



AALBORG UNIVERSITET

MASTER OF SCIENCE (MSC) IN ENGINEERING (BIOTECHNOLOGY)

MASTER OF SCIENCE (MSC) IN ENGINEERING
AALBORG

MODULES INCLUDED IN THE CURRICULUM

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EXPERIMENTAL MOLECULAR BIOLOGY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for the central molecular biology
- Describe molecular biology techniques used in research and industry
- Account for transgenic techniques and design of relevant recombinant biotechnological products, including safety issues

SKILLS

- Apply molecular biology techniques used in research and industry
- Employ a comprehensive repertoire of bioinformatics analysis tools and databases
- 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 assess the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- Evaluate pros and cons of different production systems and organisms for biotechnological products
- 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 | Experimental Molecular Biology |
| Type of exam | Oral exam based on a project |
| ECTS | 15 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|--|
| Danish title | Eksperimentel molekylærbiologi |
| Module code | K-BT-K1-47 |
| Module type | Project |
| Duration | 1 semester |
| Semester | Autumn |
| ECTS | 15 |
| Language of instruction | Danish and English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Teis Esben Søndergaard |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MOLECULAR BIOLOGY AND BIOINFORMATICS

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for the molecular mechanisms involved in the synthesis, structure and replication of DNA, transcription of genes, and translation of mRNA
- Account for the structure of prokaryotic and eukaryotic genomes
- Account for commonly used databases and use common search tools for retrieving data and linking data from public databases

SKILLS

- Evaluate the use of a variety of central molecular biology techniques
- Account for possibilities and limitations in sequence comparison algorithms and use these algorithms for the analysis of molecular evolution of genes and proteins
- Recite the principles behind advanced algorithms for data mining: e.g. Neural Networks, Hidden Markov Chains and Support Vector Machines
- Analyse simple data from microarray and sequence tag based gene expression analysis
- Produce a strategy for the physical cloning of a gene using information retrieved from databases

COMPETENCES

- Interpret the central dogma of molecular biology

TYPE OF INSTRUCTION

- Lectures and theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Molecular Biology and Bioinformatics |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|--|
| Danish title | Molekylærbiologi og bioinformatik |
| Module code | K-BT-K1-24 |
| Module type | Course |
| Duration | 1 semester |
| Semester | Autumn |
| ECTS | 5 |
| Language of instruction | Danish and English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Teis Esben Søndergaard |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

CELL BIOLOGY, IMMUNOLOGY AND GENETICS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge gained in Microbiology, Biochemistry

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The aim is to give the student a thorough insight in

- Eukaryotic cell biology and genetics and an overview of immunology
- Eukaryotic cell compartments, organelles, membranes and transport mechanisms
- Cytoskeleton, cell-cycle, and cell-division, mitosis and meiosis
- Signal transduction
- Mendel's laws
- Chromosomes and heredity
- Genotype, phenotype, and their correlation
- Genetic variability and diseases
- The composition and function of the immune system
- The role of the immune system in preventing and fighting, but also in causing disease
- Cell biologic, genetic, and immunologic methods

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for the composition of the eukaryotic cell
- Account for the composition and function of the organelles of the eukaryotic cell
- Describe inter and intra cellular communication
- Account for the background for inheritance
- Account for the theory on heredity and evolution
- Account for and evaluate selected cell biologic, genetic, and immunologic methods and techniques
- Account for central elements of the immune system
- Account for the basic mechanisms of the immune system, including the potential pathologic developments

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Cell biology, Immunology and Genetics |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|-------------------------------------|
| Danish title | Cellebiologi, immunologi og genetik |
| Module code | K-BT-K1-5 |
| Module type | Course |
| Duration | 1 semester |
| Semester | Autumn |
| ECTS | 5 |
| Language of instruction | Danish and English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Anders Olsen |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MICROBIAL DIVERSITY AND ACTIVITY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

- The aim is to provide a fundamental understanding of how to characterize identity and function of prokaryotes using imaging and molecular techniques, how prokaryotes form consortia and biofilms, and how mixed microbial communities can be used to solve environmental challenges, such as production of bioenergy, reuse of resources, and production of clean water.
- Identification of microorganisms using molecular and bioinformatic approaches
- Use of advanced microscopy for characterization of microorganisms in mixed cultures
- Methods to determine activity of microorganisms directly in biofilm
- Biofilm formation, composition, microbial communication and microbial communities
- Pathogenic bacteria in biofilms
- Principles for control of unwanted prokaryotes
- Transformation of micropollutants
- Transformation of C, N and P in mixed communities
- Use of mixed communities to purify soil, water and air

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for the formation, composition, growth and activity of mixed microbial communities
- Describe growth of human-related and pathogenic bacteria in biofilms
- Explain the use of mixed communities to clean soil, water and air for C, N and P
- Explain the use of mixed communities for nutrient recovery and bioenergy production

SKILLS

- Apply bioinformatic databases and account for molecular techniques used for identification of microorganisms

TYPE OF INSTRUCTION

- Lectures and theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Microbial Diversity and Activity |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|-------------------------------------|
| Danish title | Mikrobiel diversitet og aktivitet |
| Module code | K-BT-K1-22 |
| Module type | Course |
| Duration | 1 semester |
| Semester | Autumn |
| ECTS | 5 |
| Language of instruction | Danish and English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Per Halkjær Nielsen |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

PROTEIN SCIENCE

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for how to design, produce, purify, and characterize proteins
- Describe how activity and stability of enzymes and other biotechnological relevant proteins can be determined
- Account for the development of new preparative and analytical methods in protein science

SKILLS

- Describe, model, and evaluate protein structures
- Compare and substantiate the choice of protein producing organisms for technical products
- 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 assess the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- Account for the scientific basis of selected preparative and analytical methods
- Compare and explain theoretical and practical results within the field of protein science
- 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 | Protein Science |
| Type of exam | Oral exam based on a project |
| ECTS | 15 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|----------------------------------|
| Danish title | Proteinteknologi |
| Module code | K-BT-K2-38 |
| 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 | Peter Kristensen |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

PROTEIN CHEMISTRY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for the chemistry and thermodynamics behind protein structure, folding, stability and function, including the effect of protein modifications
- Account for central elements of protein biosynthesis and processing
- Account for protein evolution and homology

SKILLS

- Design recombinant proteins and processes for their purification
- Explain, use and document the effect of different preparative and analytical methods, including different forms of chromatography and electrophoresis

COMPETENCES

- Read and understand advanced scientific articles in structural and analytical protein chemistry

TYPE OF INSTRUCTION

- Lectures
- Theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Protein Chemistry |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|--------------|-------------|
| Danish title | Proteinkemi |
| Module code | K-BT-K2-20 |

Master of Science (MSc) in Engineering (Biotechnology)

| | |
|----------------------------|----------------------------------|
| 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 | Peter Kristensen |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

PROTEIN STRUCTURE

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

SKILLS

Students who have passed the module should be able to

- Predict and model protein structures from sequence data
- Give an account of state-of-the-art techniques for the investigation and determination of structure, including the procedures involved, prerequisites and the advantages and shortcomings of each of these techniques
- Extract and model biomolecular structural data from relevant databases
- Visualize structures and utilize structural data to explain biomolecular function
- Give an account of classification of protein structures

COMPETENCES

- Read and understand scientific articles on the determination, interpretation and application of biomolecular structures

TYPE OF INSTRUCTION

- Lectures
- Theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Protein Structure |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|--------------|-----------------|
| Danish title | Proteinstruktur |
| Module code | K-BT-K2-21 |
| Module type | Course |
| Duration | 1 semester |

Master of Science (MSc) in Engineering (Biotechnology)

| | |
|----------------------------|---------------------------------|
| Semester | Spring |
| ECTS | 5 |
| Language of instruction | English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

CARBOHYDRATE CHEMISTRY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Explain and show in depth understanding of the structure and chemical properties of mono- and disaccharides as well as oligo- and polysaccharides
- Demonstrate knowledge of industrially important carbohydrates including hydrocolloids and their gelation properties
- Explain essential aspects of glycobiology
- Demonstrate in depth knowledge of the substrate specificity, regio- and anomeric selectivity as well as the function and catalytic mechanisms of carbohydrate active enzymes
- Demonstrate knowledge of the enzymology related to degradation and modification of plant based biomass including starch, cellulose and pectin

SKILLS

- Apply and suggest methods of carbohydrate synthesis and modifications to solve problems in industrial processes and applications
- Apply knowledge to evaluate structure in relation to functional properties of carbohydrates
- Carry out calculations on basic carbohydrate chemical concepts
- Perform theoretical analyses of chemical and physical methods in carbohydrate chemistry
- Suggest relevant chemical and enzyme catalysts for chemical reactions in carbohydrate chemistry

TYPE OF INSTRUCTION

- Lectures
- Theoretical exercises

EXTENT AND EXPECTED WORKLOAD

150 hours

EXAM

EXAMS

| | |
|------------------------|--|
| Name of exam | Carbohydrate Chemistry |
| Type of exam | Written or oral exam |
| ECTS | 5 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|---|
| Danish title | Kulhydratkemi |
| Module code | K-BT-K2-9 |
| 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 Haastrup Pedersen , Kim Lambertsen Larsen |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

PROJECT WORK IN AN EXTERNAL ORGANISATION

2018/2019

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 assess 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 Work in an External Organisation |
| Type of exam | Oral exam based on a project |
| ECTS | 30 |
| Assessment | Passed/Not Passed |
| Type of grading | External examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|--|--|
| Danish title | Projektarbejde i en ekstern organisation |
| Module code | K-BT-K3-68 |
| Module type | Project |
| Duration | 1 semester |
| Semester | Autumn |
| ECTS | 30 |
| Language of instruction | Danish and English |
| Empty-place Scheme | Yes |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |
| Time allocation for external examiners | B |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MASTER'S THESIS IN BIOTECHNOLOGY

2018/2019

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 biotechnology
- Explain the highest international research within the thesis subject area

SKILLS

- Master the scientific methods and general skills related to the thesis subject area
- 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, 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 assess 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 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 to an extent that corresponds to the ECTS load of the thesis

EXTENT AND EXPECTED WORKLOAD

900 hours

EXAM

EXAMS

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

| | |
|------------------------|--|
| Type of grading | External examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|---------------------------------|
| Danish title | Kandidatspeciale i bioteknologi |
| Module code | K-BT-K4-44 |
| Module type | Project |
| Duration | 1 semester |
| Semester | Spring |
| ECTS | 30 |
| Language of instruction | English |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MASTER'S THESIS IN BIOTECHNOLOGY

2018/2019

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 biotechnology
- Explain the highest international research within the thesis subject area

SKILLS

- Master the scientific methods and general skills related to the thesis subject area
- 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, 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 assess 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 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 to an extent that corresponds to the ECTS load of the thesis

EXTENT AND EXPECTED WORKLOAD

1800 hours

EXAM

EXAMS

| | |
|--------------|----------------------------------|
| Name of exam | Master's Thesis in Biotechnology |
| Type of exam | Master's thesis/final project |
| ECTS | 60 |
| Assessment | 7-point grading scale |

| | |
|------------------------|--|
| Type of grading | External examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|----------------------------|---------------------------------|
| Danish title | Kandidatspeciale i bioteknologi |
| Module code | K-BT-K4-45 |
| Module type | Project |
| Duration | 2 semesters |
| Semester | Spring |
| ECTS | 60 |
| Language of instruction | English |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MEDICAL PROTEIN SCIENCE

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Students who have passed the module should be able to

- Account for how to design, produce, purify, and characterize proteins
- Describe how activity and stability of enzymes and medical relevant proteins, including antibodies, anti-microbial peptides, and other therapeutic proteins can be determined
- Account for the development of new preparative and analytical methods in protein science

SKILLS

- Describe, model, and evaluate protein structures
- Compare and substantiate the choice of protein producing organisms for medical products
- 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 assess the problem of the project and results in relevant scientific contexts and social conditions

COMPETENCES

- Account for the scientific basis of selected preparative and analytical methods
- Compare and explain theoretical and practical results within the field of protein science
- 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 | Medical Protein Science |
| Type of exam | Oral exam based on a project |
| ECTS | 15 |
| Assessment | 7-point grading scale |
| Type of grading | Internal examination |

| | |
|------------------------|--|
| Criteria of assessment | As stated in the Joint Programme Regulations |
|------------------------|--|

FACTS ABOUT THE MODULE

| | |
|--|----------------------------------|
| Danish title | Medicinsk Proteinteknologi |
| Module code | K-BT-K2-41 |
| 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 | Peter Kristensen |
| Time allocation for external examiners | B |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MASTER'S THESIS IN MEDICAL BIOTECHNOLOGY

2018/2019

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 medical biotechnology
- Explain the highest international research within the thesis subject area

SKILLS

- Master the scientific methods and general skills related to the thesis subject area
- 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, 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 assess 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 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 to an extent that corresponds to the ECTS load of the thesis

EXTENT AND EXPECTED WORKLOAD

900 hours

EXAM

EXAMS

| | |
|--------------|--|
| Name of exam | Master's Thesis in Medical Biotechnology |
| Type of exam | Master's thesis/final project |
| ECTS | 30 |
| Assessment | 7-point grading scale |

| | |
|------------------------|--|
| Type of grading | External examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

| | |
|--|---|
| Danish title | Kandidatspeciale i medicinsk bioteknologi |
| Module code | K-BT-K4-46 |
| Module type | Project |
| Duration | 1 semester |
| Semester | Spring |
| ECTS | 30 |
| Language of instruction | English |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |
| Time allocation for external examiners | D |

ORGANISATION

| | |
|-------------|---|
| Study Board | Study Board of Biotechnology, Chemistry and Environmental Engineering |
| Department | Department of Chemistry and Bioscience |
| Faculty | Faculty of Engineering and Science |

MASTER'S THESIS IN MEDICAL BIOTECHNOLOGY

2018/2019

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 medical biotechnology
- Explain the highest international research within the thesis subject area

SKILLS

- Master the scientific methods and general skills related to the thesis subject area
- 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, 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 assess 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 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 to an extent that corresponds to the ECTS load of the thesis

EXTENT AND EXPECTED WORKLOAD

1800 hours

EXAM

EXAMS

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|--------------|--|
| Name of exam | Master's Thesis in Medical Biotechnology |
| Type of exam | Master's thesis/final project |
| ECTS | 60 |
| Assessment | 7-point grading scale |

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|------------------------|--|
| Type of grading | External examination |
| Criteria of assessment | As stated in the Joint Programme Regulations |

FACTS ABOUT THE MODULE

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|--|---|
| Danish title | Kandidatspeciale i medicinsk bioteknologi |
| Module code | K-BT-K4-47 |
| Module type | Project |
| Duration | 2 semesters |
| Semester | Spring |
| ECTS | 60 |
| Language of instruction | English |
| Location of the lecture | Campus Aalborg |
| Responsible for the module | Reinhard Wimmer |
| Time allocation for external examiners | D |

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