



AALBORG UNIVERSITET

STUDIEORDNING FOR KANDIDATUDDANNELSEN I IDRÆTSTEKNOLOGI 2015

**MASTER OF SCIENCE (MSC) IN TECHNOLOGY
AALBORG**

MODULES INCLUDED IN THE CURRICULUM

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INSTRUMENTATION AND PHYSICAL PERFORMANCE

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

See admission criteria

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about technologies used in sports
- Can explain the scientific communication processes related to scientific conference presentations
- Can explain the process of and criteria for peer reviewed scientific communication

SKILLS

- Can apply relevant techniques to analyse movement in relation to physical performance
- Can apply signal processing methods of data in relation to physical performance *or* can apply musculoskeletal modelling techniques within Sports Science
- Can discuss and perform biomechanical recordings and processing methods
- Can demonstrate ability to communicate the main points of a research project in a written abstract for a scientific meeting
- Can demonstrate an application of a recent technology within Sports Science
- Can demonstrate ability to structure a presentation of new scientific knowledge in written and oral forms

COMPETENCES

- Can evaluate choice of methods and technologies in relation to the research problem
- Can critically evaluate research results in relation to physical performance

EXAM

EXAMS

Name of exam	Instrumentation and Physical Performance
Type of exam	Oral exam based on a project
ECTS	15
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

Please contact the [programme student counsellors](#) if you consider applying to the education and you have questions.

Please consult the Moodle page for your semester and contact the semester coordinator if you have academic questions, or the study secretary if you have administrative questions.

All other enquiries may be directed to [Malene Møller Knudsen](#), secretary of the Study Board.

FACTS ABOUT THE MODULE

Danish title	Instrumentering og præstationsevne
Module code	STIIDT15K1_1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

APPLIED TECHNOLOGY AND MEASUREMENT TECHNIQUES IN SPORTS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about performance assessment methods used in sports
- Have knowledge about the general principles behind the sensors and transducers used to assess performance
- Have knowledge about the sources and magnitudes of error in relation to assessment methods
- Have knowledge about how technology has contributed to the development of sports
- Have knowledge about ethical implications of using or misusing technology in sport

SKILLS

- Can design an experimental protocol in regard to given research question or practical problem
- Can transfer series of raw data into meaningful quantities
- Can critically discuss the appropriate use of sport technology

COMPETENCES

- Can compare and critically evaluate measurement results on technical interventions
- Can evaluate sports technology findings in regard to their importance for individual athletes, the sport and the society

EXAM

EXAMS

Name of exam	Applied technology and Measurement Techniques in Sports
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Anvendt teknologi og måleteknik i idræt
Module code	STIIDT15K1_2
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

MOVEMENT ANALYSIS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about the methods used to assess movement on humans
- Have knowledge about the general principles of optical motion capture systems
- Have knowledge about basic methods of image analysis and data reduction
- Have knowledge about the general principles of sensor-based motion capture equipment
- Have an overview on applications of movement analysis

SKILLS

- Can design, plan and prepare a motion capture session using an optical system
- Can compare different technological solutions to motion capture in regard to minimal requirements and error sources
- Can collect and analyse data from motion capture systems by applying general tracking and data filtering techniques
- Can prepare raw data for further data analysis in modelling software

COMPETENCES

- Can critically evaluate the limitations of motion capture data and the possible effects of these limitations on analysis results
- Can integrate motion capture analyses with other movement related data (e.g., force and electromyography) and interpret these results within the context of the research problem

EXAM

EXAMS

Name of exam	Movement Analysis
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Bevægelsesanalyse
Module code	STIIDT15K1_3
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

INTERPLAY BETWEEN ATHLETE AND EQUIPMENT

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the first

semester of the Master's programme in Sports Technology

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about the sports product industry
- Have knowledge about available analysis methods and their advantages and limitations
- Have knowledge of production processes typical for sports equipment
- Can explain the product lifecycle from conception over design and manufacture to use and recycling
- Are able to understand technical specifications of products

SKILLS

- Can apply the theory of mechanics of materials on sports equipment
- Can apply an appropriate numerical method for a given case *or* can apply an embedded technology in relation to sports
- Can analyse the function of a sports product in connection with the human body
- Can demonstrate the ability to qualitatively assess production costs

COMPETENCES

- Can analyse the needs of a sportsman and the added value of a sports product (e.g. enhanced performance, added comfort, minimized injuries)
- Can discuss about sports products (e.g. design, quality, costs) with relevant professionals in science or industry (e.g. engineers, product analysis specialists, equipment producers)

EXAM

EXAMS

Name of exam	Interplay Between Athlete and Equipment
Type of exam	Oral exam based on a project
ECTS	15
Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Samspil mellem idrætsudøver og udstyr
Module code	STIIDT15K2_1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	15
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

MECHANICS OF MATERIALS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about stress-strain relationships of different kind of materials (e.g. metals, textile, biological tissues)
- Have knowledge about the tensorial nature and interdependence of stresses and strains
- Have knowledge about the general line of reasoning from the macroscopic state (geometry, materials, loads) through the deformation state to the local state (stresses and strains at a point, failure prediction)
- Have knowledge about the fact that different failure models exists depending on the choice of material and stress multi-axiality
- Have knowledge about the distinction between static loading, time-varying (repeated) loading, and impact loading

SKILLS

- Can apply the methodology to simple cases (e.g. beams and rods) in order to evaluate deformations and risk of failure
- Can assess primary criteria for choices of structural layout and material (e.g. maximum load, permissible deformation, energy absorption)
- Can assess the number of loading cycles to failure for comparison with endurance curves

COMPETENCES

- Are able to evaluate combined structures through discretization into elementary structural types (beams, rods, columns etc.)
- Can conduct a qualified dialogue with engineers on the material of sports products

EXAM

EXAMS

Name of exam	Mechanics of Materials
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

Please contact the [programme student counsellors](#) if you consider applying to the education and you have questions.

Studieordning for kandidatuddannelsen i Idrætsteknologi 2015

Please consult the Moodle page for your semester and contact the semester coordinator if you have academic questions, or the study secretary if you have administrative questions.

All other enquiries may be directed to [Malene Møller Knudsen](#), secretary of the Study Board.

FACTS ABOUT THE MODULE

Danish title	Styrkelære
Module code	STIIDT15K2_2
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

MANUFACTURING PROCESSES

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about product attributes, user need clarification and product specifications and understand the product development process as a whole
- Have knowledge about the basic concepts of manufacturing including common manufacturing processes, manufacturing planning, supply chains and outsourcing
- Have knowledge about the progress from conceptual idea/product to the realization of prototype as well as specifying the manufacturing set-up
- Have knowledge about the interplay between design, material, processing and cost and quality
- Have knowledge about the economics of manufacturing and product development

SKILLS

- Can choose suitable analysis tools and methods for the application of interest within product development and manufacturing
- Can communicate analysis results from the product development towards the manufacturing department
- Can choose material, process and manufacturing set-up
- Can apply economic analysis tools on product development problems

COMPETENCES

- Can discuss the design process in sports science and engineering
- Can evaluate the added value to an industrial design and realization project
- Can conduct qualified negotiations with offshore manufacturers on sports product fabrication

EXAM

EXAMS

Name of exam	Manufacturing Processes
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Produktionsprocesser
Module code	STIIDT15K2_3
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

APPLICATION OF SCIENTIFIC METHODS IN SPORTS TECHNOLOGY

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Has knowledge, skills and competences corresponding to the first two

semesters of the Master's programme in Sports Technology

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

To give the student experience in applying scientific methods and/or performing scientific experiments related to Sports Technology at a University Department or in a company in Denmark or abroad. With this semester the student will be able either to broaden and/or deepen his or her experience in a specific research area.

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge of instrumentation and physical performance as well as interplay between the athlete and equipment
- Can reflect on this knowledge on a scientific basis

SKILLS

- Can critically apply scientific methods and tools to research within the chosen area of knowledge
- Can evaluate and to choose scientific theories and methods within the chosen area of research
- Can communicate problems, methods and results within the scientific area, in both oral and written form

COMPETENCES

- Can choose technologies, record, analyze and critically evaluate real and/or simulation results in relation to sports technology
- Can independently initiate or to perform collaboration within the discipline
- Are able to take responsibility for their own professional development

EXAM

EXAMS

Name of exam	Application of Scientific Methods in Sports Technology
Type of exam	Oral exam based on a project
ECTS	30
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

Please contact the [programme student counsellors](#) if you consider applying to the education and you have questions.

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All other enquiries may be directed to [Malene Møller Knudsen](#), secretary of the Study Board.

FACTS ABOUT THE MODULE

Danish title	Anvendelse af videnskabelige metoder i idrætsteknologi
Module code	STIIDT15K3_1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

MASTER'S THESIS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to 1st, 2nd and 3rd semester of the Master's programme in Sports Technology. All exams from semesters 1, 2 and 3 must be passed.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The Master's thesis is the last element of the scientific education, with the aim to integrate and/or deepen previously acquired skills and to display the ability to perform scientific work.

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge of instrumentation and physical performance as well as interplay between athlete and equipment at the highest international level of research
- Can to reflect on this knowledge on a scientific basis

SKILLS

- Can critically apply scientific methods and tools to research within the chosen area of knowledge
- Can evaluate and to choose scientific theories and methods and to identify scientific problems within the chosen area of research
- Can communicate problems, methods and results within the scientific area, in both oral and written form

COMPETENCES

- Can choose technologies, record, analyze and critically evaluate real and simulation results in relation to physical performance
- Can independently initiate and to perform collaboration within the discipline and interdisciplinary as well, and to take professional responsibility
- Can independently take responsibility for their own professional development and specialization

EXAM

EXAMS

Name of exam	Master's Thesis
Type of exam	Oral exam based on a project
ECTS	30
Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

Please contact the [programme student counsellors](#) if you consider applying to the education and you have questions.

Please consult the Moodle page for your semester and contact the semester coordinator if you have academic questions, or the study secretary if you have administrative questions.

All other enquiries may be directed to [Malene Møller Knudsen](#), secretary of the Study Board.

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale
Module code	STIIDT15K4_1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	30
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

MODELLING OF HUMAN FUNCTION

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about simulation methods useful in sports
- Have knowledge about the assumptions and limitations of the methods
- Have knowledge about the connection between the model and the anatomic/physiological reality
- Can explain the general principles of modelling, simulation, verification and validation
- Can explain how the human body and its interaction with the surroundings can be analysed by means of modelling and simulation technology

SKILLS

- Can apply musculoskeletal modelling techniques on problems within Sports Science
- Can apply kinematic data as input to musculoskeletal models (e.g. motion capture data)
- Can apply experimental model validation techniques

COMPETENCES

- Can critically evaluate simulation results

EXAM

EXAMS

Name of exam	Modelling of Human Function
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Modellering af kroppens funktioner
Module code	STIIDT15K1_4
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

DIGITAL PROCESSING OF BIOMECHANICAL SIGNALS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge of a high level programming language
- Have knowledge about the basics of programming including data types, flow control, functions and error handling
- Have knowledge about mathematical functions used to solve sports technology problems with focus on data mining
- Have knowledge of the concepts, theories and techniques for estimating parameters of discrete stochastic processes
- Have knowledge of power spectral analysis of stationary stochastic processes and their limitations

SKILLS

- Can develop, debug and test a computer program (e.g. MatLab) that enables processing of measurement data
- Can export the developed programs to other platforms
- Can extract relevant data from discrete biomechanical signals and large dataset

COMPETENCES

- Can evaluate the consequences of different signal processing methods
- Can compare different signal processing methods

EXAM

EXAMS

Name of exam	Digital Processing of Biomechanical Signals
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Digital behandling af Biomekaniske Signaler
Module code	STIIDT15K1_5
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

NUMERICAL MODELLING

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge on how to establish a geometrical specification of a product via computer based models using Computer Aided Design and Technical Drawings
- Have knowledge on how the Finite Element Method can be applied to obtain approximate solutions to physical problems governed by partial differential equations
- Have knowledge about the applications, assumptions, and limitations of the Finite Element Method
- Have knowledge about the compromise between accuracy and simulation time
- Have knowledge about the numerical steps taken in a finite element analysis in order to obtain results of deformation (strains) and stresses.

SKILLS

- Can establish a three dimensional parametric model of a structure or component using a commercial computer software program
- Can produce and interpret a technical drawing of a product (i.e. a structure or component)
- Can perform a linear static stress analysis using a commercial finite element program
- Can interpret and report results of simple finite element analyses
- Can demonstrate a basic understanding of concepts and applications of finite element analysis from a sports science view point

COMPETENCES

- Know when and where to use finite element analysis as a part of an analysis or design process in sports science and engineering
- Can conduct a qualified dialogue with analysis specialists on numerical analysis of sports products

EXAM

EXAMS

Name of exam	Numerical Modelling
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Numerisk modellering
Module code	STIIDT15K2_4
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine

EMBEDDED/MOBILE SYSTEMS AND THEIR APPLICATIONS IN SPORTS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

Knowledge, skills and competences corresponding to the Bachelor degree in Sports Science at Aalborg University.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge about building-blocks and the underlying scientific principles of embedded systems
- Have knowledge on how to build solutions to real-world problems using embedded systems
- Have knowledge on basic principles of computer programming

SKILLS

- Can apply microcontroller-based systems solutions for sport relevant projects
- Can implement ad-hoc solutions for hardware and software design
- Can critically read original technical reports relevant to sports technologies

COMPETENCES

- Can identify hardware and software solutions and partially implement them

EXAM

EXAMS

Name of exam	Embedded/mobile Systems and Their Applications in Sports
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in the Framework Provisions

ADDITIONAL INFORMATION

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FACTS ABOUT THE MODULE

Danish title	Embedded/mobile systemer og deres anvendelser indenfor idræt
Module code	STIIDT15K2_5
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Malene Møller Knudsen , Pia Britt Elberg

ORGANISATION

Study Board	Study Board of Health, Science and Sports
Department	Department of Health Science and Technology
Faculty	The Faculty of Medicine