SEMESTER DESCRIPTION

Master of Science in Engineering (Biomedical Engineering and Informatics)

AALBORG

1st semester

Spring semester 2026

AALBORG UNIVERSITET

Department of Health Science and Technology

Study board for Health and Technology

Study Regulations/Curriculum:

https://studieordninger.aau.dk/2025/54/5872

Semester framework theme:

During the semester (and the rest of the Master's programme), students are trained in the use of scientific methods, including problem analysis and their solutions, in the field of health technology.

The level of the Master's degree program will also be perceived as higher than the Bachelor's degree program, as the students work independently at a high scientific level, e.g. in relation to information search. To support the students in this, the first semester is focused on providing a good starting point in the research-based work. Therefore, both the project and the course Scientific Methods and Communication focus on the students being able to work with an engineering problem, but with a scientific approach and at a high international level.

In addition, the students must choose one of two profiles that will be linked to the project proposals that are presented. The profiles consist of choosing courses, either from election group 1 or 2, see below.

Election group 1:
Advanced Signal Processing
Stochastic Processes

Election group 2:
Interoperability of Clinical Information Systems
Decision Support

Semester coordinator:

Steffen Frahm, ksf@hst.aau.dk

Secretariat assistance:

Programme secretary:

Kamilla Kjær Brosze (kamilakp@hst.aau.dk)

Study board secretary:

Berit Lund Sørensen (blc@hst.aau.dk)

Content:

Semester organisation and time schedule

This semester consists of the following project and course modules:

Notice that you must choose EITHER election group 1 (Advanced Signal Processing, Stochastic Processes) og 2 (Interoperability of Clinical Information Systems, Decision Support)

Module type	Title	Module coordinator:	ECTS	Assessment	Type of exam
Project module	Design of Scientific Project	Steffen Frahm	15	7-point grading scale	Project
Joint course module	Scientific Methods and Communication	Steffen Frahm	5	Passed/Not passed	Written exam
Election group 1 - Course module	Advanced Signal Processing	Johannes Jan Struijk	5	Passed/Not passed	Oral exam
Election group 1 -Course module	Stochastic Processes	Samuel Emil Schmidt	5	Passed/Not passed	Written exam
Election group 2 -Course module	Interoperability of Clinical Information Systems	Ulrike Pielmeier	5	Passed/Not passed	Written exam
Election group 2 -Course module	Decision Support	Decision Support	5	Passed/Not passed	Oral exam

Semester outline

The main activities during the semester are outlined here:

September/February	October/March	November/April	December/May	January/June
Group formation (read the policy here) **Semester group meeting** her	**Status seminar** (read the policy here)	**Semester group meeting** her	**Date for submitting your project** (find the exam plan here)	**Exam** (find the exam plan here) **Project exam** (find requirements here - find the exam plan here))

Group formation

During the semester, project groups will be formed according to the guidelines applicable to HST's policy for group formation. Find examples of methods of group formation here.

Administrative groups – further information will follow

Semester evaluation

The semester is evaluated the following ways:

1. The students are invited to participate in two semester group meetings. The semester coordinator decides how the semester group meetings will be executed. The module coordinators are also invited.
2. The students will receive an electronic survey at the end of the semester in order to evaluate the semester and its activities. Time will be given to evaluate the previous semester at the beginning of the following semester.
3. Based on the above evaluations from the students, the semester coordinator will prepare a semester evaluation report which will be processed by the study board after the semester is completed.

Full time study

The programme is a full-time study, and the students are expected to spend approximately 42 hours per week on their studies (incl. exams and the exam preparations).

The semester starts the first coming weekday in September and ends the last weekday in January.

Project module description

DESIGN OF SCIENTIFIC PROJECT

ECTS: 15

Project module coordinator:

Steffen Frahm, ksf@hst.aau.dk
Department of Health Science and Technology

The exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-students-and-teaching-staff#exam-plans

Primary teaching language: **English**

Type of exam:

Group based project exam

Link to exam video

Read more about group based project exam here

Assessment: 7-point grading scale

Duration of examination:
Projects of 15 ECTS and more: 45 min per eksaminee (max. 5 hours)

Concerning examination: ☒ Internal examiner ☐ External examiner

The written product must be submitted in

Digital Exam

A potential reexamination is conducted: orally

It is not allowed to use generative AI as an aid during the examination.
However, students are allowed to use generative AI in connection with the project work with reference to AAU's guidelines for the use of generative AI in the project work.

MODULE ACTIVITIES

The project module is supervised by researchers from the Department of Health Science and Technology.

The project work consists of collaboration between the students and support from the supervisor to ensure that the learning objectives of the curriculum are achieved. In the project work, the students will perform: supervisor meetings, literature search, study design, data collection and analysis, mathematical modelling, presentations, and synthesis.

Status seminar:

A status pitch will be held approximately midway through the semester. This will include the content of the project background and key problem(s) and, if possible, also considerations and choice of method. Here, the status of the projects is presented in short and scientific manner, and experiences are exchanged between the groups, and an oral discussion is initiated.

An oral pitch is made from a short abstract from the project group. Afterwards the opponent group asks questions. Instructions for conducting the seminar are uploaded to Moodle.

https://studieordninger.aau.dk/2025/53/5942

Course module description I

SCIENTIFIC METHODS AND COMMUNICATION

ECTS: 5

Course module coordinator:

Steffen Frahm, ksf@hst.aau.dk
Department of Health Science and Technology

Exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-students-and-teaching-staff#exam-plans

Primary teaching language: **English**

Type of exam: Written

Assessment: Passed/Not passed

Duration of examination: 4 hours

Description of the practical conduct of the exam:

The exam is conducted: ☒ individually ☐ group based

Exam language: English

At written exams Observer must be applied

Permitted aids in the exam:

☒ Notes, literature, online books in offline condition, PC and calculator.

Reexam format: A potential reexam will be conducted in the same format as the ordinary exam. If fewer than 10 students are registered no later than 14 days before the re-sit exam, the examiner has the option to change the exam format

Scope and expected work effort

Activity	Number of hours spent on study activities in the module
Lectures	14
Exercises	12
Workshop	10
Exam	4
Exam preparation	24
Literature readings	50*
Individual work	36*

* Please note that the course requires several preparatory tasks, e.g. reading literature or preparing short articles/abstracts. Therefore, more time has been set aside for preparation than usual. For example, the students must write an abstract, a short-paper, as well as a peer-review of a short-paper (anonymously) as well as prepare presentations for various workshops in the various course sessions, see more below. The purpose of the various workshops is to provide the students with the prerequisites to contribute qualitatively to the semester conference SEMCON, which concludes the course.

Module activities

In order to ensure that all programs and semesters have equal access to seminar rooms to the greatest extent possible, the HST management has decided that for a 5 ECTS course module, 10 course sessions of 2 lessons (2 x 45 min) can be scheduled in a seminar room and 2 hours of associated assignments/workshops/group work/sports practice in common study areas or equivalent. In addition, a number of online timetable activities can be organized – either as video (voiceover slides, panopto, etc.) or as digital course activity. An MS Teams will be created for all modules where any synchronous digital teaching activities, assignment collection, student presentations, etc. can be handled.

Title	Lecturer and place of employment	Learning objectives from the programme curriculum
1. Course introduction and introduction to scientificity and scientific **hypothesis.** **Lectures and exercises.**	Steffen Frahm, Department of Health Science and Technology	Can give a detailed account of classic study designs in health science research. Can explain the principles of the research process independently of scientific methods. Can argue for connections between hypothesis or research questions, scientific method and data. Can discuss scientific quality criteria, in general and in relation to scientific studies.
2. Research ethics. **Lectures and exercises.**	Steffen Frahm, Department of Health Science and Technology	Can independently explain the possibilities and limitations of different types of study designs, such as bias, blinding and credibility. Can independently identify research ethics issues, including scientific integrity and bioethics.
3. Hypothesis generation, systematic literature search and critical reading **Lectures and exercises.**	Laura Petrini, Department of Health Science and Technology	Can argue for connections between hypothesis or research questions, scientific method and data. Can discuss scientific quality criteria, in general and in relation to scientific studies. Can apply advanced methods for structured coverage of a research area through systematic literature search as well as critical reading and evaluation of scientific literature.
4. **Hypothesis testing and quantitative study designs.** **Lectures and exercises.**	Steffen Frahm, Department of Health Science and Technology	Can give a detailed account of classic study designs with in health science research. Can independently explain the possibilities and limitations of different types of study designs, such as bias, blinding and credibility. Can argue for connections between hypothesis or research questions, scientific method and data.

		Can argue for and select relevant study design for exemplified hypothesis or problem formulation.
5. **Qualitative study designs.** **Lectures and exercises.**	Pernille Heyckendorff Secher, Department of Health Science and Technology	Can give a detailed account of classic study designs with in health science research. Can independently explain the possibilities and limitations of different types of study designs, such as bias, blinding and credibility. Can argue for connections between hypothesis or research questions, scientific method and data. Can argue for and select relevant study design for exemplified hypothesis or problem formulation.
6. Scientific communication: Publication of findings and introduction to SEMCON. **Lectures and workshop.**	Steffen Frahm, Department of Health Science and Technology	Can explain the principles of the research process independently of scientific methods. Can communicate own research, both orally and in writing, to a scientific conference. Can apply, evaluate and communicate peer review.
7. Scientific communication: How is a peer review done? **Lectures and workshop.**	Steffen Frahm, Department of Health Science and Technology	Can discuss scientific quality criteria, in general and in relation to scientific studies. Can communicate own research, both orally and in writing, to a scientific conference. Can apply, evaluate and communicate peer review.
8. SEMCON – semester conference. All students are assigned tasks such as e.g. oral/poster presentation or peer-review responses/critical feedback etc. **Workshop.**	Steffen Frahm, Laura Petrini, Pernille Heyckendorff Secher + supervisors Department of Health Science and Technology	Can discuss scientific quality criteria, in general and in relation to scientific studies. Can argue for and select relevant study design for exemplified hypothesis or problem formulation. Can communicate their own research, both orally and in writing, to a scientific conference.

Literature
Literature list is found in Moodle.

https://www.moodle.aau.dk/course/view.php?id=59764

Additional information

Combined course module:

The entire module is combined between the 1st semester Master of Clinical Science and Technology, the 1st semester Master of Musculoskeletal Physiotherapy and the 1st semester Master of Science in Engineering (Bio-medical Engineering and Informatics). There may therefore be repetitions depending on previous experiences, but the module particularly supports scientific thinking, understanding and competence, including communication skills. Furthermore, the depth of the individual learning objectives is different from what you have experienced in previous semesters/programs.

All questions regarding the course must be asked first to fellow students and then via a question forum on the course's Moodle page. The forum is answered 1-2 times weekly. Questions by e-mail will not be answered.

Admission to the individual exam requires that you have disseminated research, both in writing by submitting an abstract, as well as by oral presentation and at a poster session at a scientific conference (SEMCON).

Course module description II

ADVANCED SIGNAL PROCESSING

ECTS: 5

Course module coordinator:

Johannes Jan Struijk, jjs@hst.aau.dk
Department of Health Science and Technology

Exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-students-and-teaching-staff#exam-plans

Primary teaching language: **English**

Type of exam: Oral

Assessment: Passed/Not passed

Duration of examination: 20 minutes

Participants in an oral exam:
☒ Exam supervisor
☒ Lecturer
☒ Internal co-assessor

Description of the practical conduct of the exam:

The exam is conducted: ☒ individually ☐ group based

Exam language: English

The written product submitted ahead of the exam must be submitted in
Other: e-mail

The exam starts with a presentation from the student(s):
☒ Yes ☐ No ☐ Not relevant

At an oral exam the student draws one or more question(s):
☐ Yes ☒ No ☐ Not relevant

Permitted aids in the exam:
☒ None

Reexam format: **Oral**

SCOPE AND EXPECTED WORK EFFORT

Activity	Number of hours spent on study activities in the module
Lectures	22
Exercises	22
Workshop	8
Exam	0,5
Exam preparation*[1]	97,5 Includes a miniature project work

[1] Includes a miniature project work

MODULE ACTIVITIES

In order to ensure that all programmes and semesters have equal access to seminar rooms to the greatest extent possible, the HST management has decided that for a 5 ECTS course module, 10 course sessions of 2 lessons (2 x 45 min) can be scheduled in a seminar room and 2 hours of associated assignments/workshops/group work/sports practice in common study areas or equivalent. In addition, a number of online timetable activities can be organized – either as video (voiceover slides, panopto, etc.) or as digital course activity. An MS Teams will be created for all modules where any synchronous digital teaching activities, assignment collection, student presentations, etc. can be handled.

Title	Lecturer and place of employment	Learning objectives from the programme curriculum
Introduction to JTFA	Johannes J. Struijk, Department of Health Science and Technology	Can explain the relationship between time, frequency and wavelet analysis Can explain methods for estimating features in biological signals Can characterise and analyse the frequency content of a biological signal in relation to time Can argue for the choice of appropriate time-frequency distribution in relation to different biomedical problems
Continuous Wavelet Transform	Johannes J. Struijk, Department of Health Science and Technology	Can explain the relationship between time, frequency and wavelet analysis Can explain methods for estimating features in biological signals Can characterise and analyse the frequency content of a biological signal in relation to time Can argue for the choice of appropriate time-frequency distribution in relation to different biomedical problems Can design wavelets for time-frequency analysis and adaptive filtering
Matching Pursuit	Johannes J. Struijk, Department of Health Science and Technology	Can explain the relationship between time, frequency and wavelet analysis Can account for adaptive filtering and multivariate signal processing Can explain methods for estimating features in biological signals Can characterise and analyse the frequency content of a biological signal in relation to time
Discrete Wavelet Transform	Johannes J. Struijk, Department of Health Science and Technology	Can explain the relationship between time, frequency and wavelet analysis Can explain methods for estimating features in biological signals Can characterise and analyse the frequency content of a biological signal in relation to time Can argue for the choice of appropriate time-frequency distribution in relation to different biomedical problems Can design wavelets for time-frequency analysis and adaptive filtering

Source separation - PCA	Johannes J. Struijk, Department of Health Science and Technology	Can explain methods for estimating features in biological signals Can use multivariate methods for classification and feature space reduction
Source Separation - ICA	Johannes J. Struijk, Department of Health Science and Technology	Can account for adaptive filtering and multivariate signal processing Can explain methods for estimating features in biological signals Can use multivariate methods for classification and feature space reduction
Bi-orthogonal bases **Hilbert Transform**	Johannes J. Struijk, Department of Health Science and Technology	Can explain methods for estimating features in biological signals
Introduction to non-linear methods	Johannes J. Struijk, Department of Health Science and Technology	Can account for adaptive filtering and multivariate signal processing Can explain methods for estimating features in biological signals Can characterise non-linear methods of analysis Can identify different non-linear methods for analysing biological signals
Data fitting and smoothing splines	Johannes J. Struijk, Department of Health Science and Technology	Can explain methods for estimating features in biological signals Can characterise non-linear methods of analysis Can identify different non-linear methods for analysing biological signals Can use multivariate methods for classification and feature space reduction
Cohen's class time frequency distributions	Johannes J. Struijk, Department of Health Science and Technology	Can explain the relationship between time, frequency and wavelet analysis Can explain methods for estimating features in biological signals Can characterise non-linear methods of analysis Can characterise and analyse the frequency content of a biological signal in relation to time Can identify different non-linear methods for analysing biological signals Can argue for the choice of appropriate time-frequency distribution in relation to different biomedical problems Can design wavelets for time-frequency analysis and adaptive filtering Can assess which adaptive filters are suitable for solving a given task Can use multivariate methods for classification and feature space reduction

Introduction to adap-tive filters	Johannes J. Struijk, Department of Health Science and Technology	Can account for adaptive filtering and multivariate signal processing. Can assess which adaptive filters are suitable for solving a given task.
Miniature project	Johannes J. Struijk, Department of Health Science and Technology	Free choice.

Literature

Literature list is found in Moodle.

https://www.moodle.aau.dk/course/view.php?id=59788

Course module description III

STOCHASTIC PROCESSES

ECTS: 5

Course module coordinator:

Samuel Emil Schmidt, sschmidt@hst.aau.dk
Department of Health Science and Technology

Exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-students-and-teaching-staff#exam-plans

Primary teaching language: English

Type of exam: Written

Assessment: Passed/Not passed

Duration of examination: 3 hours

Description of the practical conduct of the exam:

Exam language: English

At written exams Observer must be applied

Permitted aids in the exam:
☒ Notes, literature, online books in offline condition, PC and calculator.

Reexam format: A potential reexam will be conducted in the same format as the ordinary exam. If fewer than 10 students are registered no later than 14 days before the re-sit exam, the examiner has the option to change the exam format

Scope and expected work effort

Activity	Number of hours spent on study activities in the module
Lectures	24
Exercises	24
Theory workshop	8 (miniature project)
Exam	3
Exam preparation	52
Literature readings	39 (3 hours per lecture)

MODULE ACTIVITIES

In order to ensure that all programmes and semesters have equal access to seminar rooms to the greatest extent possible, the HST management has decided that for a 5 ECTS course module, 10 course sessions of 2 lessons (2 x 45 min) can be scheduled in a seminar room and 2 hours of associated assignments/workshops/group work/sports practice in common study areas or equivalent. In addition, a number of online timetable activities can be organized – either as video (voiceover slides, panopto, etc.) or as digital course activity. An MS Teams will be created for all modules where any synchronous digital teaching activities, assignment collection, student presentations, etc. can be handled.

Title	Lecturer and place of employment	Learning objectives from the programme curriculum
Introduction to probability and stochastic variables.	Martin Siemienski Andersen, Department of Health Science and Technology	Can describe stochastic processes and their applications as models for real signals. Can explain the defining properties of different stationary stochastic process models.
Introduction to stochastic processes and multidimensional stochastic variables.	Martin Siemienski Andersen, Department of Health Science and Technology	Can select analytical tools to study the phenomenon of chance in an engineering context. Can describe stochastic processes and their applications as models for real signals.
Cross- and auto-correlation.	Martin Siemienski Andersen, Department of Health Science and Technology	Can use cross- and auto-correlation for analysis of stochastic processes.
Detection theory in signals (Bayesian theory).	Martin Siemienski Andersen, Department of Health Science and Technology	Can demonstrate understanding of concepts, theories and techniques for estimating parameters in discrete stochastic processes.
Examples of stochastic processes.	Samuel E. Schmidt, Department of Health Science and Technology	Can describe stochastic processes and their applications as models for real signals. Can explain the defining properties of different stationary stochastic process models. Can analyze and characterize stochastic phenomena and choose appropriate models.
Power spectrum density.	Samuel E. Schmidt, Department of Health Science and Technology	Can estimate the power spectral density of discrete stochastic processes and understand the limitations of this estimate. Can analyze biomedical signals, which can be modeled as stochastic processes, using power spectrum density.
Time-discrete stochastic processes in LTI systems	Samuel E. Schmidt,	Can demonstrate understanding of concepts, theories and techniques for estimating parameters in discrete stochastic processes.

and application to biomedical signals.	Department of Health Science and Technology	Can use cross- and auto-correlation for analysis of stochastic processes. Can analyze biomedical signals, which can be modeled as stochastic processes, using power spectrum density.
Ergodicity and biomedical signals.	Samuel E. Schmidt, Department of Health Science and Technology	Can analyze biomedical signals, which can be modeled as stochastic processes, using power spectrum density.
Modelling time-discrete stochastic processes.	Samuel E. Schmidt, Department of Health Science and Technology	Can demonstrate understanding of concepts, theories and techniques for estimating parameters in discrete stochastic processes. Can analyze biomedical signals, which can be modeled as stochastic processes, using power spectrum density.
Wiener filter.	Martin Siemienski Andersen, Department of Health Science and Technology	Can analyze and characterize stochastic phenomena and choose appropriate models.
Kalman filter.	Samuel E. Schmidt, Department of Health Science and Technology	Can analyze and characterize stochastic phenomena and choose appropriate models.
Prediction of a stochastic signal.	Samuel E. Schmidt, Department of Health Science and Technology	Can analyze and characterize stochastic phenomena and choose appropriate models.
Question hour regarding exams.	Martin Siemienski Andersen and Samuel E. Schmidt, Department of Health Science and Technology	

Literature

Literature list is found in Moodle.

https://www.moodle.aau.dk/course/view.php?id=59787

Course module description IV

INTEROPERABILITY IN CLINICAL INFORMATION SYSTEMS

ECTS: 5

Course module coordinator:

Ulrike Pielmeier
Department of Health Science and Technology

Exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-studerende-og-undervisere#eksamensplaner

Primary teaching language: **English**

Type of exam: Written

Assessment: Passed/Not passed

Duration of examination: 3 hours

Description of the practical conduct of the exam:

Exam language: English

At written exams Observer must be applied

Permitted aids in the exam:
☒ Notes, literature, online books in offline condition, PC and calculator.

Reexam format: Written

Scope and expected work effort

Interoperability in Clinical Information Systems is aimed at students who want to improve their skills and profile themselves in standardization, data use and informatics. This course addresses the principles, methods, standards, and challenges of achieving interoperability between clinical information systems across healthcare sectors and disciplines. The focus is on how health data can be exchanged, interpreted, and reused safely and meaningfully to support clinical workflows, decision-making, research, and secondary use, within regulatory and organizational constraints.

The course covers technical, semantic, organizational, and legal dimensions of interoperability, emphasizing real-world healthcare systems and infrastructures.

The average student is expected to work 30 hours per ECTS.

In this way, a course module of 5 ECTS requires 150 hours of work incl. exam and its preparation.

Activity	Number of hours spent on study activities in the module
Lectures	20
Exercises	20
Exam	3
Exam preparation	27
Self-study, literature readings and preparation before and after lectures	80

MODULE ACTIVITIES

In order to ensure that all programmes and semesters have equal access to seminar rooms to the greatest extent possible, the HST management has decided that for a 5 ECTS course module, 10 course sessions of 2 lessons (2 x 45 min) can be scheduled in a seminar room and 2 hours of associated assignments/workshops/group work/sports practice in common study areas or equivalent. In addition, a number of online timetable activities can be organized – either as video (voiceover slides, panopto, etc.) or as digital course activity. An MS Teams will be created for all modules where any synchronous digital teaching activities, assignment collection, student presentations, etc. can be handled.

Title	Lecturer and place of employment	Learning objectives from the programme curriculum
Concepts and levels of interoperability. **1 lecture + exercises**	Ulrike Pielmeier, Department of Health Science and technology	Can separate knowledge and an information model
Interoperability standards and semantic interoperability: openEHR, SNOMED CT, ICD, LOINC **3 lectures + exercises**	Ulrike Pielmeier, Department of Health Science and technology N.N. Center for Clinical Data Science	Can clearly separate clinical and technical standardization. Can apply methods for clinical and technical standardization.
Interoperability Architectures and API-based interoperability using HL7 FHIR. **2 lectures + exercises**	Simon Christian Dahl Center for Clinical Data Science Aalborg Universitetshospital and AAU	Can explain architectures that support interoperability. Can apply methods for clinical and technical standardization.
Design of user interface, practical use of SNOMED CT, and post-coordination **2 lectures + exercises and workshop**	Katja Møller Jensen Department of Health Science and technology	Configure templates in clinical information systems. Can use clinical terminology and classifications in a configuration context.

Requirements specifications for health data exchange and modeling of trust frameworks. **1 lecture + exercises.**	Ulrike Pielmeier, Department of Health Science and technology	Can apply scientific methods in requirement specifications. Can explain architectures that support interoperability.
Use Cases for Interoperability - Live Epidemiology, Personlized Medicine and AI **1 lecture + exercises**	Charles Vestegham Center for Clinical Data Science Aalborg Universitetshospital and AAU	Can reuse and create value from data using methods for interoperability.

Literature

Literature list is found in Moodle.

https://www.moodle.aau.dk/course/view.php?id=59786

Course module description V

DECISION SUPPORT

ECTS: 5

Course module coordinator:

Dan S. Karbing, dank@hst.aau.dk
Department of Health Science and Technology

Exam plan

Is located here:

https://www.hst.aau.dk/staff-and-students/for-studerende-og-undervisere#eksamensplaner

Primary teaching language: **English**

Type of exam: Oral

Assessment: Passed/Not passed

Duration of examination: 20 minutes

Participants in an oral exam:
☒ Exam supervisor
☒ Lecturer
☒ Internal co-assessor

Description of the practical conduct of the exam:

The exam is conducted: ☒ individually ☐ group based

Exam language: English

The exam starts with a presentation from the student(s):
☒ Yes ☐ No ☐ Not relevant

At an oral exam the student draws one or more question(s):
☒ Yes ☐ No ☐ Not relevant

Permitted aids in the exam:
☒ Some - Portfolio

Reexam format: Oral

Scope and expected work effort

The average student is expected to work 30 hours per ECTS.

In this way, a course module of 5 ECTS requires 150 hours of work incl. exam and its preparation.

Activity	Amount of hours spent on study activities in the module
Lectures	20
Exercises	24
Workshop	2 (exam question hour + presentation and discussion of portfolio assignment)
Exam	0,5
Exam preparation	33,5
Litterature readings	30
Individual problem solving	40

MODULE ACTIVITIES

In order to ensure that all programmes and semesters have equal access to seminar rooms to the greatest extent possible, the HST management has decided that for a 5 ECTS course module, 10 course sessions of 2 lessons (2 x 45 min) can be scheduled in a seminar room and 2 hours of associated assignments/workshops/group work/sports practice in common study areas or equivalent. In addition, a number of online timetable activities can be organized – either as video (voiceover slides, panopto, etc.) or as digital course activity. An MS Teams will be created for all modules where any synchronous digital teaching activities, assignment collection, student presentations, etc. can be handled.

Title	Lecturer and place of employment	Learning objectives from the programme curriculum
Development of decision support and decision support systems I+II. **2 x lectures + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can account for potential benefits and risks of using clinical decision support and decision support systems. Can provide examples of applications of existing clinical decision support systems. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision.
Rule-based systems and Fuzzy logic. **2 x lectures + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can account for potential benefits and risks of using clinical decision support and decision-support systems. Can provide examples of applications of existing clinical decision support systems. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can develop a heuristic rule-based decision support system. Can develop a simple decision support system with representation of uncertainty and decision(s).
Model-based systems. **1 x lecture + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can account for potential benefits and risks of using clinical decision support and decision-support systems. Can provide examples of applications of existing clinical decision support systems. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge.

		Can develop a simple decision support system with representation of uncertainty and decision(s). Can develop a decision support system by combining a physiological model with a utility theory model of a clinical decision.
Decision Theory I+II. **2 x lectures + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can provide examples of applications of existing clinical decision support systems. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can develop a simple decision support system with representation of uncertainty and decision(s). Can develop a decision support system by combining a physiological model with a utility theory model of a clinical decision.
Bayesian networks I+II. **2 x lectures + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can account for potential benefits and risks of using clinical decision support and decision support systems. Can provide examples of applications of existing clinical decision support systems. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can develop a simple decision support system with representation of uncertainty and decision(s).
Implementation and evaluation of decision support systems. **1 x lecture + exercises**	Dan S. Karbing, Department of Health Science and Technology	Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can choose and use methods for evaluating decision support. Can develop a heuristic rule-based decision support system. Can develop a simple decision support system with representation of uncertainty and decision(s). Can develop a decision support system by combining a physiological model with a utility theory model of a clinical decision.

1 x session using the free study workplaces for working with portfolio. **4 hours**	Dan S. Karbing, Department of Health Science and Technology	Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can choose and use methods for evaluating decision support. Can develop a heuristic rule-based decision support system. Can develop a simple decision support system with representation of uncertainty and decision(s). Can develop a decision support system by combining a physiological model with a utility theory model of a clinical decision.
Online exam question hour as well as student presentation and discussion of portfolio assignments. **2 hours.**	Dan S. Karbing, Department of Health Science and Technology	Can account for potential benefits and risks of using clinical decision support and decision-support systems. Can account for evidence in clinical decision support. Can discuss requirements for and prerequisites for knowledge and data in relation to decision support. Can compare different methods of representing uncertainty and knowledge. Can compare different methods of representation of a decision. Can choose and use methods for evaluating decision support.

Literature

Literature list is found in Moodle.

https://www.moodle.aau.dk/course/view.php?id=59785