AALBORG UNIVERSITET

CIVILINGENIØR, CAND.POLYT I KEMITEKNIK, 2021

CIVILINGENIØR
ESBJERG

MODULER SOM INDGÅR I STUDIEORDNINGEN

INDHOLDSFORTEGNELSE

FLUID MECHANICS

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Explain fundamental basis for the formulation and analysis of the statics and dynamics of the flow of viscous fluids
- Account for fluid kinematics
- Explain stresses in fluids, equation of motion, constitutive models and Navier-Stokes equations
- Account for Reynolds averaging and turbulence models
- Describe turbulent and laminar boundary layers including understanding of momentum equation for boundary layers
- Explain the basic phenomena involved in multiphase flows

SKILLS

- Plan, design and make experiments and choose measurements methods suitable to the characteristics of the fluid
- Determine and apply appropriate experimental methods to fluid flows
- Apply appropriate analytical, semi-empirical and numerical methods for mathematical description of fluid dynamic problems
- Use multiphase flow models

COMPETENCES

- Independently define and analyse scientific problems within the area of fluid dynamics
- Independently be a part of professional and interdisciplinary development work within the area of fluid dynamics

TYPE OF INSTRUCTION

- Lectures, workshops, exercises, mini-projects and self-studies

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Fluid Mechanics
Type of exam	Written or oral exam
ECTS	5
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	Strømningslære
Module code	K-KT-K1-7
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Mandø

ORGANISATION

Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

CHEMICAL ENGINEERING THERMODYNAMICS

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This course deals with computational aspects of phase equilibrium and chemical thermodynamics.

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for vapor-liquid and gas-liquid equilibrium under ideal and nonideal conditions
- account for liquid-liquid and vapor-liquid-liquid equilibrium
- account for equilibria involving solid phases
- account for solution thermodynamics, fugacity, and activity, excess properties, property changes of mixing
- account for chemical-reaction equilibria
- account for computational aspects of chemical engineering thermodynamics

SKILLS

- perform PVT and fugacity calculations using cubic equation of state
- perform activity coefficient calculations
- perform bubble and dew point calculations, and flash calculations using both the Gamma/Phi and the Phi/Phi formulation for vapor-liquid and gas-liquid equilibrium
- perform liquid-liquid equilibrium calculations
- perform chemical equilibrium calculations
- perform equilibrium calculation for multiphase reacting systems
- regress thermodynamic model parameters from experimental data

COMPETENCES

- select appropriate thermodynamic models for chemical engineering and oil and gas technology problems
- assess and select scientific literature to obtain relevant thermodynamic model parameters
- develop customized computer programs for performing thermodynamic calculations

TYPE OF INSTRUCTION

- Lectures
- Problem solving sessions

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Chemical Engineering Thermodynamics
Type of exam	Written or oral exam
ECTS	5
Permitted aids	All written and all electronic aids

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	Kemisk termodynamik
Module code	K-KT-K1-34
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Maschietti

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

COLLOID AND INTERFACE SCIENCE

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The course aims to introduce the students to the central terms and methods in colloid and interface chemistry. This includes:

- Colloids, macromolecules, clusters and emulsions
- Interface and surface tension
- Wetting of surfaces
- Adsorption at interfaces
- Micelles, foam and bubbles
- Sol-gel processes
- Electrostatic interaction, double layer and stability of colloids
- Zeta potential
- Scattering techniques
- X-ray methods and electron microscopy techniques.

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for different types of colloids and their stability
- account for adsorption at interfaces
- account for surfactants, wettability and emulsions
- account for different scattering techniques, X-ray methods and electron microscopy
- account for different disciplines in which the theory of colloid and interface science are beneficial for understanding details of products or processes
- explain the importance of size and interparticle forces that result in macroscopic properties of substances
- explain models of colloids and interfaces that can be used for the description and understanding of different colloid systems.

SKILLS

- apply general theory of colloid science in combination with experimental tools

COMPETENCES

- select and apply models to describe different colloidal systems and interfaces
- evaluate which kinds of experimental tools that preferable can be used to enhance the physico-chemical understanding of processes and products

TYPE OF INSTRUCTION

- Lectures
- Laboratory and theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Colloid and Interface Science
Type of exam	Written or oral exam
ECTS	5
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	Kolloid- og grænsefladekemi
Module code	K-KT-K1-8A
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Simonsen

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

PROCESS MODELLING

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This project module deals with modelling of chemical processes and chemical process units.

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for chemical processes, chemical reactors and separation units
- account for relevant simulation tools for modelling and designing chemical processes, chemical reactors and separation units
- account for chemical process synthesis and process optimization
- account for instrumentation, economic, safety and environmental aspects of chemical processes

SKILLS

- select, apply and develop experimental methods for generating data supporting process modelling
- investigate a given case using modelling tools
- create a computational model of a given case in the chemical industry
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology, and communicate the research-based foundation and problem and results in writing, graphically and orally in a professionally reasoned and coherent way
- assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- communicate chemical engineering problems and solutions to peers, interdisciplinary groups, and non-specialists, including collaborative partners and end-users
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility to implement academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

Project work

EXTENT AND EXPECTED WORKLOAD

450 hours

EXAM

PREREQUISITE FOR ENROLLMENT FOR THE EXAM

- An approved PBL competency profile is a prerequisite for participation in the project exam

EXAMS

Name of exam	Process Modelling
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	Procesmodellering
Module code	K-KT-K2-15A
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Sergey Kucheryavskiy
Time allocation for external examiners	B

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

PROCESS DESIGN AND SIMULATION

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This course is focused on process design, simulation and optimization of processes within chemical engineering.

LEARNING OBJECTIVES

KNOWLEDGE

Students who complete the module must be able to

- account for basic process synthesis and design methods
- account for the principles of process simulation
- explain process optimization using process simulation
- account for computational aspects of phase equilibria
- describe commercial process simulators

SKILLS

- illustrate actual processes in a PFD
- convert a PFD into a working process simulation
- perform rigorous process mass and energy balances
- perform steady-state simulation and evaluate results
- perform sensitivity analysis and optimization
- perform computer-aided process design and process improvements

COMPETENCES

- investigate processes using simulation tools
- select and utilise appropriate thermodynamic models

TYPE OF INSTRUCTION

- Lectures
- Practical exercises
- Group and individual instruction

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Process Design and Simulation
Type of exam	Written or oral exam
ECTS	5
Permitted aids	All written and all electronic aids
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	Procesdesign og simulering
Module code	K-KT-K2-37
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Haoshui Yu

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

ADVANCED REDOX AND SEPARATION PROCESSES

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The aim of the course is to provide the students with knowledge on i) advanced oxidation processes based on production and reactions of hydroxyl radicals and ii) separation processes used in environmental application such as adsorption and membrane processes. The theoretical principles of the processes will be studied in detail together with discussions and case examples on their use in modern water treatment (drinking water, surface water, groundwater and industrial wastewater) and soil and groundwater remediation applications.

LEARNING OBJECTIVES

KNOWLEDGE

Students who complete the module must be able to

- explain fundamental physical processes and chemical reactions involved in: Fentons based processes, photochemical advanced oxidation processes, photocatalysis, electrochemical oxidation, ozonation
- explain degradation mechanisms and removal pathways of micropollutants
- explain adsorption isotherms of relevance to activated carbon adsorption
- explain the separation principles and mechanisms involved in membrane filtration of micropollutants
- explain strengths and weaknesses of redox and separation processes
- explain how different water treatment unit operations complement each other in terms of overall treatment level and process intensification

SKILLS

- calculate energy consumption and other parameters that are used to compare the efficiency of advanced oxidation processes for a given application
- estimate important design characteristics of a treatment system for a given application

COMPETENCES

- device prober treatment strategies to reach desired water qualities, based on actual water treatment problems and raw water compositions
- use proper terminology in oral, written and graphical communication and documentation related to water treatment technology

TYPE OF INSTRUCTION

- Lectures
- Theoretical problem solving
- Workshops

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Advanced Redox and Separation Processes
Type of exam	Written or oral exam

ECTS	5
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	Avancerede redox og Separationsprocesser
Module code	K-KT-K2-38
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Muff

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

CHEMOMETRICS AND PROCESS MONITORING

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who complete the module must be able to

- account for general methods for multivariate data analysis (principal component analysis, multiple linear regression, principal component regression, projection on latent structures, soft independent modelling of class analogy)
- account for methods for data preprocessing (centering, scaling, nonlinear and spectroscopic reprocessing, orthogonal signal correction).
- explain basic methods for variable selection (Selectivity ratio, VIP, interval PLS, jack-knife)
- explain the theoretical background of these methods, their advantages and limitations as well as possible applications
- explain how multivariate methods complement traditional statistical methods

SKILLS

- explore multivariate data, find groups and trends, detect and remove outliers
- calibrate and do proper validation of multivariate regression models, use these models for prediction
- evaluate if data need a preprocessing and which method to apply
- calibrate and evaluate models for data classification
- compare different regression and classification models and identify the best
- use multivariate methods for analysis of real data from different applications

TYPE OF INSTRUCTION

- Lectures
- Workshops
- Exercises
- Mini-projects

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

Name of exam	Chemometrics and Process Monitoring
Type of exam	Written or oral exam
ECTS	5
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	Kemometri og procesovervågning
Module code	K-KT-K2-36
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Sergey Kucheryavskiy

ORGANISATION

Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

SPECIALISATION IN CHEMICAL ENGINEERING

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The project will typically focus on one of the following subjects

- Ceramics and photocatalysis
- Chemicals in oil and gas industry
- Environmental technology
- Fossil fuels and enhanced oil recovery,
- Natural products,
- Polymer technology
- Spectroscopy and data analysis

LEARNING OBJECTIVES

KNOWLEDGE

Students who complete the module must be able to

- account for the theoretical basics of chemical engineering

SKILLS

- execute laboratory experiments
- apply physico-chemical models within chemical engineering
- utilise processes equipment adn process simulators within chemical engineering
- analyse experimental data
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology, and communicate the research-based foundation, problem and results of the project in writing, graphically and orally in a coherent way
- assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- select, combine and review experimental and theoretical methods, as appropriate, in order to solve complex problems in chemical engineering
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility for implementing academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialisation

TYPE OF INSTRUCTION

- Project work with supervision

EXTENT AND EXPECTED WORKLOAD

900 hours

EXAM

EXAMS

Name of exam	Specialisation in Chemical Engineering
Type of exam	Oral exam based on a 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	Specialisering i kemiteknik
Module code	K-KT-K3-35
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Muff
Time allocation for external examiners	B

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

PROJECT-ORIENTED STUDY IN AN EXTERNAL ORGANISATION

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- explain the scientific basis of the work carried out by the external organisation

SKILLS

- master the scientific methods and general skills related to the project work in the external organisation
- write a report following the standards of the field of study, use the correct terminology and document extensive use of relevant and original scientific literature, and communicate and discuss the project's foundation, problem and results in writing, graphically and verbally in a coherent way
- critically assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses and discuss the problem of the project and results in relevant scientific contexts and social conditions
- evaluate the potential of the project for further development, assessing and incorporating relevant economic, ethical, environmental and other socially relevant factors

COMPETENCES

- participate in development, innovation, and research and use scientific methods to solve complex tasks
- take professional responsibility to implement independent assignments and interdisciplinary collaborations
- independently take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

- Project work, supervised by an external supervisor in collaboration with an internal supervisor at Aalborg University
- Project work in an external organisation must be in areas of relevance to the competence profile of the program

EXTENT AND EXPECTED WORKLOAD

900 hours

EXAM

EXAMS

Name of exam	Project-Oriented Study in an External Organisation
Type of exam	Oral exam based on a project
ECTS	30
Assessment	Passed/Not Passed
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 ekstern organisation
Module code	K-BIO-K3-66
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Language of instruction	English
Empty-place Scheme	Yes
Responsible for the module	Pedersen

ORGANISATION

Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

MASTER'S THESIS

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- explain the scientific basis and scientific issues in within the competence profile of the program
- explain the highest international research within the thesis subject area

SKILLS

- master the scientific methods and general skills related to the competence profile of the program
- write a project report following the standards of the field of study, use the correct terminology and document extensive use of relevant and original scientific literature, and communicate and discuss the
- project's research-based foundation and problem and results in writing, graphically and verbally in a professionally reasoned and coherent way
- Critically assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses and discuss the problem of the project and results in relevant scientific contexts and social conditions
- evaluate the potential of the project for further development, assessing and incorporating relevant economic, ethical, environmental and other societal relevant factors

COMPETENCES

- participate in and independently implement technological and scientific development and research, develop and implement experimental work and solve complex tasks using scientific methods
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility to implement independent academic assignments and interdisciplinary collaborations
- independently take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

Project work

EXTENT AND EXPECTED WORKLOAD

900 hours

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	K-KMB-K4-5
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	30
Language of instruction	English
Responsible for the module	Pedersen
Time allocation for external examiners	D

ORGANISATION

Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

MASTER'S THESIS

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- explain the scientific basis and scientific issues in within the competence profile of the program
- explain the highest international research within the thesis subject area

SKILLS

- master the scientific methods and general skills related to the competence profile of the program
- write a project report following the standards of the field of study, use the correct terminology and document extensive use of relevant and original scientific literature, and communicate and discuss the
- project's research-based foundation and problem and results in writing, graphically and verbally in a professionally reasoned and coherent way
- Critically assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses and discuss the problem of the project and results in relevant scientific contexts and social conditions
- evaluate the potential of the project for further development, assessing and incorporating relevant economic, ethical, environmental and other societal relevant factors

COMPETENCES

- participate in and independently implement technological and scientific development and research, develop and implement experimental work and solve complex tasks using scientific methods
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility to implement independent academic assignments and interdisciplinary collaborations
- independently take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

- Project work.

A long Master's thesis of more than 30 ECTS must include work of experimental nature and has to be approved by the Head of Studies. The amount of experimental work must reflect the allotted ECTS.

EXTENT AND EXPECTED WORKLOAD

1800 hours

EXAM

EXAMS

Name of exam	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	Kandidatspeciale
Module code	K-KMB-K4-4
Module type	Project
Duration	2 semesters
Semester	Autumn
ECTS	60
Language of instruction	English
Responsible for the module	Pedersen
Time allocation for external examiners	D

ORGANISATION

Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

OIL AND GAS SEPARATION

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This project module deals with the fundamentals of oil and gas production and focuses on the separation processes of the produced fluids.

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for general process engineering
- explain the fundamentals of oil and gas production units, with special regard to offshore systems
- account for the nature of reservoir fluids
- explain basic operations of oil and gas separation units, with special regard to offshore systems
- account for basic operations of gas and produced water treatment
- account for environmental and safety aspects regarding oil and gas production

SKILLS

- work out mass and energy balances to oil and gas separation units
- do PVT calculations of aqueous, oil and gas phases
- prepare process flow diagrams (PFD) of oil and gas separation units
- design horizontal and vertical 2-phase and 3-phase separators
- design relevant equipment pertaining to oil and gas separation
- design and optimize the overall separation train
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology, and communicate the research-based foundation and problem and results in writing, graphically and orally in a professionally reasoned and coherent way
- assess and select relevant scientific literature, scientific methods, models and other tools used in the project and analyze the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility for implementing academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

Project work

EXTENT AND EXPECTED WORKLOAD

450 hours

EXAM

EXAMS

Name of exam	Oil and Gas Separation

Type of exam	Oral exam based on a project
ECTS	15
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	Olie og gas separation
Module code	K-KT-K1-25A
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Maschietti

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

MODELING OF OIL AND GAS PRODUCTION

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This project module deals with modelling of oil and gas production processes.

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for oil and gas production from reservoir to refinery
- account for enhanced oil recovery processes
- account for high-pressure fluid behavior
- account for produced water treatment units
- account for production chemistry in oil and gas production
- account for relevant simulation tools for modelling processes in the oil and gas industry
- account for instrumentation, economic, safety and environmental aspects related to oil and gas production

SKILLS

- select, apply and develop experimental methods for generating data supporting process modelling
- create a computational model of a given case in the oil and gas industry
- investigate a given case using modelling tools
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology, and communicate the research-based foundation and problem and results in writing, graphically and orally in a professionally reasoned and coherent way
- assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- communicate oil and gas problems and solutions to peers, interdisciplinary groups, and non-specialists, including collaborative partners and end-users
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility to implement academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

Project work

EXTENT AND EXPECTED WORKLOAD

450 hours

EXAM

PREREQUISITE FOR ENROLLMENT FOR THE EXAM

- An approved PBL competency profile is a prerequisite for participation in the project exam

EXAMS

Name of exam	Modeling of Oil and Gas Production
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	Modellering af olie og gas produktion
Module code	K-KT-K2-16B
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Sergey Kucheryavskiy
Time allocation for external examiners	B

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

SPECIALISATION IN OIL AND GAS TECHNOLOGY

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The project will typically focus on one of the following subjects

- Enhanced oil recovery methods
- Petrophysical characterization of reservoirs
- Modelling and design of oil and gas related processestechnology
- Process units and application of process simulators to oil and gas related processes

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for the theoretical basics of oil and gas technology

SKILLS

- execute laboratory experiments
- apply physico-chemical models to oil and gas problems
- analyze data from experimental work and simulations on oil and gas production
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology and communicate the research-based foundation, problem and results of the project in writing, graphically and orally in a coherent way
- assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- select and combine experimental and theoretical methods, as appropriate, in order to solve complex problems in oil and gas technology
- critically review the methods used and the results obtained on the project work
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility for implementing academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

- Project work

EXTENT AND EXPECTED WORKLOAD

900 hours

EXAM

EXAMS

Name of exam	Specialisation in Oil and Gas Technology
Type of exam	Oral exam based on a 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	Specialisering i Olie og gasteknologi
Module code	K-KT-K3-26A
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Maschietti
Time allocation for external examiners	B

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
Faculty	The Faculty of Engineering and Science

PROCESS ANALYSIS

2025/2026

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- account for theoretical, numerical and experimental tools used for process analysis
- explain physical, chemical and mathematical theory behind the tools used for process analysis

SKILLS

- apply methods and instruments as well as data sampling systems to solve problems of process analysis
- write a project report following the standards of the field of study, include relevant original scientific literature, use the correct terminology, and communicate the research-based foundation and problem and results in writing, graphically and orally in a professionally reasoned and coherent way
- assess and select relevant original scientific literature and current scientific methods, models and other tools used in the project and asses the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- evaluate and select approoriate theoretical methods and laboratory equipment, and transfer theory and methodology between different process analysis tasks
- handle the planning, implementation and management of complex and unpredictable research and/or developmental tasks and take professional responsibility to implement academic assignments and interdisciplinary collaborations
- take responsibility for own professional development and specialization

TYPE OF INSTRUCTION

- Project work

EXTENT AND EXPECTED WORKLOAD

450 hours

EXAM

EXAMS

Name of exam	Process Analysis
Type of exam	Oral exam based on a project
ECTS	15
Permitted aids	All written and all electronic aids
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	Procesanalyse
Module code	K-KT-K1-18A
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Esbjerg
Responsible for the module	Maschietti

ORGANISATION

Education owner	Master of Science (MSc) in Engineering (Chemical Engineering)
Study Board	Study Board of Chemistry and Bioscience
Department	Department of Chemistry and Bioscience
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