AALBORG UNIVERSITET

CIVILINGENIØR, CAND.POLYT. I MATERIALETEKNOLOGI 2017

CIVILINGENIØR
AALBORG

MODULER SOM INDGÅR I STUDIEORDNINGEN

INDHOLDSFORTEGNELSE

METALLIC MATERIALS

2019/2020

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained an in-depth understanding of theoretical and experimental methods in metallurgy within the specific area of topics covered by the project.
- Have attained an understanding for methods of analysis and experimental methods and their characteristics, applications, and limitations.

SKILLS

- Be able to describe and experimentally determine a likely phase and chemical composition for metallic alloys.
- Be able to demonstrate understanding of microstructure for metals and metal alloys.
- Be able to devise mechanical or heat treatments for a metal or an alloy, and be able to predict the outcome of applying such a treatment.
- Be able to give a critical evaluation of the methods applied for determining microstructure, chemical composition or mechanical and other properties.
- Be able to use correct terminology.
- Be able to compare theoretical and experimental results.

COMPETENCES

- Be able to set up a realistic hypothesis for the outcome of a process, obtaining a property or the like, within the field of metallurgy.
- Be able to devise an experimental method to falsify or validate a given hypothesis.
- Be able to use advanced experimental techniques within the field of metallurgy.
- Be able to apply the background theory and the insight obtained, in validation of material choice for a given application.

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

Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Metalliske materialer
Module code	M-MAT-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	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

POLYMERS AND POLYMER COMPOSITES

2019/2020

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

This module is based on knowledge obtained in 1st Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained a comprehensive understanding of polymers.

SKILLS

- Be able to choose a polymer/polymer composite for a given application
- Be able to specify a material system for a composite to a given application
- Be able to demonstrate understanding of microstructure for polymers and polymer based composites.
- Be able to give a critical evaluation of the methods applied for determining microstructure, chemical composition or mechanical and other properties.
- Be able to use correct terminology.
- Be able to compare theoretical and experimental results.

COMPETENCES

- Be able to devise experiments for documentation.
- Be able to set up a realistic hypothesis for the outcome of a process, obtaining a property, or the like, within the field of polymers and polymer based composites.
- Be able to devise an experimental method to falsify or validate a given hypothesis.
- Be able to use advanced experimental techniques within the field of polymers and polymer composites.
- Be able to apply the background theory and the insight obtained, for validation of the material choice for a given application.

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	Polymers and Polymer Composites
Type of exam	Oral exam based on a project
ECTS	15

Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Polymerer og polymer kompositter
Module code	M-MAT-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	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

INDUSTRIAL DEVELOPMENT

2019/2020

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

This module is based on knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced materials.
- Be able to apply analytical, numerical and experimental methods in relation to verification of material performance.

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 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 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
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

ADDITIONAL INFORMATION

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-MAT-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	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

ACADEMIC INTERNSHIP

2019/2020

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

This module is based on knowledge obtained in 2nd Semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have gained knowledge and understanding of advanced materials.
- Be able to apply analytical, numerical and experimental methods in relation to verification of material performance.

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	Academic Internship
Type of exam	Oral exam based on a project
ECTS	30
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Projektorienteret forløb i en virksomhed
Module code	M-MAT-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	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

LONG MASTER'S THESIS

2019/2020

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

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.

LEARNING OBJECTIVES

KNOWLEDGE

- Have attained thorough understanding of a broad range of theoretical, numerical and experimental techniques within the area of Materials Engineering.

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 in 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 in or lead projects in materials technology, product development, modeling and analysis of material systems and production technology.
- The graduates are expected to have gained a broad knowledge within the areas of Materials Technology. The graduates have knowledge about qualified materials selection, materials behavior to external stimuli, influence of processing on material properties and material microstructure, metallurgy, issues related to polymer chemistry, various material testing methods and simulation of material behavior.

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 industry.
- Be competent to solve new and complicated technical problems by the use of advanced analytical and experimental techniques.

TYPE OF INSTRUCTION

In this module, the Master's project is carried out. The module constitutes independent project work and concludes the programme. Within the approved topic, the Master's project must document that the level for the programme 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
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Langt kandidatspeciale
Module code	M-MAT-K3-3
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	60
Language of instruction	English
Location of the lecture	Campus Aalborg
Responsible for the module	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science

MASTER'S THESIS

2019/2020

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 Materials Engineering.

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 in 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 in or lead projects in materials technology, product development, modeling and analysis of material systems and production technology.
- The graduates are expected to have gained a broad knowledge within the areas of Materials Technology. The graduates have knowledge about qualified materials selection, materials behavior to external stimuli, influence of processing on material properties and material microstructure, metallurgy, issues related to polymer chemistry, various material testing methods and simulation of material behavior.

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 industry.
- Be competent to solve new and complicated technical problems by the use of advanced analytical and experimental techniques.

TYPE OF INSTRUCTION

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

Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale
Module code	M-MAT-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	Jan Schjødt-Thomsen

ORGANISATION

Study Board	Study Board of Mechanical Engineering and Physics
Department	Department of Materials and Production
Faculty	Faculty of Engineering and Science