



Semester description for 1st semester, Master in Science in Medicine with Industrial Specialization, Autumn 2019

Semester details

Board of Studies for Medicine

[Curriculum of Master in Science in Medicine with Industrial Specialisation](#)

Semester framework theme

This should include an elaborated description in a prose form of the focus of the semester, activities implemented to fulfil the competence objectives and the thematic(s) of the semester. In other words, the semester description includes the “framework theme” that the students will be exposed to during the semester. The role of the semester and its contribution to students’ academic progression should also be described.

The 1st semester of MedIS master education is organized in 3 tracks: 1) Biomedicine (BM), 2) Translational Medicine (TM) and 3) Medical Market Access (MMA). Teaching is organized in research based PBL courses and projects relevant for teaching outcomes for each professional track: BM- pathophysiology and diagnostics, TM- research and methodology in pharmacology, MMA- market analysis and new products. Courses specific for each professional track have their own general focus: BM courses focus on understanding of disease pathophysiology at the cellular and molecular levels. Students will learn to perform hypothesis-driven experiments in order to investigate human pathophysiology. TM- the focus of the semester is at improving clinical trials by applying results from basic research in the clinic. MMA- the purpose of the semester is the introduction of the medical market and improvement of the markets for medical, pharmaceutical, and biotechnological equipment.

Semester organisation and time schedule

This must be a short description of the different activities of the semester, their mutual connections and the way in which they support each other and also support students in reaching their goals; such activities may be study trips, internship periods, project modules course modules, including laboratory activities, cooperation with external stakeholders, possible cross-disciplinary cooperation relations, any guest lectures and other events.

3 lecture courses of 5 ECTS each (see below), the lectures include guest lecturers from hospitals, companies and other Danish universities

PBL practical project of 15 ECTS

As part of the practical project, the students are expected to participate in a small course about PBL.

Semester coordinator and secretariat assistance

Names of anchorperson (teaching staff), course coordinator, semester coordinator (or similar title) and secretariat assistance provider(s).

Semester coordinator: Maj Schneider Thomsen, mst@hst.aau.dk, Department of Health, Science and Technology.

Semester secretary: Dorthe Skree, dsk@hst.aau.dk, School of Medicine and Health.

Student representative: Please check semester details on Moodle.

BIOMEDICINE

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code) Profile: Biomedicine (BM) Molecular Pathogenesis / Molekylær patogenese 5 ECTS course module
Location Master, Science in Medicine with Industrial Specialisation, 1 st semester Board of Studies for Medicine
Module coordinator The academic staff member responsible for the organisation and execution of the module. The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here. Jacek Lichota, jlichota@hst.aau.dk , Department of Health Science and Technology.
Type and language Module type (e.g. study subject module, course module, project module etc.) Language of instruction. Combined Lecture and seminar course. The course will be taught in English.
Objectives Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine). <u>From Curriculum:</u> After attending this course, the student is expected to: Knowledge <ul style="list-style-type: none">• Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation Skills <ul style="list-style-type: none">• Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies• Reflect upon the temporal aspect of disease progression• Understand how aging affects health and tendency towards disease manifestations• Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases Competences <ul style="list-style-type: none">• Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations In this module the understanding of disease processes will be further developed. Main focus of the course will be placed at the molecular aspects of disease progression and understanding how the molecular networks can be used to identify new possible targets for the future drug development.

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

Disease development in the whole human body will be scrutinized in this module. This will be based on the skills acquired during the bachelor MedIS education but at a higher level. Teaching will give an understanding of how disease processes can be utilized as targets for future drugs. The students will set up realistic research programmes for investigating different hypotheses in the course of teaching. Moreover, there will be a focus on strengthening students' oral communication skills within research dissemination and ability to discuss disease processes in a bigger forum. The course additionally has a focus on the use of research literature instead of teaching books. This course will take disease understanding to a research level. There will therefore also be a focus on searching for research literature, reading articles, but also learning to be critical towards the research literature through a journal club session.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

The course consists of 9 sessions, which will be a combination of lectures and seminars. Each session contains a 90 min lecture from an invited speaker. The lecture will be based on the speaker's own research on the topic of the week. Through the lectures, the students will learn more about disease development and potential targets for future drugs. Following the lecture, there will be a seminar, which is divided into three parts. In the first part, a group of students gives a presentation on the topic of the week, followed by a discussion session facilitated by another group of students. Each session ends with a journal club arranged by a third group of students. After the 9 sessions there will be a final evaluation as part of the module, also referred to as the "exam". This session structure and content of this session is elaborated in the section: Exam.

During the course, the students are expected to prepare one presentation based on articles the students have chosen themselves within the topic of the week and a written assignment. The students are expected to search the literature on the given topic and find relevant articles to include in their presentation. The main workload for the students is therefore in preparing for this presentation. The presentation will be followed by a discussion of the presented literature. This session is prepared by another set of students based on the literature provided by the presenting group and their written assignment.

Finally, during each session, an hour will be allocated to discussion of an article (journal club) within the session's topic, with the perspective of reaching a deeper understanding of the molecular pathogenesis, but also to learn the art of reading research articles and being critical towards presented results. This session will be prepared by a third group of students.

The expected workload of 150 hours for this 5 ECTS module will therefore be

Actual teaching hours: 4 hours pr. session = 36 hours

General preparation for each session: 4 hours pr. session = 36 hours

Student presentation and writing an assignment (once during the module): 26 hours

Student discussion (once during the module): 6 hours

Journal club presentation (once during the module): 15 hours

Final evaluation (exam): 26 hours (presentation and assignment) and 5 hours (facilitation of discussion)

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

Obligatory course for MedIS students who have chosen BM track.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

Bachelor in MedIS, Medicine or similar education

Module activities (course sessions etc.)

Level 1		
Activity - type and title	Lecturer including department affiliation*	Learning goals from curriculum
<p>Session 1: Introduction to the course and selection of topic</p> <p>Lecture, Topic selection, and seminar</p>	Jacek Lichota, HST, AAU	
<p>Session 2: Nutrition, aging, and Oxidative stress</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	Torben Moos HST, AAU/ Jacek Lichota	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Understand how aging affects health and tendency towards disease manifestations • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases
<p>Session 3: Cancer pathogenesis</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	Kasper Bendix Johnsen DTU/ Jacek Lichota HST, AAU	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Reflect upon the temporal aspect of disease progression • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases
<p>Session 4: Atherosclerosis</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	Invited lecturer/ Jacek Lichota HST, AAU	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies

		<ul style="list-style-type: none"> • Reflect upon the temporal aspect of disease progression • Understand how aging affects health and tendency towards disease manifestations • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations
<p>Session 5: CNS pathogenesis: Neurodegeneration and Vascular disorders</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	<p>Maj Schneider Thomsen, HST, AAU/ Jacek Lichota HST, AAU</p>	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Reflect upon the temporal aspect of disease progression • Understand how aging affects health and tendency towards disease manifestations • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations.
<p>Session 6: CNS pathogenesis: psychological diseases incl. dementia</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	<p>Ove Wiborg, HST, AAU/ Jacek Lichota HST, AAU</p>	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Reflect upon the temporal aspect of disease progression • Understand how aging affects health and tendency towards disease manifestations • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic

		<p>mechanisms leading to major human diseases</p> <ul style="list-style-type: none"> • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations.
<p>Session 7: Genetic disorders</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	<p>Annette Burkhart Larsen, HST, AAU</p>	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Reflect upon the temporal aspect of disease progression • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations
<p>Session 8: Endocrinology and osteoporosis</p> <p>Lecture and Seminar (Student presentation, Discussion and Journal club)</p>	<p>Peter Vestergaard, KI, AAUH/ Jacek Lichota HAST, AAU</p>	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations
<p>Session 9: Immune pathogenesis</p> <p>Lecture and</p>	<p>Ralf Agger HST, AAU/ Emil Kofoed HST, AAU/ Jacek Lichota HST, AAU</p>	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation

Seminar (Student presentation, Discussion and Journal club)		<ul style="list-style-type: none"> • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases
Final evaluation (the "Exam") Presentation of second assignment of own choice and discussion	Jacek Lichota	<ul style="list-style-type: none"> • Demonstrate relevant knowledge of all topics taught in the bachelor education in Medicine with Industrial Specialisation • Elaborate on how disease processes may originate from common hazards like oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies • Evaluate and compare the causative roles of oxidative stress, inflammation, autoimmunity, pathogens, atherosclerosis, carcinogens, hemorrhagic diathesis, and genetic deficiencies in the pathogenetic mechanisms leading to major human diseases • Synthesize knowledge about how common diseases arise in man and be able to suggest likely targets for therapy based on genetic and phenotypic manifestations

* All rights reserved for changes during the semester due to e.g. illness, cancellations etc.

Examination

This course is evaluated during the modul and is based on oral presentations during the module. Therefore to pass this course the students should be active during the course, and in groups prepare one presentation including an assignment, facilitate a discussion session and facilitate a journal club session.

The last session of this course will be a final evaluation ("The exam"), where the students in groups give a second presentation including uploading an assignment based on a freely chosen topic. The students will furthermore facilitate a seconds discussion session based on another groups presentation, uploaded material and assignment.

One week prior to the exam the students are expected to upload material related to their presentations, which will be used for facilitating the discussion session.

Module coordinator will be present at the exam, which lasts 4 hours. All resources are available during the exam. The course will be graded Passed/Not Passed.

For further information, we refer to webpage concerning examination on www.smh.aau.dk

Module title, ECTS credits (and possibly STADS code)

Profile: Biomedicine (BM) and Translational Medicine (TM)

Genomik, proteomik og bioinformatik i sygdom og diagnostik / Genomics, Proteomics and Bioinformatics in Disease and Diagnostics

5 ECTS

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester

Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Jacek Lichota, jlichota@hst.aau.dk, Department of Health, Science and Technology.

Type and language

Module type (e.g. study subject module, course module, project module etc.)

Language of instruction.

This course module is held in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After attending this course, the student is expected to:

This course should give an in-depth understanding of molecular basis of life. Furthermore the role of genes, genomes and proteomes in disease development in principally all organs of the body is a big part of this course. The most important methods in molecular diagnostics are discussed. The course encompasses basic bioinformatics tools needed in a modern biomedical laboratory.

The course spans the following topics:

1. Genomics and proteomics in diagnostics and disease:
 - a. Regulation of gene expression
 - b. Post-translation protein modifications and fibrillation
 - c. Epigenetics
 - d. Molecular cloning
 - e. Mutations and DNA repair
 - f. Modern diagnostic methods
2. Bioinformatics:
 - a. Biological Databases
 - b. Alignments and Phylogeny
 - c. Gene expression and Structural Analysis of genes and gene products

Knowledge

- Explain organization of genes and genomes in eukaryotes, particularly in human
- Explain all levels at which expression of genes is regulated and what consequences it has for the disease pathophysiology as well as potential in diagnostics

Skills

- Apply basic molecular methods in diagnostic laboratory
- Evaluate a choice of diagnostic method
- Choose appropriate databases, algorithms and parameters in a bioinformatics analysis

Competences

- Combine the theoretical knowledge about genes and genomes with the ability to perform laboratory experiments in order to design a diagnostic or analytical protocol
- Evaluate the obtained results based on the theoretical knowledge within pathophysiology and molecular medicine
- Solve and evaluate complex analytical issues e.g. design of new diagnostic tools, evaluation of scientific articles at the highest international level; integrating knowledge from the previous semesters with the current course
- Analyse molecular data such as DNA sequences, mRNA, proteins using bioinformatics

The course focuses on the important competences such as being able to analyse big amount of data, use different databases that are accessible to date. Moreover the modern diagnostic methods like Next Generation Sequencing and Mass Spectrometry will be part of the course.

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

This course gives a deep understanding of the molecular basis of life. The course gives insight into the role of genes and genomes in the pathogenesis of different diseases in all organs of the human body. The most relevant and advanced diagnostic methods will be discussed. The students will learn the most important bioinformatic tools, which are used in the modern biomedical laboratory.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

The course spans 5 ECTS and is organized in 14 lectures with theoretical exercises and learning-by-doing exercises. In the genomics part the students will be presented with advanced theory about genome structure and function. Additionally one lecture will provide knowledge about diagnostic tools used in the hospital laboratory for genome analysis. The lectures are 90 minutes, the students will be provided with text book chapters and articles for self-study before the lectures. After the lectures there will be additional problem-solving exercises facilitating understanding of the topics. The bioinformatics and proteomics part will consist of theoretical preparation based on the provided literature and learning-by-doing exercises, which will last 90 minutes in the class and extend with outside-the-class activities in order to complete all tasks and fulfil learning outcomes. Because the students will be given practical exercises in the proteomics and bioinformatics part, therefore all students must bring their laptops (no iPad). ECTS load is calculated as 5 ECTS equalling to 150 working hours for every student, 50 hours for each submodule. The students are expected to read the given literature and participate in the lectures.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

MedIS students enrolled in BM and TM profiles.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

Bachelor in MedIS or Medicine or any relevant B.Sc. from Denmark or abroad

Module activities (course sessions etc.)**Level 1**

Activity - type and title	Lecturer including department affiliation*	Learning goals from curriculum
Lecture 1. Genome anatomy and variation	Jacek Lichota HST, AAU	Explain organization of genes and genomes in eukaryotes, particularly in human.
2. Genes, environment and inheritance. Human genetic diseases.	Jacek Lichota HST, AAU	Evaluate the obtained results based on the theoretical knowledge within pathophysiology and molecular medicine.
3. DNA genetic testing	Rasmus Froberg Brøndum, KI, AAUH	Apply basic molecular methods in diagnostic laboratory. Evaluate a choice of diagnostic method.
4. Genomics and more	Ihab Lolos, KI, AAUH	Combine the theoretical knowledge about genes and genomes with the ability to perform laboratory experiments in order to design a diagnostic or analytical protocol.
5. Pain and gene therapy. Personalized medicine.	Parisa Gazerani, HST, AAU	Solve and evaluate complex analytical issues e.g. design of new diagnostic tools, evaluation of scientific articles at the highest international level; integrating knowledge from the previous semesters with the current course.
6. Databases and data access – Lecture, demonstration and exercise	Jeppe Emmersen, HST, AAU	Biological Databases: Choose appropriate databases, algorithms and parameters in a bioinformatics analysis.
7. Biological sequence analysis – Lecture, demonstration and exercise	Jeppe Emmersen, HST, AAU	Structural Analysis of genes and gene products: Analyse molecular data such as DNA sequences, mRNA, proteins using bioinformatics
8. Evolution and basic molecular phylogenetic analysis – Lecture, demonstration and Exercise	Jeppe Emmersen, HST, AAU	Alignments and Phylogeny
9. Tools for RNA and protein analysis – Lecture, demonstration and Exercise	Jeppe Emmersen, HST, AAU	Gene expression and Structural Analysis of genes and gene products
10. Combining data - choose the right tools and data – Demonstration and exercise leading to individual miniproject as part of formal evaluation.	Jeppe Emmersen, HST, AAU	Choose appropriate databases, algorithms and parameters in a bioinformatics analysis
11. Proteomics	Allan Stensballe, HST, AAU	Modern diagnostic methods
12. Advanced protein analysis	Allan Stensballe, HST, AAU	Structural Analysis of genes and gene products

13. Advanced protein analysis	Allan Stensballe, HST, AAU	Post-translation protein modifications and fibrillation
14. From NGS to MS	Allan Stensballe, HST, AAU	Analyse molecular data such as DNA sequences, mRNA, proteins using
15. Modern diagnostic methods	Allan Stensballe, HST, AAU	Modern diagnostic methods

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Examination

The module has a final written exam (internal assessment by pass/fail)

The written exam allows for an individual assessment of the student's ability to explain, critically assess, and select the different topics studied in the course. The final exam is delivered through the Digital Exam platform. Duration is 2 hours and no helping aids are allowed. The module coordinator is present during the first 30 minutes of the exam to help with interpretation issues students may have. Re-examination may be implemented as an oral exam, depending on the number of students.

For further information, we refer to webpage concerning examination on www.smh.aau.dk

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Biomedicine (BM) and Translational Medicine (TM)
Molekylære og cellulære metoder i biomedicin / Molecular and Cellular Methods in Biomedicine
5 ECTS course module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester
Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Cristian Pablo Pennisi, cpennisi@hst.aau.dk, Department of Health, Science and Technology.

Type and language

Module type (e.g. study subject module, course module, project module etc.)

Language of instruction

The module consists of a course module and takes place in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

Students who complete this module will be able to:

Knowledge

- Recall the terminology, concepts, and theories in molecular and cellular biology associated to the methods discussed in the module, both under normal conditions and in disease
- Identify and classify the different approaches for the study and diagnosis of disease processes, recognizing the advantages and limitations of each of these approaches

- Demonstrate understanding of the theory and principles behind the different molecular and cellular methods
- Identify the current perspectives and challenges in cell and molecular-based assays used in biomedicine

Skills

- Investigate and critically assess the relevant scientific literature
- Apply the theory to design experimental protocols, identifying the appropriate sources of materials and interpreting the corresponding technical specifications
- Select the appropriate methods in the context of a cell or molecular biological research problem
- Use basic routines to collect data from measurement instruments
- Use bioinformatic tools and databases to obtain and analyse relevant molecular biology data
- Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results

Competences

- Critically assess, organize and present scientific information, both orally and in writing
- Integrate the obtained knowledge and skills within new areas to design, plan and conduct advanced tasks and projects
- Select the appropriate methods and approaches to aid the screening, diagnosis, and monitoring of diseases in their professional practice

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The goal of this module is to introduce students to modern methods used in biomedicine to investigate and diagnose disease processes, with a focus on methods used to study the diseases at molecular and cellular levels. The topics include methods for advanced biochemical and molecular-biological studies, such as real-time RT-PCR, western blotting, ELISA, fluorescence imaging, widefield and confocal microscopy, flow cytometry, histology, mass spectrometry and medical genetic diagnostics. The students are expected to understand the principles behind the different diagnostic methods, using the theories in molecular and cellular biology learned during the bachelor education.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

Teaching hours (lectures): 1h x 14 lectures = 14 h (0.46 ECTS)

Preparation for the lectures: 1,5 h x 14 lectures = 21 h (0.7 ECTS)

Exercises and discussion after the lectures: 3 h x 14 lectures = 42 h (1.40 ECTS)

Group assignment: 4 h x 7,5 weeks = 30 h (1 ECTS)

Oral presentation of the group assignment and discussion workshop: 4 h x 2 sessions= 8 h (0.26 ECTS)

Written exam: 35 h (1.16 ECTS)

The course is planned in sessions of 4 hours, two sessions per week during 7 weeks. Students are expected to prepare for the lecture by reading the materials available in Moodle. A general lecture on the topic is given during the first hour. Then, students have 2,5 hours to solve an assignment, which typically consists of a set of questions or practical exercises. The teacher helps the students answering the questions. Finally, there is a summarizing discussion during the last 30 minutes.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

1st semester students of the Master of Science in Medicine with Industrial Specialisation, both BM and TM profiles.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

There is no explicit prerequisite in the curriculum. However, it is expected that the students possess a background on biochemistry and molecular biology of the cell (for example, module 5.3 of the AAU MedIS bachelor programme or equivalent).

Module activities (course sessions etc.)

Activity - type and title	Lecturer including department affiliation*	Learning goals from curriculum
Lecture 1: Introduction	Cristian Pablo Pennisi, HST, AAU	<ul style="list-style-type: none"> Recall the terminology, concepts, and theories in molecular and cellular biology associated to the methods discussed in the module, both under normal conditions and in disease Identify and classify the different approaches for the study and diagnosis of disease processes, recognizing the advantages and limitations of each of these approaches Identify the current perspectives and challenges in cell and molecular-based assays used in biomedicine
Lecture 2 and 3: Brightfield microscopy and Fluorescence and confocal microscopy	Vladimir Zachar, HST, AAU	<ul style="list-style-type: none"> Demonstrate understanding of the theory and principles behind the different molecular and cellular methods Select the appropriate methods in the context of a cell or molecular biological research problem
Lecture 4: Image processing	Vladimir Zachar, HST, AAU	<ul style="list-style-type: none"> Demonstrate understanding of the theory and principles behind the different molecular and cellular methods Use basic routines to collect data from measurement instruments Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results
Lecture 5: Methods in cell electrophysiology	Cristian Pablo Pennisi, HST, AAU	<ul style="list-style-type: none"> Demonstrate understanding of the theory and principles behind the different molecular and cellular methods Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results
Lecture 6 and 7: Immunological methods	Ralf Agger, HST, AAU	<ul style="list-style-type: none"> Demonstrate understanding of the theory and principles behind the different molecular and cellular methods Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results
Lecture 8 and 9: Histochemistry and immunochemistry	Cristian Pablo Pennisi, HST, AAU	<ul style="list-style-type: none"> Demonstrate understanding of the theory and principles behind the different molecular and cellular methods Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results

Lecture 10: Recombinant DNA	Trine Fink, HST, AAU	<ul style="list-style-type: none"> • Demonstrate understanding of the theory and principles behind the different molecular and cellular methods • Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results •
Lecture 11: qPCR	Maj Schneider Thomsen, HST, AAU	<ul style="list-style-type: none"> • Demonstrate understanding of the theory and principles behind the different molecular and cellular methods • Use bioinformatic tools and databases to obtain and analyse relevant molecular biology data
Lecture 12: Molecular microbiology	Svend Birkelund, HST, AAU	<ul style="list-style-type: none"> • Demonstrate understanding of the theory and principles behind the different molecular and cellular methods • Use bioinformatic tools and databases to obtain and analyse relevant molecular biology data
Lecture 13: Mass spectrometry	Allan Stensballe, HST, AAU	<ul style="list-style-type: none"> • Demonstrate understanding of the theory and principles behind the different molecular and cellular methods • Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results
Lecture 14: RNA interference technology	Fabia Febbraro (HST) – to be confirmed	<ul style="list-style-type: none"> • Demonstrate understanding of the theory and principles behind the different molecular and cellular methods • Qualitatively and quantitatively analyse experimental data and apply cell and molecular biology knowledge to interpret the results
Assignments	The lecturer in charge of the corresponding lecture	<ul style="list-style-type: none"> • Select the appropriate methods in the context of a cell or molecular biological research problem • Investigate and critically assess the relevant scientific literature • Critically assess, organize and present scientific information, both orally and in writing
Group assignment (obligatory)	Cristian Pablo Pennisi, HST, AAU	<ul style="list-style-type: none"> • Apply the theory to design experimental protocols, identifying the appropriate sources of materials and interpreting the corresponding technical specifications • Critically assess, organize and present scientific information, both orally and in writing • Integrate the obtained knowledge and skills within new areas to design, plan and conduct advanced tasks and projects • Select the appropriate methods and approaches to aid the screening, diagnosis, and monitoring of diseases in their professional practice
Presentation workshop: (obligatory)	Cristian Pablo Pennisi, HST, AAU	<ul style="list-style-type: none"> • Critically assess, organize and present scientific information, both orally and in writing

* All rights reserved for changes during the semester due to e.g. illness, cancellations etc.

Examination

The module has a final written exam (internal assessment by pass/fail)

The written exam allows for an individual assessment of the student's ability to explain, critically assess, and select the different methods studied in the course.

A pre-requisite for participation in the final exam is approval of the written group assignment and participation in the presentation workshop. The final exam is delivered through the Digital Exam platform. Duration is 2 hours and no helping aids are allowed. The module coordinator is present during the first 30 minutes of the exam to help with interpretation issues students may have.

Re-examination may be implemented as an oral exam, depending on the number of students. In case of an oral re-exam, students will be given the assignment and have 20 min. preparation time before the examination.

For further information, we refer to webpage concerning examination on www.smh.aau.dk and Digital Eksamen (DE)

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Biomedicine (BM)
Pathophysiology and Diagnostics / Patofysiologi og diagnostik
15 ECTS project module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester
Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.
The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Maj Schneider Thomsen, mst@hst.aau.dk, Department of Health, Science and Technology.

Type and language

Module type (e.g. study subject module, course module, project module etc.)
Language of instruction.

English

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After completing this module, the student is expected to:

Skills

- Choose relevant methodology for analysing disease states of the human biological system
- Formulate a working hypothesis based on biomedical knowledge and data

Competences

- Analyse disease processes using relevant methods
- Select and critically demonstrate an understanding at the theoretical and practical level on relevant methodology used for testing their hypotheses
- Analyse data from experimental or theoretical experiments relevant to the chosen biological systems

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The content of the projects vary widely since there are many research topics represented in the section of biomedicine. The projects will typically be done within: neurobiology, stem cells, cancer, immunology, microbiology, medical mass spectrometry and more.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

15 ECTS corresponding to 450 hours. It is expected that the students work full time on the project unless they are participating in other courses. Project work includes reading scientific literature, the practical work in the laboratory, writing, analysing, exam preparation, meeting with supervisor etc.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

MedIS-students from the Biomedical (BM) or Translational Medicine (TM) professional track.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

Bachelor in MedIS, Medicine or a similar education.

Module activities (course sessions etc.)

The majority of supervisors represent the Section of Biomedicine and therefore projects will take place in the section most of time. Many projects are done in collaboration with the hospital giving the students opportunity to learn the research environment in the hospital's setup. The learning outcomes for the project work are defined in the curriculum. Every proposed project description will be reviewed before semester start by the semester coordinator and approved if in agreement with learning outcomes.

Examination

1. Oral group examination
2. During the exam both the supervisor and maybe co-supervisor will be present together with an internal examiner
3. During the project period, the students will write a project and hand it in using "Digital Eksamen" – date TBA. The exam is initiated by the students giving a scientific presentation of their project, followed by questioning by the examiners.
4. There is 45 min available in total for each student covering: student presentations, questioning by examiners and grading. As an example a group of 4 students will be examined for 4 x 45 min = 3 hours covering: student presentations, questioning by examiners and grading.
5. The project will be evaluated using the 7-point grading scale and the grade will be given individually and based on an overall assessment of:
 - The written project
 - The individual student presentation of the project
 - The individual performance of the students during the oral examination

For further information, we refer to webpage concerning examination on www.smh.aau.dk

TRANSLATIONAL MEDICINE

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Translational Medicine (TM)

Aktuelle forskningsområder i moderne farmakologi / Current Research Topics in Modern Pharmacology
5 ECTS course module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester
Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Parisa Gazerani, gazerani@hst.aau.dk, Department of Health Science & Technology.

Type and language

Module type (e.g. study subject module, course module, project module etc.)
Language of instruction.

Course module-English*

* English. All written materials will be in English. In case all students are speaking Danish, lectures and discussions may be carried out in Danish, if the students so choose.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site.

From Curriculum:

Students who complete the module are expected to:

Knowledge

- Have solid knowledge of core principles of research pharmacology based on the highest international research in modern pharmacology
- Understand scientific problems and challenges in R&D pharmacology and how to reflect on challenges with possible solutions

Skills

- Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations
- Apply knowledge gained in this course to solve problems in pharmacology research in a real-world manner. Must be able to initiate discussion, define a problem and implement pharmacology discipline-specific tools to arrive at a consensus on how the problem is best solved

Competences

- Formulate a research proposal to identify mechanisms of action or potential side-effects of new drugs for a certain disorder or condition

Pharmacology is a research discipline applying a set of principles and methods to study mode of action of drugs in biological systems. The goal of this course is to expose students to a variety of cutting-edge research topics in basic and applied pharmacological research. Through this course students will be trained and prepared for careers in research and development (R&D) in pharmaceutical industry, academic and research institutions, governmental and other healthcare agencies. Topics encompass a number of different areas in modern pharmacology. For the topics and timing, follow the course page in the Moodle.

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

Relevant topics of pharmacology and evaluation of efficacy and safety of efficacy and safety drugs are presented and discussed. Identification and application of efficacy and safety biomarkers are also discussed and in this regard. It is relevant to 1.2 and 5.4 but also in general it complements the further education in pharmacological elements in regard to pathophysiology-related treatment of diseases and disorders.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

5 ECTS course (150 hours)

Lectures: 16 double lectures (90 or 135 min) + on-site activities (45 or 90 min)

Exercises*: minimum 720 min

Preparation including exam: minimum 12 hours

This course covers 5 ECTS and consists of formal lectures (16 double lectures) given by faculty members and visiting lecturers from academia and industry; research seminars or workshops; interactive in-class discussions; literature-based discussion; and student seminars on various properties and effects of newer drugs in form of oral presentations or written essays and assignments. Projects on current pharmacological research, new drug and delivery developments and re-evaluation of currently employed drugs, their mechanism of action, etc. will be introduced, followed by group discussions on PBL exercises. Reading materials are provided in Moodle. Cases and examples are provided for implementation of the knowledge and skills learned during the course and to grow competences for real life cases in students' future career.

This module is a 5 ECTS course module, meaning that students are required to be engaged with course activities equal to 150 hours (this calculation is based on conversion of one ECTS to 30 hours for an average student). 20 hours has been considered for home reading and self-study of different materials relevant to either pre reading or post lecture readings or both.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

MedIS students with a bachelor degree or other relevant bachelor degrees with basic knowledge in pharmacology.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

It is expected that the participants have passed a basic pharmacology course and are familiar with principles of pharmacology and pharmacotherapy of diseases and disorders in general.

Module activities (course sessions etc.)

On-site course assignments and exercises for group work: case-based written assignment will be posted and the students need to complete a short report-assignment-response after group work. It can also be presented orally at the course. Cases are basically designed around a disease or disorder for which a drug is being developed or issues regarding drug development that are required to be discussed and addressed. These activities plus active participation of students in the course will make the fundamentals for continuous course evaluation for final marks.

Level 1		
Activity - type and title	Planned instructor*	Learning goals from curriculum

<p>1. Research in Pharmacology from basic to clinic: role of PK I</p>	<p>Anne Estrup Olesen and Louise Ladebo Rasmussen, Clinical Institute, AAUH</p>	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
<p>2. Research in Pharmacology from basic to clinic: role of PK II</p>	<p>Anne Estrup Olesen and Louise Ladebo Rasmussen, Clinical Institute, AAUH</p>	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
<p>3. Pharmacology of opioids and non-opioids (principles of therapy or prevention for chronic pain with a focus on new therapeutics and pipelines)</p>	<p>Parisa Gazerani, HST, AAU</p>	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
<p>4. Pharmacology of headaches (principles of therapy or prevention for headaches with a focus on new therapeutics and pipelines)</p>	<p>Meg Duroux, HST, AAU</p>	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved

		<ul style="list-style-type: none"> Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
<p>5. Treatment of CNS disorders</p> <p>(principles of therapy or prevention for CNS degenerative disorders with a focus on new therapeutics and pipelines)</p>	Parisa Gazerani, HST, AAU	<ul style="list-style-type: none"> Have solid knowledge of core principles of research pharmacology Understand scientific problems and challenges in R&D pharmacology and reflect on challenges Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
6. Pharmacology of GI disorders	Parisa Gazerani, HST, AAU	<ul style="list-style-type: none"> Have solid knowledge of core principles of research pharmacology Understand scientific problems and challenges in R&D pharmacology and reflect on challenges Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
7. Cardiovascular pharmacology: focus on beta-blockers and positive inotropic agents	Parisa Gazerani (HST, AAU) or invited speaker from Clinical Institute	<ul style="list-style-type: none"> Have solid knowledge of core principles of research pharmacology Understand scientific problems and challenges in R&D pharmacology and reflect on challenges Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
8. Drugs for sleep disorders	Parisa Gazerani, HST, AAU	<ul style="list-style-type: none"> Have solid knowledge of core principles of research pharmacology Understand scientific problems and challenges in R&D pharmacology and reflect on challenges Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to

		<p>arrive at a consensus on how the problem is best solved</p> <ul style="list-style-type: none"> • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
9. Ocular pharmacology, what is new?	Parisa Gazerani (HST,AAU) or invited speaker from Clinical Institute	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
10. Pharmacology of respiratory system disorders	Parisa Gazerani (HST,AAU) or invited speaker from Clinical Institute	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
11. Antiepileptic drugs)	Parisa Gazerani, HST, AAU	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
12. Drug-drug interactions and adverse drug reactions	Parisa Gazerani, HST, AAU	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations

		<ul style="list-style-type: none"> • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
13. Neuropsychopharmacology: affective disorders	Ove Wiborg, HST, AAU	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
14. Neuropsychopharmacology: cognitive disorders	Ove Wiborg, HST, AAU	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
15. Antibacterial, antiviral, antifungal, drugs acting on parasites	Parisa Gazerani ,HST,AAU or invited speaker from Clinical Institute	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate obtained data, to predict or interpret findings and to communicate these by scientific presentations • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
16. Updates on antidiabetic agents new therapeutics and pipelines	Parisa Gazerani (HST,AAU) or invited speaker from Clinical Institute	<ul style="list-style-type: none"> • Have solid knowledge of core principles of research pharmacology • Understand scientific problems and challenges in R&D pharmacology and reflect on challenges • Apply methods and tools to analyse current pharmacology research projects, to evaluate

		<p>obtained data, to predict or interpret findings and to communicate these by scientific presentations</p> <ul style="list-style-type: none"> • Be able to initiate discussion, define a problem and implement pharmacology discipline specific tools to arrive at a consensus on how the problem is best solved • Formulate a research proposal to identify mechanisms of action or potential side effects of new drugs.
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* All rights reserved for changes during the semester due to e.g. illness, cancellations etc. the order of lectures can be different from what is listed here; therefore the actual course plan with dates and time will be posted on Moodle. The description here is to present which topics are covered by which faculty member or speaker.

Examination

1. Examination form: evaluation during the course through students group assignments, essays, presentation, journal club discussion, and similar.
2. This exam form and content has been chosen to reflect on learning objectives and teaching activities at the course to test knowledge, skills and competence of students. These competences are being taught during the session through lectures, group work, presentations and discussions.
3. Eventual of course activity e.g. assignments, reports, oral group presentations are continuous during the course period. Continuous evaluation (pass-fail) is based on both active course participation and classroom group work on assignments and group presentations.

For further information, we refer to webpage concerning examination on www.smh.aau.dk

Module title, ECTS credits (and possibly STADS code)

Profile: Translational Medicine (TM)

Farmakologisk forskning og metode / Research and Methodology in Pharmacology

15 ECTS project module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester

Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Parisa Gazerani, gazerani@hst.aau.dk, Department of Health Science and Technology.

Type and language

Module type (e.g. study subject module, course module, project module etc.)

Language of instruction.

The project can be written in Danish or English. This must be with agreement together with supervisor(s).

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After completing this module, the student is expected to:

Knowledge

- Explain topics in pharmacology essential for translational medicine and drug development

Skills

- Apply a set of principles and methods to study mode of action of drugs in biological systems either in terms of basic or applied pharmacological research
- Design protocols for research in translational medicine
- Choose suitable methodology and apply appropriate statistics and data handling

Competences

- Assess or predict mechanisms of action or potential side-effects of drugs for a certain disorder or condition
- Students must be able to complete a clear and concise literature review
- Formulate a fundamental aims of their research project
- Discuss the theoretical and practical aspects of the chosen research field and corresponding methodologies, such as molecular pharmacology, cardiovascular pharmacology, gastrointestinal pharmacology, respiratory tract pharmacology, urogenital tract pharmacology, pharmacology of tissue repair, neuropharmacology, psychopharmacology, Immunopharmacology, pharmacology of aging, paediatric pharmacology, or drug delivery
- Collect, critically analyse and interpret data

It is recommended that in any given projects students develop the general knowledge about the model and translational aspects to clinic and relevancy to disease or disorder under evaluation.

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The theme is pharmacology and assessment and can be as broad spectrum as design, conduction, analysis and reporting on any aspect of pharmacology at preclinical or clinical level.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

During the project period (15 ECTS) it is expected that the students work full time on the project unless they are participating in other courses. Project work includes reading scientific literature, applying methods obtained from the courses that are relevant for their project, writing, analysing, etc.

In total, the project should be allocated to approximately 450 hours of work per student, of which 125 should be used in preparing the written report, and 25 hours should be used for preparation and examination. This might be subjected to some changes based on the details of project and agreement with supervisor(s).

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

MedIS students in TM (or candidates with a competence in research in medicine and health area in general). Since there are some BM/TM projects, it can be extended to some aspects of BM profile in case of the BM/TM definition in the project.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

Have general knowledge in pharmacology, methods for assessments and analysis of safety or efficacy of past or future drugs under preclinical or clinical conditions of a given disorder or surrogate models of disease or disorders. Data mining, questionnaire-based assays, and retrospective analysis are also acceptable

Module activities (course sessions etc.)

Through the TM profile course of pharmacology and other TM-BM course students are being prepared to apply the knowledge and skills in their project within the TM project theme.

Students are expected to write a project within the area of "Research and Methodology in Pharmacology". The goal is to apply their knowledge and skills in any aspects of this thematic profile for development of a drug and reaching to competency of design, conduction, data handling, analysis or problem solving in trial challenges, application of rules and guidelines in a trial, if any.

Students are encouraged to form groups of max 4. They are expected to apply the techniques, regulations, etc. learned from courses taught. Furthermore, they should have a general understanding of the research and methodology in pharmacological trials and associated areas.

The supervisors are affiliated to mainly (but not limited to) department of health science technology, Aalborg University hospital, Animal facility, clinics, apotek, health sector, and similar.

The students are entitled to a minimum of three meetings with their supervisor(s) during the project period.

Examination

- The exam will be an oral group exam based on the submitted project.
- During the exam, the students will be assessed on the progression of their knowledge, skills and competences as described in the curriculum.
- The oral examination form was chosen to facilitate the evaluation of their abilities to work problem-based with a specific topic and to demonstrate their abilities to discuss an academic topic on an appropriately scientific level.
- Present at the exam will be the students, the internal supervisor, potential co-supervisors, and an internal censor. The exam will be evaluated by the internal supervisor and an internal censor. The exam will be assessed using the 7 point scale.
- The students are expected to give a short presentation (10 min per student) of the project at the beginning of the oral exam. The length of the exam will be 45 minutes per student.
- Aids (the project report and notes) will be allowed.
- The project report should be handed in using digital exam (www.de.aau.dk)
- If the exam format is changed before the reexam, this will be announced no later than 14 days before.

For more information please consult

- The exam plan on www.smh.aau.dk

Digital Exam www.de.aau.dk

MEDICAL MARKET ACCESS

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Medical Market Access (MMA)

Principper inden for markedsføring og markedsføringsledelse / Principles of Marketing and Marketing Management

5 ECTS course module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester

Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.
The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Louise Hansen, lhansen@id.aau.aau.dk, Department of Business and Management.

Type and language

Module type (e.g. study subject module, course module, project module etc.)
Language of instruction.

The course will be held in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After attending this course, the student is expected to:

Knowledge

- Demonstrate basic knowledge of marketing theory and marketing strategy (Introduction to the field and overview of theory)
- Demonstrate basic knowledge of marketing considerations regarding product properties, branding, packaging, price, costs of innovation, distribution, promotion, key stakeholders, corporate branding, segmentation, product development (user-driven)
- Demonstrate basic understanding of a customer focus (i.e. learning to focus on the customer; the need to know something about the customer in order to make strategic decisions)
- Demonstrate knowledge of Applied Methods in Market Analysis
- Demonstrate basic knowledge of marketing in the health sector, including an introduction to business planning and implementing marketing activities in Denmark
- Demonstrate knowledge of market access tasks in a company, including knowledge of companies' work relative to doctors and patients (and patient associations, researchers, etc.) with an eye toward the use of medicine (both the introduction of new medicines, as well as sustaining the market over time) and collaboration/negotiation with authorities
- Demonstrate knowledge of pricing in selected countries such as the United States, the United Kingdom, Germany, Denmark and Sweden

Skills

- Use the methods of the field to analyse a given market issue
- Identify company needs for information/knowledge on key market conditions
- Design and conduct interviews as part of a market study
- Outline the content of a simple marketing initiative based on context and formulation of the problem

Competences

- Understand the need of pharmaceutical companies for information on markets
- Understand companies' organisation of market analyses and marketing activities

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The goal of the course 'Principles of Marketing og Marketing Management' is to give the student a basic introduction into marketing theory and principles of sales promotion specifically related to the health sector. Furthermore, the course will introduce the market characteristics and regulations that are relevant for marketing within the healthcare sector. The course will additionally related marketing to the theories of welfare economics.
During the course, the student will work on cases from the industry.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

The course is 5 ECTS and the students can expect approx. 150 hours teaching including lectures, exercises, preparations and exam. The course is offered as 8 lectures of 4 hours. Furthermore, four exercise sessions of 4 hours will be included.

Teaching hours (lectures): 4h x 11 lectures and exercises = 44 h (1.46 ECTS)

Preparation for the lectures: 8 h x 8 lectures = 64 h (2.12 ECTS)

Preparation for exercises: 4 h x 3 lectures = 12 h (0.40 ECTS)

Preparation and completion of exam: 30 h (1 ECTS)

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

The course is part of the Medical Market Access master programme.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

No prerequisites as this is an introductory course.

Module activities (course sessions etc.)

Activity - type and title	Lecturer including department affiliation*	Learning goals from curriculum
Lecture 1: Introduction to the course and health policy	Louise Hansen Department of Business and Management.	Demonstrate basic knowledge of marketing theory and marketing strategy (Introduction to the field and overview of theory) Demonstrate basic knowledge of marketing in the health sector, including an introduction to business planning and implementing marketing activities in Denmark.
Lecture 2: Welfarism and microeconomics	Louise Hansen, Department of Business and Management.	Demonstrate basic knowledge of marketing in the health sector, including an introduction to business planning and implementing marketing activities in Denmark. Demonstrate knowledge of market access tasks in a company, including knowledge of companies' work relative to doctors and patients (and patient associations, researchers, etc.) with an eye toward the use of medicine (both the introduction of new medicines, as well as sustaining the market over time) and collaboration/negotiation with authorities

<p>Lecture 3: The introduction of new medicines</p>	<p>Louise Hansen, Department of Business and Management.</p>	<p>Demonstrate knowledge of pricing in selected countries such as the United States, the United Kingdom, Germany, Denmark and Sweden</p> <p>Demonstrate basic knowledge of marketing considerations regarding product properties, branding, packaging, price, costs of innovation, distribution, promotion, key stakeholders, corporate branding, segmentation, product development (user-driven)</p>
<p>Exercise 1: Negotiation between monopsonistic authority and pharmaceutical company</p>	<p>Louise Hansen, Department of Business and Management and Nanna Kastrup Hermansen</p> <p>Department of Business and Management.</p>	<p>Understand companies' organisation of market analyses and marketing activities</p>
<p>Lecture 4: Pricing of prescription medicines</p>	<p>Louise Hansen and Alexander Arndt Pasgaard</p> <p>Department of Business and Management.</p>	<p>Demonstrate basic knowledge of marketing theory and marketing strategy (Introduction to the field and overview of theory)</p> <p>Demonstrate basic understanding of a customer focus (i.e. learning to focus on the customer; the need to know something about the customer in order to make strategic decisions)</p> <p>Identify company needs for information/knowledge on key market conditions</p>
<p>Exercise 2: The bidding game</p>	<p>Louise Hansen and Alexander Arndt Pasgaard</p> <p>Department of Business and Management.</p>	<p>Demonstrate knowledge of applied methods in market analysis</p> <p>Use the methods of the field to analyse a given market issue</p>
<p>Lecture 5: Consumer marketing: over-the-counter medicine</p>	<p>Louise Hansen</p> <p>Department of Business and Management.</p>	<p>Understand the need of pharmaceutical companies for information on markets</p>
<p>Exercise 3: Marketing strategies for over-the-counter drugs</p>	<p>Louise Hansen and Nanna Kastrup Hermansen</p> <p>Department of Business and Management.</p>	<p>Understand the need of pharmaceutical companies for information on markets</p> <p>Outline the content of a simple marketing initiative based on context and formulation of the problem</p>
<p>Lecture 6: Ethical considerations in pharma - contact to general practice</p>	<p>Louise Hansen</p> <p>Department of Business and Management.</p>	<p>Demonstrate basic knowledge of marketing theory and marketing strategy (Introduction to the field and overview of theory)</p> <p>Demonstrate basic knowledge of marketing considerations regarding product properties, branding, packaging, price, costs of innovation, distribution,</p>

		promotion, key stakeholders, corporate branding, segmentation, product development (user-driven)
Lecture 7: Medical devices	Jeppe Vangsgaard Department of Business and Management.	Demonstrate knowledge of market access tasks in a company, including knowledge of companies' work relative to doctors and patients (and patient associations, researchers, etc.) with an eye toward the use of medicine (both the introduction of new medicines, as well as sustaining the market over time) and collaboration/negotiation with authorities Demonstrate basic understanding of a customer focus (i.e. learning to focus on the customer; the need to know something about the customer in order to make strategic decisions)
Lecture 8: Medical market access in the international perspective	Louise Hansen Department of Business and Management.	Demonstrate knowledge of market access tasks in a company, including knowledge of companies' work relative to doctors and patients (and patient associations, researchers, etc.) with an eye toward the use of medicine (both the introduction of new medicines, as well as sustaining the market over time) and collaboration/negotiation with authorities Demonstrate basic understanding of a customer focus (i.e. learning to focus on the customer; the need to know something about the customer in order to make strategic decisions)

* All rights reserved for changes during the semester due to e.g. illness, cancellations etc.

Examination

- The exam format will be an individual written exam of 2 hour duration.
- The exam will contain both short answer questions and essay questions.
- This format was chosen to ensure that both knowledge, skills and competencies are tested.
- The assessment is pass/fail. This will be assessed by the module coordinator and an internal censor.
- The exam will be distributed and should be handed in using Digital Exam
- During the exam it will be allowed to use the following aids: books, slides and notes. The use of internet is only allowed for down- and upload of the exam.
- If the exam format is changed before the reexamination, this will be announced no later than 14 days before.
- For more information please consult
 - The exam plan on www.smh.aau.dk
 - The archive of old exam sets www.smh.aau.dk

Digital Exam (www.de.aau.dk)

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Medical Market Access (MMA)
Sundhedsøkonomi / Economics of Health and Health Care
5 ECTS course module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester
Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.
The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Cathrine Elgaard Jensen
celga@business.aau.dk
Department of Business and Management

Type and language

Module type (e.g. study subject module, course module, project module etc.)
Language of instruction.

The course will be held in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After attending this course, the student is expected to:

Knowledge

- Demonstrate basic understanding of costs, including the difference between expenses and disbursements, as well as fixed, variable, indirect and direct costs
- Understand economic evaluation methods/models, i.e. cost-effectiveness, cost-utility (and QALY), cost-benefit
- Demonstrate knowledge of the health care system's organisation and financing, including the central differences between the Danish health care system and corresponding systems in selected countries such as the United States; the United Kingdom, Germany and Sweden
- Demonstrate basic knowledge of the use of microeconomic theories/models for analysis of the health sector, including supply-demand model, Principal-agent, human capital and investment in health, corporate production function and cost components, large scale operations and productivity

Skills

- Produce a (simple) economic evaluation of a medical technology (e.g. a new medicine/intervention) including sensitivity analysis (one-way, two-way, threshold value analysis, scenario analysis)
- Calculate the budget expenditures for the introduction of new medical technology (for a given organisation such as a hospital or region) and assess whether a new intervention represents "good value for money."
- Use the models and methods of the field to analyse selected issues

Competences

- Critically assess existing economic analyses
- Critically assess alternative models of financing and organizing in the health sector
- Read and understand the key messages and assumptions in published economic evaluations and reports on economic conditions in the health care system

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The course gives students basal introduction into health economy, which deals with how the healthcare system functions, how the organisation of the society and the healthcare system impacts on human health,

how decisions and politics in the health field are made, and how insufficiencies and improvement potential in the health system can be indicated using systematic evaluations and analyses.

Health economy consists in principle of two parts- the first part as a basal introduction to method of economic analysis, with special focus on economic evaluation (cost-effectiveness analysis etc.) and the second part on the importance of understanding how the health sector functions and how decisions are made etc. to be able to work with market access.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

The course is 5 ECTS and the students can expect approx. 150 hours teaching including lectures/exercises, preparations, and exam. The course is offered as 9 sessions of 4 hours each consisting of lectures and exercises. The course is prerequisite for the course 'Economic evaluation of health technologies and technology assessment' on the 2nd sem. Master in Medical Market Access.

Teaching hours (lectures): 4h x 8 lectures = 32 h (1.07 ECTS)
 Preparation for the lectures: 9,3 h x 9 sessions = 84 h (2.8 ECTS)
 Exercises in class: 4 h x 1 session = 4 h (0.13 ECTS)
 Preparation and completion of exam: 30 h (1 ECTS)

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

The course is part of the Medical Market Access master programme

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

This course is a continuation of module 5.4 (Pharmacology in pre-clinical & economic perspectives) from the bachelor in medicine with industrial specialization, but this is not a requirement

Module activities (course sessions etc.)

Level 1		
Activity - type and title	Planned instructor*	Learning goals from Curriculum
Introduction to health economics (lecture, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Understand economic evaluation methods/models, i.e. cost-effectiveness, cost-utility (and QALY), cost-benefit Use the models and methods of the field to analyse selected issues
Understanding costs and cost analysis - introduction (lecture, exercises, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Demonstrate basic understanding of costs, including the difference between expenses and disbursements, as well as fixed, variable, indirect and direct cost. Calculate the budget expenditures for the introduction of new medical technology (for a given organisation such as a hospital or region) and assess whether a new intervention represents "good value for money"

Understanding costs and cost analysis – continued (lecture, exercises, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Demonstrate basic understanding of costs, including the difference between expenses and disbursements, as well as fixed, variable, indirect and direct costs Calculate the budget expenditures for the introduction of new medical technology (for a given organisation such as a hospital or region) and assess whether a new intervention represents “good value for money.”
Measuring and valuing health effects (lecture, exercises, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Understand economic evaluation methods/models, i.e. cost-effectiveness, cost-utility (and QALY), cost-benefit Use the models and methods of the field to analyse selected issues
Economic evaluation (lecture, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Understand economic evaluation methods/models, i.e. cost-effectiveness, cost-utility (and QALY), cost-benefit Produce a (simple) economic evaluation of a medical technology (e.g. a new medicine/intervention) including sensitivity analysis (one-way, two-way, threshold value analysis, scenario analysis)
Assessment and reporting of economic evaluations (lecture, exercises, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Critically assess existing economic analyses Read and understand the key messages and assumptions in published economic evaluations and reports on economic conditions in the health care system
Organization and financing of the Danish healthcare system – introduction (lecture, 4 hours)	Louise Hansen, Department of Business and Management.	Demonstrate knowledge of the health care system's organisation and financing, including the central differences between the Danish health care system and corresponding systems in selected countries such as the United States; the United Kingdom, Germany and Sweden
Organization and financing of the Danish healthcare system-continued (lecture, 4 hours)	Lars Holger Ehlers, Department of Business and Management.	Demonstrate basic knowledge of the use of microeconomic theories/models for analysis of the health sector, including supply-demand model, Principal-agent, human capital and investment in health, corporate production function and cost components, large scale operations and productivity Critically assess alternative models of financing and organizing in the health sector
Economic evaluation (exercises, 4 hours)	Cathrine Elgaard Jensen, Department of Business and Management.	Use the models and methods of the field to analyse selected issues Critically assess existing economic analyses

*Forbehold for ændringer under semestrets forløb ved f.eks. sygdom, aflysninger m.v.

Examination

The exam format will be a written exam of 2 hour duration.

The exam will be distributed and should be handed in using Digital Exam.

The assessment is pass/fail. This will be assessed by the examiner and an internal censor. During the exam it will be allowed to use aids such as books, slides and notes.

For further information please consult www.smh.aau.dk

Module description (description of each module)

Module title, ECTS credits (and possibly STADS code)

Profile: Medical Market Access (MMA)

Kvalitetsudvikling og patientsikkerhed / Quality Development and Patient Safety

5 ECTS course module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester

Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Cathrine Elgaard Jensen, celga@business.aau.dk, Department of Business and Management.

Type and language

Module type (e.g. study subject module, course module, project module etc.)

Language of instruction.

The course can be held in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

Knowledge

- Demonstrate understanding of basic concepts and terminology in quality and patient safety including:
- the different dimensions of quality in health care, such as clinical quality, patient experienced quality and staff experienced quality
- different views on safety, such as the absence of injuries and the presence of robust systems that ensure against injuries
- Demonstrate knowledge and overview of the methods used for quality development in health care, such as accreditation, indicator monitoring, auditing, event analysis and analysis of error sources, as well as knowledge of the efficacy of these methods according to the latest research in the field
- Demonstrate knowledge of healthcare law regulations on quality and safety, such as reporting adverse events
- Demonstrate knowledge of the possibilities and methods for involving patients and families in the development of quality and safety
- Demonstrate understanding of selected models and theories on innovation and implementation, with particular focus on the difficulties in implementing new initiatives in the health care system
- Demonstrate understanding of the different purposes of measuring quality, for example research, improvement and control, and the related prerequisites and methods
- Demonstrate understanding of the concept of variation as it is used in statistical quality development

- Demonstrate knowledge of the methods for the identification and reduction of waste in the health care system and linkages between quality and economics

Skills

- Use theoretical models for analysis and interpretation of specific quality and safety problems in the health care system, such as Reason's Swiss cheese model, the ETTO principle, Donabedian's quality-of-care dimensions, Deming's system of profound knowledge, Juran's Trilogy, etc.
- Use the Model for Improvement for a specific issue in the health care system
- Formulate descriptions of operational indicators for measuring quality and safety, including outlining a plan for data collection, processing and analysis
- Use the basic tools for statistical quality development, such as series charts and Pareto charts, for presentation and analysis of clinical indicator measurements

Competences

- Contribute to planning, implementation and reporting of clinical quality development projects
- Identify and report adverse events

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

The goal of the course is to give a solid introduction to the theoretical and practical aspects of the quality and patient safety work done in the health sector. The course contains review of the most recent quality nomenclature and definitions, relevant law about quality and safety in the health sector, recent methods in quality supervision and improvement, like model for improvement, methods, and principles in avoiding unintended accidents, knowledge about the central clinical quality databases, principles in involving patients and their families in the quality and safety work, as well as knowledge about relationship between quality and economy (spill concept).

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

The course is 5 ECTS and the students can expect approx. 150 hours teaching including lectures/exercises, preparations, and exam. The course is offered as 10 sessions teaching consisting of lecture, discussion, and activating exercises that will train the students in the learning objectives. The 9 sessions are organised as 1 session that last for 3 hours, 5 sessions that last for 4 hours, 1 session last for 5 hours, and 2 sessions that last for 8 hours. This gives 44 hours of teaching. The students are expected to prepare for each session by reading the course material posted on Moodle. This preparation is expected to last approximately 9,5 hours per session, a total of 86 hours. The exam will take 2 hours and it is expected that students will need 18 hours of preparation prior to the exam. In total the students are expected to use 150 hours for this course.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

This is an obligatory course for MMA profile of MeDIS education (7th semester), it is also offered as a facultative course for master education in Public Health at SUND-AAU.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

Bachelor in MedIS or Medicine.

Module activities (course sessions etc.)

Activity - type and title	Planned instructor*	Learning goals from curriculum
Introducing quality improvement in health care (lecture + case, 5 hours)	Lars Ehlers Department of Business and Management Søren Paaske Johnsen Department of Clinical Medicine	<ul style="list-style-type: none"> • Demonstrate understanding of basic concepts and terminology in quality and patient safety including: • the different dimensions of quality in health care, such as clinical quality, patient experienced quality and staff experienced quality • Demonstrate knowledge and overview of the methods used for quality development in health care, such as accreditation, indicator monitoring, auditing, event analysis and analysis of error sources, as well as knowledge of the efficacy of these methods according to the latest research in the field • Demonstrate understanding of the different purposes of measuring quality, for example research, improvement and control, and the related prerequisites and methods • Use theoretical models for analysis and interpretation of specific quality and safety problems in the health care system, such as Reason's Swiss cheese model, the ETTO principle, Donabedian's quality-of-care dimensions, Deming's system of profound knowledge, Juran's Trilogy, etc. • Formulate descriptions of operational indicators for measuring quality and safety, including outlining a plan for data collection, processing and analysis
Patient and public involvement in health care improvement (lecture, 4 hours)	Søren Paaske Johnsen Department of Clinical Medicine	<ul style="list-style-type: none"> • Demonstrate understanding of basic concepts and terminology in quality and patient safety including: • different views on safety, such as the absence of injuries and the presence of robust systems that ensure against injuries • Demonstrate knowledge and overview of the methods used for quality development in health care, such as accreditation, indicator monitoring, auditing, event analysis and analysis of error sources, as well as knowledge of the efficacy of these methods according to the latest research in the field • Demonstrate knowledge of the possibilities and methods for involving patients and families in the development of quality and safety •
Patient and public involvement in health care improvement - continued (lecture, 4 hours)	Søren Paaske Johnsen Department of Clinical Medicine	<ul style="list-style-type: none"> • Demonstrate knowledge of healthcare law regulations on quality and safety, such as reporting adverse events • Demonstrate knowledge of the possibilities and methods for involving patients and families in the development of quality and safety • Identify and report adverse events

Research in Quality Development and Patient Safety (lecture, 4 hours)	Søren Paaske Johnsen Department of Clinical Medicine Possible visit from a representative from the pharmaceutical industry	<ul style="list-style-type: none"> • Demonstrate knowledge and overview of the methods used for quality development in health care, such as accreditation, indicator monitoring, auditing, event analysis and analysis of error sources, as well as knowledge of the efficacy of these methods according to the latest research in the field • Demonstrate understanding of the different purposes of measuring quality, for example research, improvement and control, and the related prerequisites and methods
How to make quality development work at the ward level where the direct contact with patients takes place? (lecture/exercises, 8 hours)	Søren Paaske Johnsen Department of Clinical Medicine	<ul style="list-style-type: none"> • Demonstrate understanding of the concept of variation as it is used in statistical quality development • Use the Model for Improvement for a specific issue in the health care system • Use the basic tools for statistical quality development, such as series charts and Pareto charts, for presentation and analysis of clinical indicator measurements • Contribute to planning, implementation and reporting of clinical quality development projects
Something about spillage; summary of the PDSA, feedback on the assignment (lecture/exercises, 8 hours)	Søren Paaske Johnsen Department of Clinical Medicine	<ul style="list-style-type: none"> • Demonstrate understanding of the concept of variation as it is used in statistical quality development • Demonstrate knowledge of the methods for the identification and reduction of waste in the health care system and linkages between quality and economics • Use the Model for Improvement for a specific issue in the health care system • Use the basic tools for statistical quality development, such as series charts and Pareto charts, for presentation and analysis of clinical indicator measurements • Contribute to planning, implementation and reporting of clinical quality development projects
Understanding management theory and the use of incentives in the public health care sector (lecture/exercises, 4 hours)	Lars Ehlers Cathrine Elgaard Jensen Department of Business and Management	<ul style="list-style-type: none"> • Demonstrate knowledge and overview of the methods used for quality development in health care, such as accreditation, indicator monitoring, auditing, event analysis and analysis of error sources, as well as knowledge of the efficacy of these methods according to the latest research in the field • Demonstrate knowledge of the methods for the identification and reduction of waste in the health care system and linkages between quality and economics • Use theoretical models for analysis and interpretation of specific quality and safety problems in the health care system, such as Reason's Swiss cheese model, the ETTO principle, Donabedian's quality-of-care dimensions, Deming's system of profound knowledge, Juran's Trilogy, etc.
Implementing change in health care (lecture, 4 hours)	Cathrine Elgaard Jensen Department of Business	<ul style="list-style-type: none"> • Demonstrate understanding of selected models and theories on innovation and implementation, with particular focus on the difficulties in implementing new initiatives in the health care system

	and Management	
Exercises (exercises, 3 hours)	Cathrine Elgaard Jensen Department of Business and Management	Exercises in course curriculum

* All rights reserved for changes during the semester due to e.g. illness, cancellations etc.

Examination

The exam will be a two-hour written exam, carried out using Digital Exam (DE). The student is not allowed to bring any aids or, in any way, communicate with others. The exam will be graded on the 7-point scale. With internal censorship.

For further information please consult www.smh.aau.dk

Module title, ECTS credits (and possibly STADS code)

Profile: Medical Market Access (MMA)

Markedsanalyse og marketing cases / Market Analysis and New Products Business Cases

15 ECTS project module

Location

Master, Science in Medicine with Industrial Specialisation, 1st semester

Board of Studies for Medicine

Module coordinator

The academic staff member responsible for the organisation and execution of the module.

The module leader may be the same person as the semester coordinator. If a person responsible for exam is pointed out, please state name and e-mail address here.

Louise Hansen lhan@buisness.aau.dk Department of Business and Management.

Type and language

Module type (e.g. study subject module, course module, project module etc.)

Language of instruction.

Project can be written in English.

Objectives

Description of the content and objectives of the course as regards learning objectives of the students in the module. This comprises a transcript of the knowledge, skills and competences described in the study regulations and curriculum. Reference can be made to elaborations on semester Moodle site and/or to curriculum on Study Board website (applicable for MedIS and Medicine).

From Curriculum:

After completing this module, the student is expected to:

Knowledge

- Understand the various components of the health care system including the financing and how demand and supply is influenced by market orientation within the public sector and the medical industry

Skills

- Develop, design, and implement marketing programs, processes, and activities
- Apply the analytical procedure to be followed when designing questionnaires for survey or experimental research
- Apply analytical techniques and implement marketing activities in the medical sectors is fundamental competences for the fulfilment of job requirements in the market oriented parts of the medical industry

Competences

- Recognize and compare the breadth and interdependencies of today's marketing environment
- Evaluate marketing decisions and the development of goal-oriented marketing strategies and market research including presentation of the stages in the marketing research process from the definition of a research problem to the presentation of research results

Academic content and conjunction with other modules/semesters

A brief and general description of the academic content of the module as well as the basis and motivation for the module; i.e. a brief review of the content and foundation of the module.

The intention is to provide students with an overview of each module and to create understanding of the module in relation to the semester and the entire programme.

Students are supposed to write a project in marketing and market analysis, where they demonstrate an understanding of marketing as a discipline meaning theory, terms and models. This is crucial for the ability to evaluate "with more security" what information and which considerations are necessary for making marketing decisions on the strategic and operational levels.

Projects can deal with topics such as investigation of market potential for a new drug, segmentation of markets and methods/principles for identification of customers, key stakeholders and gatekeepers, corporate branding and social corporate responsibility, or health technology and health related aid tools e.g. how to involve users in product development. Moreover it is crucial that the students gain experience with marketing way of thinking, which deals with focus on customer as well as understanding of that there is not necessary a "right way" to do things. It is also important that they learn marketing language and central terms, which are used in practice.

Project writing will give the students a valuable insight into the "real world" such as "game about doctors and patients favour", how the companies recruit doctors to use new drugs, keeping and broadening market shares, collaboration with patient associations, researchers etc. at the national and international level, and how multinational companies coordinate efforts across national borders. Moreover students can gain a glimpse of working with sale and sales promotion of drugs in different countries as well as importance of research based knowledge, different rules, organisation forms and financial systems. Last but not least the important issue is the optimisation of benefits through price fixing.

Scope and expected performance

The expected scope of the module in terms of ECTS load. This comprises number of teaching hours, exercises, preparation time, travel activity (if applicable) etc.

It gives 15 ECTS to write a project, which equals with approx. 450 hours used for the project including collection and processing of data, writing of a rapport, supervision and examination.

Participants

Indication of the participants in the module, particularly if they include several year groups, programmes or another type of co-teaching.

1st semester MedIS Master MMA students.

Prerequisites for participation

Description of the prerequisites for students' participation in the course, i.e. previous modules/courses in other semesters etc. The overall intention is to emphasise the coherence of the programme. This may be a transcript of the text in the study regulations and curriculum.

The prerequisite for writing project is participation in the course: Principles of Marketing and Marketing Management / Princippet inden for markedsføring og markedsføringsledelse.

Module activities (course sessions etc.)

The teachers are affiliated with Department of Business and Management. It is possible to involve external co-supervisors depending on a project. Note that many projects come from the Danish health system (typically medicinal industry), who wish a student, who can carry over a market investigation or other type of market analysis under supervision of the university teachers. Teachers can also have other project offers based on their own research etc.

Two weeks before the semester start the project catalogue will be accessible in Moodle. The students can also choose to work on their own topic of interest that will be formulated as a project together with a supervisor.

Examination

- The exam will be an oral group exam based on the submitted project.
- During the exam, the students will be assessed on the progression of their knowledge, skills and competences as described in the curriculum.
- The oral examination form was chosen to facilitate the evaluation of their abilities to work problem-based with a specific topic and to demonstrate their abilities to discuss an academic topic on an appropriately scientific level.
- Present at the exam will be the students, the internal supervisor, potential co-supervisors, and an internal censor. The exam will be evaluated by the internal supervisor and an internal censor. The exam will be assessed using the 7 point scale.
- The students are expected to give a short presentation (10 min per student) of the project at the beginning of the oral exam. The length of the exam will be 45 minutes per student.
- Aids (the project report and notes) will be allowed.
- The project report should be handed in using digital exam (www.de.aau.dk)
- If the exam format is changed before the reexam, this will be announced no later than 14 days before.

For further information please consult www.smh.aau.dk