composite materials.
- Be able to develop procedures for production and verification of components made from composite materials.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Mechanics of Composite Materials and Structures
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Kompositmaterialers og -konstruktioners mekanik
Module code	M-DMS-K2-3
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Lars Christian Terndrup Overgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

ENERGY AND VARIATIONAL METHODS WITH APPLICATIONS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 1st Semester.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of energy and variational methods and classical principles of stationarity to derive governing equations of statics and dynamics, and their application for solution of general problems in structural mechanics, including:
  - Energy methods and energy minimization principles as the foundation of the finite element method
  - Variational methods (methods of Ritz, Galerkin, Rayleigh and Rayleigh-Ritz)
  - Different applications of those such as analysis of statics, buckling and vibration of beams, plates and similar
  - Dynamics of discrete multi-dof and multi-body mechanical systems
  - Exact and approximate solutions to the natural frequencies and modal analysis problems for multi-dof/continuous vibration systems
- Approximate methods for nonlinear mechanical vibrations

SKILLS

- Be able to apply energy and variational methods for the solution of problems in statics and dynamics involving discrete and continuous, multi-rigid-body and multi-dof vibrational mechanical systems
- Be able to adequately simulate and analyze dynamics of linear and non-linear mechanical systems

COMPETENCES

- Be able to apply energy minimization / maximization principles to derive the relationships between stresses, strains, displacements, material properties, and external effects (e.g., tractions and volume forces) in the form of balance of the kinetic and potential energies and the work done by internal and external forces.
- Be able to use the variational calculus as a convenient and robust tool for formulating the governing equations of statics and dynamics of rigid and solid bodies in applied mechanics.
- Be able to apply the energy and variational methods to find approximate analytical and numerical (e.g. finite element) solutions of complex problems in statics, stability and dynamics of mechanical systems
- Be able to formulate equations of motion for multi-body mechanical systems and for discrete multi-dof and continuous vibration systems using Lagrange and Newton-Euler equations.
- Be able to understand and analyze the dynamic behavior (mode shapes and eigenfrequencies) of linear vibration systems
- Be able to use appropriate (e.g., harmonic balance) methods to analyze behavior of nonlinear vibration systems.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Energy and Variational Methods with Applications
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

FACTS ABOUT THE MODULE

Danish title	Energi- og variationsmetoder med anvendelser
Module code	M-DMS-K2-4
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Sergey Sorokin

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INDUSTRIAL DEVELOPMENT

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The project work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project may be carried out individually or in groups.

EXTENT AND EXPECTED WORKLOAD

Since it is a 20 ECTS course module the expected workload is 600 hours for the student.

EXAM

EXAMS

Name of exam	Industrial Development
Type of exam	Oral exam based on a project
ECTS	20
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

The extent of the project must reflect the allotted time in ECTS.

FACTS ABOUT THE MODULE

Danish title	Industrielt udviklingsarbejde
Module code	M-DMS-K3-5
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	20
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INDUSTRIAL DEVELOPMENT

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The project work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project may be carried out individually or in groups.

EXTENT AND EXPECTED WORKLOAD

Since it is a 25 ECTS course module the expected workload is 750 hours for the student.

EXAM

EXAMS

Name of exam	Industrial Development
Type of exam	Oral exam based on a project
ECTS	25
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

The extent of the project must reflect the allotted time in ECTS.

FACTS ABOUT THE MODULE

Danish title	Industrielt udviklingsarbejde
Module code	M-DMS-K3-6
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	25
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INDUSTRIAL DEVELOPMENT

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The project work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project may be carried out individually or in groups.

EXTENT AND EXPECTED WORKLOAD

Since it is a 30 ECTS course module the expected workload is 900 hours for the student.

EXAM

EXAMS

Name of exam	Industrial Development
Type of exam	Oral exam based on a project
ECTS	30
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

FACTS ABOUT THE MODULE

Danish title	Industrielt udviklingsarbejde
Module code	M-DMS-K3-1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INTERNSHIP

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The student is included in the company's daily work and carry out independent project work on an industrial problem relevant for the company. Concurrent to the work in the company, the student makes a project report, which is evaluated after the ending of the internship.

EXTENT AND EXPECTED WORKLOAD

Since it is a 20 ECTS course module the expected workload is 600 hours for the student.

EXAM

EXAMS

Name of exam	Internship
Type of exam	Oral exam based on a project
ECTS	20
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

The extent of the project must reflect the allotted time in ECTS.

FACTS ABOUT THE MODULE

Danish title	Projektorienteret forløb i en virksomhed
Module code	M-DMS-K3-7
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	20
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INTERNSHIP

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The student is included in the company's daily work and carry out independent project work on an industrial problem relevant for the company. Concurrent to the work in the company, the student makes a project report, which is evaluated after the ending of the internship.

EXTENT AND EXPECTED WORKLOAD

Since it is a 25 ECTS course module the expected workload is 750 hours for the student.

EXAM

EXAMS

Name of exam	Internship
Type of exam	Oral exam based on a project
ECTS	25
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

The extent of the project must reflect the allotted time in ECTS.

FACTS ABOUT THE MODULE

Danish title	Projektorienteret forløb i en virksomhed
Module code	M-DMS-K3-8
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	25
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INTERNSHIP

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module adds to the knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced engineering design of mechanical systems and structures.
- Be able to understand and apply advanced analysis tools for evaluating the performance of advanced mechanical systems and structures.
- Have knowledge and comprehension of the relation between synthesis and analysis in the design process.

SKILLS

- Be able to describe the problem solved and the criteria applied for its solution.
- Be able to evaluate the concepts, theories, and methodologies applied in the solution of the problem.
- Be able to account for the choices made during the solution of the problem, and substantiate that these are made on a high professional level.
- Be able to assess the limitations of the concepts, theories, and methodologies applied in the solution of the problem.

COMPETENCES

- Be able to analyze and solve an actual problem, of industrial relevance, through application of systematic research and development processes, including advanced analytical, experimental, and/or numerical methods and models.

TYPE OF INSTRUCTION

The student is included in the company's daily work and carry out independent project work on an industrial problem relevant for the company. Concurrent to the work in the company, the student makes a project report, which is evaluated after the ending of the internship.

EXTENT AND EXPECTED WORKLOAD

Since it is a 30 ECTS course module the expected workload is 900 hours for the student.

EXAM

EXAMS

Name of exam	Internship
Type of exam	Oral exam based on a project
ECTS	30
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

The project can be combined with up to 10 ECTS of courses, which reduces the ECTS of the project accordingly (e.g., a 20 ECTS project combined with 10 ECTS of course-work). The semester must add up to a total workload of 30 ECTS. The project may be finalized with a project report or in the form of a scientific paper with supporting appendices.

FACTS ABOUT THE MODULE

Danish title	Projektorienteret forløb i en virksomhed
Module code	M-DMS-K3-2
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

MASTER'S THESIS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have attained thorough understanding of a broad range of theoretical, numerical and experimental techniques within the area of design of mechanical systems.

SKILLS

- Be able to apply scientific methodology to solve a wide variety of problems within the field of specialization.
- Be able to perform scientific work in relevant topics within the field of specialization.
- Be able to apply a wide range of engineering methods in research and development projects in the field of specialization.
- Be able to participate or lead projects in mechanical system design, product development, modeling and analysis of mechanical systems, materials technology, production technology, structural mechanics and design of lightweight structures.

COMPETENCES

- Be able to work independently with a project on a specific problem within their field of interest on the highest possible level within their specialization.
- Be able to take part in technical development and research
- Be able to direct the technical management of development projects within the industry.
- Be competent to solve new and complicated technical problems by the use of advanced mathematics, scientific and technological knowledge.

TYPE OF INSTRUCTION

In this module, the Master's project is carried out. The module constitutes independent project work and concludes the program. Within the approved topic, the Master's project must document that the level for the program has been attained.

EXTENT AND EXPECTED WORKLOAD

Since it is a 30 ECTS course module the expected workload is 900 hours for the student.

EXAM

EXAMS

Name of exam	Master's Thesis
Type of exam	Master's thesis/final project
ECTS	30
Assessment	7-point grading scale
Type of grading	External examination

ADDITIONAL INFORMATION

The master thesis can be conducted as a long master thesis using both the 3rd and 4th semester. If choosing to do a long master thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS.

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale
Module code	M-DMS-K4-1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	30
Language of instruction	English
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

STRESS AND DEFORMATION ANALYSES OF LOAD CARRYING STRUCTURAL ELEMENTS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of theoretical and experimental determination of the stress and deformation states occurring in a structural element when carrying a mechanical load.
- Have attained an understanding for methods of analysis and experimental methods and the characteristics of their applications and limitations

SKILLS

- Be able to set up the governing equations for the theory of elasticity.
- Be able to demonstrate the properties of the strain and stress tensors.
- Be able to account for the implementation and practical use of the analytical, numerical, and experimental methods applied in the project.
- Be able to give a critical evaluation of the methods applied for stress and deformation analyses and the results obtained.
- Be able to use correct terminology.
- Be able to compare theoretical and experimental results.
- Be able to critically evaluate applied methods and their results.

COMPETENCES

- Be able to analyze a load carrying element on the basis of model considerations, using continuum mechanics, and by applying numerical methods including the finite element method.
- Be able to investigate the behavior of a structural element under mechanical loading with experimental techniques such as strain gauges and digital image measurement techniques.
- Be able to compare theoretical and experimental results carefully, and critically evaluate the methods applied and the results obtained.
- Be able to apply the background and the insight obtained, on intuitive design optimization, and suggest geometrical changes or a redesign including change of material.

TYPE OF INSTRUCTION

The module is carried out as group-based problem-oriented project work. The group work is carried out as an independent work process in which the students themselves organize and coordinate their workload in collaboration with a supervisor. The project is carried out in groups with normally no more than 6 members.

EXTENT AND EXPECTED WORKLOAD

Since it is a 10 ECTS course module the expected workload is 300 hours for the student.

EXAM

EXAMS

Name of exam	Stress and Deformation Analyses of Load Carrying Structural Element
Type of exam	Oral exam based on a project

ECTS	10
Assessment	7-point grading scale
Type of grading	Internal examination

ADDITIONAL INFORMATION

This course are followed by students without a B.Sc. in Mechanical Engineering and Manufacturing from Aalborg University (INTRO semester).

FACTS ABOUT THE MODULE

Danish title	Spændings- og deformationsanalyse af kraftoverførende konstruktion
Module code	M-DMS-K1-2
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	10
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

PROBLEM-BASED LEARNING, THEORY OF ELASTICITY AND THE FINITE ELEMENT METHOD, MATLAB

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge and understanding of project organized problem based learning.
- Have knowledge about group work/conflicts and ways to solve conflicts.
- Have knowledge and comprehension of planning and structuring the documentation of a project.
- Have knowledge and understanding of central concepts, theories, and methods concerning theory of elasticity.
- Have knowledge and understanding of the governing conditions and equations to be fulfilled in any linear elastic continuum subjected to static loads.
- Have knowledge and understanding of central concepts and theories concerning the finite element method.
- Have knowledge and understanding of central terms and governing equations for a linear static finite element problem.
- Have knowledge and comprehension of the basic features of MATLAB as a programming language.

SKILLS

- Be able to apply the project organized learning to actual problem related work in groups of up to 6 persons.
- Be able to apply systematic methods within the topics of this course.
- Be able to apply index notation and tensor calculus to manage a linear elastic mechanical problem.
- Be able to account for considerations related to the use of concepts, theories, and methods from the finite element method in practise.
- Be able to use the basic computational facilities of MATLAB.

COMPETENCES

- Independently be able to define and analyse scientific problems.
- Be able to design, code, and debug a program in MATLAB.

TYPE OF INSTRUCTION

The teaching is organized in accordance with the general form of teaching. Please see the programme cirruculum §17.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module the expected workload is 150 hours for the student.

EXAM

EXAMS

Name of exam	Problem-based Learning, Theory of Elasticity and the Finite Element Method, MATLAB
Type of exam	Written or oral exam
ECTS	5

Assessment	Passed/Not Passed
Type of grading	Internal examination

ADDITIONAL INFORMATION

For students without a B.Sc. in Mechanical Engineering and Manufacturing from Aalborg University (INTRO semester)

FACTS ABOUT THE MODULE

Danish title	Problembaseret læring, elasticitetsteori og finite element metodeteori, MATLAB
Module code	M-DMS-K1-6
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Esben Lindgaard

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

COMPUTATIONAL FLUID DYNAMICS (CFD) AND MULTIPHASE FLOW

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about the methods behind Computational Fluid Dynamics (CFD)
- Have knowledge about various spatial and temporal discretisation schemes
- Have knowledge about the pressure-velocity coupling method for solving the Navier-Stokes equations numerically
- Have knowledge about meshing strategies and boundary conditions
- Have knowledge about the fundamentals of turbulence, the energy cascade and Kolmogorov hypotheses
- Have knowledge and understanding within Reynolds-Averaged Navier-Stokes (RANS) and turbulence modelling
- Have knowledge about the fundamentals of multiphase flow
- Have knowledge about different modelling approaches for multiphase flow and multiphase models in the context of CFD
- Have knowledge about turbulence-particle interaction in multiphase flow

SKILLS

- Be able to use the finite volume method to numerically solve simple problems
- Be able to perform a mesh independency study in CFD analyses
- Be able to perform CFD analyses of a turbulent flow with regards to selection of turbulence model and near wall modelling/meshing strategy
- Be able to perform CFD analyses for non-reacting multiphase flow, for both the Euler-Euler and Euler-Lagrange approaches
- Be able to apply proper terminology in oral, written and graphical communication and documentation within CFD, turbulence and multiphase flows

COMPETENCES

- Be able to use the finite volume method to numerically solve simple problems
- Be able to perform a mesh independency study in CFD analyses
- Be able to perform CFD analyses of a turbulent flow with regards to selection of turbulence model and near wall modelling/meshing strategy
- Be able to perform CFD analyses for non-reacting multiphase flow, for both the Euler-Euler and Euler-Lagrange approaches
- Be able to apply proper terminology in oral, written and graphical communication and documentation within CFD, turbulence and multiphase flows

TYPE OF INSTRUCTION

Lectures supplemented by workshops, exercises, hands-on and self-studies.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module, the work load is expected to be 150 hours for the student.

EXAM

EXAMS

Name of exam	Computational Fluid Dynamics (CFD) and Multiphase Flow
Type of exam	Oral exam Oral examination which can be based on a mini-project.
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in the Joint Programme Regulations. http://www.engineering.aau.dk/uddannelse/studieadministration/

FACTS ABOUT THE MODULE

Danish title	Numerisk strømningslære (CFD) og flerfasestrømning
Module code	N-EE-K1-7
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg, Campus Esbjerg
Responsible for the module	Chungen Yin

ORGANISATION

Study Board	Study Board of Energy
Department	Department of Energy Technology
Faculty	Faculty of Engineering and Science

TEST AND VALIDATION

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds upon knowledge obtained in the modules Applied Statistics and Probability Theory or similar.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Understand methodology for design of experiments and test series and for reduction of ambiguity of experimental results, and for comparability with model predictions
- Explain elementary and advanced quantification tools, and their application to validation between model and experiment data
- Account for common contemporary methods and relevant specific industry standards
- Understand processing methods for analog and digital data (continuous vs. discrete)

SKILLS

- Scrutinize a non-trivial physical systems for appropriate experimental study
- Isolate principal measurable parameters
- Design an experiment matrix for systematic variation of parameters
- Perform a probabilistic study of the experimental data in order to quantify the influence of individual parameters
- Scrutinize a model (analytical or numerical) for comparison with an appropriate experimental study
- Isolate principal input parameters and their known or assumed statistical variations
- Perform a probabilistic study of the model in order to quantify the level of confidence
- Account for the level of coherence between test results and model predictions
- Identify invalid data (outliers)
- Account for common errors and limitations in the processing of model data or experimentally obtained data

COMPETENCES

- Undertake experiment planning and execution for refinement and validation (or rejection) of model-based predictions of phenomena within their principal line of study

TYPE OF INSTRUCTION

The course is taught by a mixture of lectures, workshops, exercises, mini-projects and self-studies.

EXTENT AND EXPECTED WORKLOAD

Since it is a 5 ECTS course module, the work load is expected to be 150 hours for the student.

EXAM

EXAMS

Name of exam	Test and Validation
Type of exam	Written and oral exam Oral examination based on a submitted written assignment.

ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Joint Programme Regulations. http://www.engineering.aau.dk/uddannelse/studieadministration/

FACTS ABOUT THE MODULE

Danish title	Test og validering
Module code	N-EE-K3-21
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg, Campus Esbjerg
Responsible for the module	Erik Appel Jensen, Henrik Sørensen

ORGANISATION

Study Board	Study Board of Energy
Department	Department of Energy Technology
Faculty	Faculty of Engineering and Science

50 ECTS LONG MASTER'S THESIS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have attained thorough understanding of a broad range of theoretical, numerical and experimental techniques within the area of design of mechanical systems.

SKILLS

- Be able to apply scientific methodology to solve a wide variety of problems within the field of specialization.
- Be able to perform scientific work in relevant topics within the field of specialization.
- Be able to apply a wide range of engineering methods in research and development projects in the field of specialization.
- Be able to participate or lead projects in mechanical system design, product development, modeling and analysis of mechanical systems, materials technology, production technology, structural mechanics and design of lightweight structures.

COMPETENCES

- Be able to work independently with a project on a specific problem within their field of interest on the highest possible level within their specialization.
- Be able to take part in technical development and research
- Be able to direct the technical management of development projects within the industry.
- Be competent to solve new and complicated technical problems by the use of advanced mathematics, scientific and technological knowledge.

TYPE OF INSTRUCTION

In this module, the Master's project is carried out. The module constitutes independent project work and concludes the program. Within the approved topic, the Master's project must document that the level for the program has been attained.

EXTENT AND EXPECTED WORKLOAD

Since it is a 50 ECTS project module the expected workload is 1500 hours for the student.

EXAM

EXAMS

Name of exam	50 ECTS Long Master's Thesis
Type of exam	Master's thesis/final project
ECTS	50
Assessment	7-point grading scale
Type of grading	External examination

FACTS ABOUT THE MODULE

Danish title	50 ECTS Langt kandidatspeciale
Module code	M-DMS-K3-3
Module type	Project
Duration	2 semesters
Semester	Autumn
ECTS	50
Language of instruction	English
Location of the lecture	Campus Aalborg
Responsible for the module	Sergey Sorokin

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

LONG MASTER'S THESIS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have attained thorough understanding of a broad range of theoretical, numerical and experimental techniques within the area of design of mechanical systems.

SKILLS

- Be able to apply scientific methodology to solve a wide variety of problems within the field of specialization.
- Be able to perform scientific work in relevant topics within the field of specialization.
- Be able to apply a wide range of engineering methods in research and development projects in the field of specialization.
- Be able to participate or lead projects in mechanical system design, product development, modeling and analysis of mechanical systems, materials technology, production technology, structural mechanics and design of lightweight structures.

COMPETENCES

- Be able to work independently with a project on a specific problem within their field of interest on the highest possible level within their specialization.
- Be able to take part in technical development and research
- Be able to direct the technical management of development projects within the industry.
- Be competent to solve new and complicated technical problems by the use of advanced mathematics, scientific and technological knowledge.

TYPE OF INSTRUCTION

In this module, the Master's project is carried out. The module constitutes independent project work and concludes the program. Within the approved topic, the Master's project must document that the level for the program has been attained.

EXTENT AND EXPECTED WORKLOAD

Since it is a 60 ECTS project module the expected workload is 1800 hours for the student.

EXAM

EXAMS

Name of exam	Long Master's Thesis
Type of exam	Master's thesis/final project
ECTS	60
Assessment	7-point grading scale
Type of grading	External examination

FACTS ABOUT THE MODULE

Danish title	Langt kandidatspeciale
Module code	M-DMS-K3-4
Module type	Project
Duration	2 semesters
Semester	Autumn
ECTS	60
Language of instruction	English
Location of the lecture	Campus Aalborg
Responsible for the module	Sergey Sorokin

ORGANISATION

Study Board	Study Board of Industry and Global Business Development
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science