AALBORG UNIVERSITET

CIVILINGENIØR, CAND.POLYT. I PRODUKT- OG DESIGNPSYKOLOGI, 2018

CIVILINGENIØR
AALBORG

MODULER SOM INDGÅR I STUDIEORDNINGEN

INDHOLDSFORTEGNELSE

INVESTIGATION OF SUBJECTIVE EXPERIENCES

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The project unit will support students in achieving deeper knowledge and skills in cognitive psychology of perception and use this knowledge to concrete problems.

LEARNING OBJECTIVES

KNOWLEDGE

- Understand methods to measure and transform subjective impression.
- Understand the perceptual and cognitive problems and use these in the project.

SKILLS

- Could use methods to measure and transform subjective impression.
- Could communicate scientific work in the form of a scientific paper and poster in English.

COMPETENCES

Can synthesize the above information through the design, execution and statistical analysis of user experiments and/or psychophysical experiments

Can

- Design and prototype manufacture a product that enhances the interaction between users and the technical system by incorporating advanced knowledge of perception, cognition and/or emotion psychological aspects gained through the design, execution and evaluation of one or more usability test, where the interaction between users and technical systems are analysed.

or

- Clarify the human perceptual or cognitive performance in one or more modalities and report this for basic scientific use or in relation to specific applications.

TYPE OF INSTRUCTION

The project is documented by:

- A scientific paper, written in English
- A poster, also in English
- Edited worksheets documenting the various project details

EXAM

EXAMS

Name of exam	Investigation of Subjective Experiences
Type of exam	Oral exam based on a project
ECTS	15
Assessment	7-point grading scale
Type of grading	Internal examination

Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Undersøgelse af subjektive indtryk
Module code	ESNPDPK1P1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

ADVANCED COGNITIVE PSYCHOLOGY

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on basic knowledge of general and cognitive psychology (Almen- og kognitionspsykologi)

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The course aims to support the study of personal experience in relation to design of user interfaces through personal experiences conscious expression and function. Experience is here defined narrowly as perception, memory, emotions, thinking, self and motivation.

LEARNING OBJECTIVES

KNOWLEDGE

Have elaborated understanding of cognitive approaches, concepts and methods.

This knowledge should be, but not necessarily limited to:

- knowledge of perception
- knowledge about memory, recollections and Self
- knowledge of motivation and emotion psychology
- knowledge of basic themes, and classic and modern theories
- knowledge of empirical studies of particular relevance for the field

SKILLS

- Can apply this knowledge to relate constructively to theory and empirical.
- Can apply this knowledge to explore concrete everyday phenomena.
- Can apply this knowledge in the design of user interfaces.

COMPETENCES

- Can relate to different ethical theory approaches cognitive psychology.
- Can deal independently and critically to theoretical and practical approaches.
- Can apply the acquired knowledge in practical and relevant contexts.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	Advanced Cognitive Psychology
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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Udvidet kognitionspsykologi
Module code	ESNPDPK1K1
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

APPLIED EXPERIMENTAL PSYCHOLOGY AND PSYCHO-PHYSICS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge of basic statistics and probability theory

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

Must have knowledge of the psychophysical methods that can be used to measure human perception, cognition, and performance, including:

- Threshold and comparison methods
- Quantitative methods for measuring psychophysical responses including, nominal, ordinal, interval and ratio scales.
- Transformation of data to relevant scales. Normalization and standardization.
- Comparative and non-comparative scaling: paired comparison and semantic differential techniques.
- Probabilistic choice models for paired comparison (BTL), and the concept of transitivity.
- Descriptive analysis, including selection and use of censor panels for scaling experiments, word elicitation, selection, scaling and analysis.
- Practical design of scales.
- Design of scaling experiments.
- Factor analysis

SKILLS

- Carry out measurement and scaling of psychophysical responses.
- Use statistical software for analysis of the results.

COMPETENCES

- Can choose the appropriate psychophysical method for a given problem.
- Have experience carrying out experiments using appropriate methods.
- Can analyse the results from experiments using appropriate statistical methods.

TYPE OF INSTRUCTION

Lectures followed by exercises and/or lab-work.

EXAM

EXAMS

Name of exam	Applied Experimental Psychology and Psycho-physics
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale

Type of grading	Internal examination
Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Anvendt eksperimentalpsykologi og psykofysik
Module code	ESNPDPK1K2
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

INTERACTION

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The project aims to create or explore an interaction. It could, for example be a man-machine interaction, a human-human interaction or human-machine-human interaction.

LEARNING OBJECTIVES

KNOWLEDGE

- Understand the fundamental aspects of the designed/examined interaction.
- Understand the psychological concepts that are either related to or possibly can describe the designed/examined interaction.
- Understand methods for the measurement of the designed/examined interaction influence on humans.

SKILLS

- Can design a prototype which is part of/or which can be used in connection with the designed/investigated interaction.
- Can measure on the designed/examined interaction with an aim of investigating the influence on humans.
- Can with the relevant tools analyse the measured data from this could account for the interaction's influence on humans.

COMPETENCES

- Can synthesize the above information into a holistic understanding of the designed/examined the interaction and its influence on humans.

Can

- Design and prototype manufacture a product using knowledge of applied cognitive psychology, to improve the human's experience of a product. The improvement of the interaction could be measured through various user experience tests where a later statistical analysis could give a concrete estimate of the interaction's influence on the user.

or

- Investigate a given interaction, in order to provide design guidelines, suggestions for improvement, or a design concept that can increase or improve the interaction's influence on the user.

TYPE OF INSTRUCTION

Project work

- A report

or

- A scientific paper, in conjunction with edited work sheets documenting the various details of the project.

EXAM

EXAMS

Name of exam	Interaction

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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Interaktion
Module code	ESNPDPK2
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	15
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

APPLIED COGNITIVE PSYCHOLOGY AND EXPERIMENTAL SOCIAL PSYCHOLOGY

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge obtained during the 1st semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The student will work with various psychological problems as they are reflected in technological interactive systems.

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge and understanding of perception-cognition and emotion psychological theories including: affordance, branding process, primer demotions, problem solving and creativity.
- Have an understanding of the complex interplay between psychological dimensions of human interaction with technical systems.
- Have knowledge of the individual's dependence on its context.
- Have knowledge of the forces as leads, influences and motivates individuals and groups to choose, waive or alter attitudes, evaluations, preferences and behaviour.
- Have knowledge of relevant research methods, including the social psychological experiment, and qualitative research methods.

SKILLS

- Can identify and understand the psychological problems in technological interactive systems.
- Can identify and understand social psychological issues in technological interactive systems.

COMPETENCES

- Can apply theoretical knowledge to analyse practical problems and synthesize solutions based on it.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	Applied Cognitive Psychology and Experimental Social Psychology
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Anvendt kognitionspsykologi og eksperimentel socialpsykologi
Module code	ESNPDPK2K1
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

PROFILING IN ENGINEERING PSYCHOLOGY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This module requires students to reflect on their previously acquired competences and to plan for further studies within topics of relevance to their interests and to their academic progression. Students have to complete a study within a self-chosen topic.

LEARNING OBJECTIVES

KNOWLEDGE

- Have insight into recent theories, methods and results
- Can understand and reflect on theories, methods and practice
- Can identify relevant research topics

SKILLS

- Can find and evaluate relevant information
- Can advance own professional profile
- Can chose and use relevant theories, methods, tools and data within the field
- Can apply correct terminology in communication with fellow students, teachers, users and others.

COMPETENCES

- Can take part in cross-disciplinary activities with a professional approach

- Can identify and pursue personal professional interests and goals
- Can plan and implement self-study activities
- Can give peers constructive criticism and can respond appropriately to criticism from peers.
- Can discuss professional progression within the module and in relation to the education

TYPE OF INSTRUCTION

As part of the learning objectives students must plan the implementation of the module and have it approved by a supervisor/coordinator and by the study board.

EXAM

EXAMS

Name of exam	Profiling in Engineering Psychology
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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Profilering i produkt- og designpsykologi
Module code	ESNPDPK2K2
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

MASTER'S THESIS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge obtained during the 1st - 3rd semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge, at the highest international level of research, of at least one of the core fields of the education
- Have comprehension of implications of research (research ethics).

SKILLS

- Can argue for the relevance of the chosen problem to the education including specifically account for the core of the problem and the technical connections in which it appears
- Can account for possible methods to solve the problem statements of the project, describe and assess the applicability of the chosen method including account for the chosen delimitation and the way these will influence on the results of the product
- Can analyse and describe the chosen problem applying relevant theories, methods and experimental data
- Can describe the relevant theories and methods in a way that highlights the characteristics and hereby document knowledge of the applied theories, methods, possibilities and delimitations within the relevant problem area
- Can analyse and assess experimental data, including the effect the assessment method has on the validity of the results.

COMPETENCES

- Can communicate scientific problems in writing and orally to specialist and non-specialist.
- Can control situations that are complex, unpredictable and which require new solutions.
- Can independently initiate and to perform collaboration within the discipline and interdisciplinary as well, and to take professional responsibility.
- Can independently take responsibility for his or her own professional development and specialization.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

Problem based project oriented project work individual or in groups of 2-3 persons

EXAM

EXAMS

Name of exam	Master's Thesis
Type of exam	Oral exam based on a project The master thesis can be conducted as a long master thesis. If choosing to do a long master thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS.
ECTS	30

Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale
Module code	ESNPDPK4P1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	30
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

COMPUTER GRAPHICS PROGRAMMING

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds upon basic knowledge of linear algebra

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The course provides an introduction to real-time computer graphics concepts and techniques. The course focuses on programmable functionalities as offered by graphics APIs, supplemented with a presentation of the relevant underlying theories. The course also introduces the concepts of Virtual Reality and Augmented Reality, and how computer graphics is used in the context of these application areas.

LEARNING OBJECTIVES

KNOWLEDGE

- Must be able to describe the programmable graphics rendering pipeline as exposed for example by OpenGL.
- Must be able to explain relevant mathematical transformations, including rotations, translations and projections in terms of matrix operations in homogeneous coordinates.
- Must be able to explain real-time local illumination models, in particular the Phong reflection model, including the use of linearly interpolated attributes (colors and surface normals.)
- Must be able to explain rasterization techniques, including texture mapping (diffuse reflection maps, gloss maps, environment/reflection maps), framebuffer operations (blending, stencil tests, depth tests), and anti-aliasing techniques (super-sampling, mip-map texture filtering).
- Must be able to describe interpolation with Bezier and Hermite curves.
- Must be able to describe the concepts of Virtual Reality and Augmented Reality, including relevant display technologies.
- Must be able to discuss central issues relating to Virtual and Augmented Reality, including tracking, interaction possibilities, and degrees of realism.

SKILLS

- Must be able to apply a graphics API such as OpenGL for procedurally generating and interactively controlling three-dimensional content.
- Must be able to program simple vertex and fragment shaders (e.g. implementing per-vertex diffuse lighting and normal mapping)

COMPETENCES

- Must be able to learn further graphics APIs (such as Direct3D, OpenGL ES, SVG, X3D, webGL in HTML5), game engines and APIs for user interaction

EXAM

EXAMS

Name of exam	Computer Graphics Programming
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination

Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Computergrafik programmering
Module code	ESNVGISK1K1A
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

MACHINE LEARNING

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The course gives a comprehensive introduction to machine learning, which is a field concerned with learning from examples and has roots in computer science, statistics and pattern recognition. The objective is realized by presenting methods and tools proven valuable and by addressing specific application problems.

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about supervised learning methods including K-nearest neighbors, decision trees, linear discriminant analysis, support vector machines, and neural networks.
- Must have knowledge about unsupervised learning methods including K-means, Gaussian mixture model, hidden Markov model, EM algorithm, and principal component analysis.
- Must have knowledge about probabilistic graphical models, variational Bayesian methods, belief propagation, and mean-field approximation.
- Must have knowledge about Bayesian decision theory, bias and variance trade-off, and cross-validation.
- Must be able to understand reinforcement learning.

SKILLS

- Must be able to apply the taught methods to solve concrete engineering problems.
- Must be able to evaluate and compare the methods within a specific application problem.

COMPETENCES

- Must have competencies in analyzing a given problem and identifying appropriate machine learning methods to the problem.
- Must have competencies in understanding the strengths and weaknesses of the methods.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	Machine Learning
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Maskinlæring
Module code	ESNSPAK3K2FA
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

PROTOTYPING AND FABRICATION TECHNIQUES

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

Objectives:

In order to be part of a leading design team, it is essential to be able to develop and communicate new interaction design concepts for the implementation and production of future electronic devices. The course rationale is that students need to have an understanding of physical interaction design processes, where ideas are formed, developed and tested in proof-of-concept models that can be demonstrated to others via video, poster presentations, and working prototypes. The focus is on understanding and applying design and development strategies needed to move from concept to working prototype, with the most recent tools and techniques for producing new forms, input/output from computers and embedded systems, and interactive systems and devices. The course incorporates advanced fabrication techniques; students should be able to build a prototype for any concept they can imagine. By incorporating computer-assisted industrial and electronic design techniques, knowledge about specific design tools and procedures is gained. In order to be able to apply this knowledge, a thorough understanding of the many underlying concepts is required.

LEARNING OBJECTIVES

KNOWLEDGE

Students who complete the module will obtain the following qualifications:

- The student must have **knowledge** about various approaches to Concept Design methodologies
- The student must have **knowledge** about standard methods and techniques for prototyping of new devices and systems
- The student must be able to **understand** the relationship between concept development and implementation/fabrication, specifically regarding research-based prototyping techniques

SKILLS

Students who complete the module will obtain the following qualifications:

- The student must be able to **apply** concept design methods and prototyping techniques to real world scenarios involving fabrication of objects or systems with intended functionalities (e.g. responsive environments, interactive games, robots, musical interfaces, public installations, etc.) Specific skills to be gained by the student may include many of the following:
- **Knowledge** of concept development techniques
- **Knowledge** of modelling and design tools
- **Knowledge** of rapid prototyping techniques
- **Understanding** advanced microcontroller programming
- **Understanding** sensors, actuators, and displays
- **Understanding** wired and wireless communication protocols
- **Understanding** 3D input devices and haptics
- **Understanding** iterative development (redesign/polish of product)
- **Understanding** circuit design (schematic to printed circuit board)
- **Understanding** Field Programmable Gate Arrays

COMPETENCES

Students who complete the module will obtain the following qualifications:

- The student must be able to **analyse** a problem, design a solution and translate it into an rapid prototyping design
- The student must be able to **analyse** his/her solutions in order to compare and assess the potential of different concept design methods and prototyping techniques, iteratively making the proper design choices
- The student must be able to **synthesize** results and concepts in a professional way equivalent to practices in both academic and industrial contexts

TYPE OF INSTRUCTION

The types of instruction for this course are decided in accordance with the current Joint Programme Regulations and directions are decided and given by the Study Board for Media Technology.

EXAM

EXAMS

Name of exam	Prototyping and Fabrication Techniques
Type of exam	Written or oral exam In accordance with the current Joint Programme Regulations and directions on examination from the Study Board for Media Technology: Oral or written examination with internal censor. The assessment is performed with the Pass/Fail grade.
ECTS	5
Permitted aids	With certain aids: See semester description
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	Are stated in the Joint Programme Regulations.

FACTS ABOUT THE MODULE

Danish title	Prototyping og fremstillingsteknikker
Module code	MSNMEDM1179
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Location of the lecture	Campus Aalborg, Campus Copenhagen, Campus Esbjerg
Responsible for the module	Claus Brøndgaard Madsen

ORGANISATION

Study Board	Study Board of Media Technology
Department	Department of Architecture, Design and Media Technology
Faculty	Technical Faculty of IT and Design

USER EXPERIENCE DESIGN FOR MULTI MODAL INTERACTION

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds upon basic knowledge of interaction design and usability

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

This course trains students to research, analyze, prototype, and conceptualize design considering all system aspects including the social and cultural contexts of use. The course gives a comprehensive knowledge about user involvement in the design process going beyond traditional methods such usability lab testing.

The objectives are realized by presenting methods and tools in a case based framework and through the students' active participation in workshops and assignments.

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about system design methods including the social and cultural contexts of use.
- Must have knowledge derived from sociological and ethnographic fields for user behaviour research
- Must have knowledge about qualitative research methods involving end users in the field, such as interview techniques and analysis and experience sampling
- Must have knowledge about scenario-based design methods
- Must have knowledge about principles for multi modal interaction design
- Must have knowledge about methods for multi modal evaluation and field studies

SKILLS

- Must be able to apply the taught methods to solve concrete design problems.
- Must be able to evaluate and compare and apply the methods for a specific design problem
- Must be able to facilitate the design process involving users in real-life contexts

COMPETENCES

- Students will acquire the competencies to decide how to choose the appropriate method to suit different dimensions of a design problem at different stages in the process and the pitfalls of each approach
- Must have competencies in understanding the strengths and weaknesses of the methods
- Must have the competencies to facilitate the design process involving users in context

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	User Experience Design for Multi Modal Interaction
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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Design af brugeroplevelsen for multimodal interaktion
Module code	ESNVGISK1K2
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg, Campus Esbjerg, Campus Copenhagen
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT, Study Board of Media Technology
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

IMAGE PROCESSING AND COMPUTER VISION

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds upon basic knowledge of linear algebra and statistics

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

Cameras capture visual data from the surrounding world. Building systems which can automatically process such data requires computer vision methods. Students who complete the module will understand the nature of digital images and video and have an inside into relevant theories and methods within computer vision and an understanding of their applicability.

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about the primary parameters of a camera system
- Must have knowledge about the representation and compression of digital images and video signal
- Must be able to understand the general framework of image processing as well as the basic point and neighborhood operations, i.e., binarization, color processing, BLOB analysis and filtering
- Must be able to explain the principles behind invariant feature point descriptors such as SIFT and Harris corners.
- Must have knowledge of different motion analysis methods, such as background subtraction and optical flow
- Must be able to understand the tracking frameworks such as the Kalman filter, mean-shift and the particle filter
- Must be able to understand different shape analysis methods such as active-shape models, procrustes, Hungarian method

SKILLS

- Must be able to apply stereo vision to generate 3D date from two or more cameras. This implies projective geometry, camera calibration, epipolar geometry, correspondence and triangulation
- Must be able to apply advanced 2D segmentation methods such as Hough transform, compound morphology, and histogram-of-oriented histograms.
- Must be able to demonstrate understanding of error propagation techniques as a tool for performance characterization of computer vision based solutions

COMPETENCES

- Must be able to learn further computer vision methods and theories, and select an appropriate solution for a given problem

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	Image Processing and Computer Vision
Type of exam	Written or oral exam
ECTS	5

Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	As stated in Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Billedbehandling og computervision
Module code	ESNVGISK2K1A
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

HUMAN SOUND PERCEPTION AND AUDIO ENGINEERING

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about the anatomy and physiology of the human ear.
- Must have knowledge about hearing diagnosis and disorders.
- Must have knowledge about fundamental properties of human sound perception (e.g. Loudness, pitch, masking, spatial hearing and time / frequency resolution).
- Must have basic knowledge about modern audio engineering including recording, reproduction and signal processing techniques (perceptive coding principles and formats, audio effects).
- Must have knowledge about multi-channel recording, storage and reproduction of sound.
- Must have knowledge about public address techniques.
- Must have insight in digital audio interfaces and standards.
- Must have insight in low noise audio design and interconnections.

SKILLS

- Must be able to set up audio systems for recording or reproduction in an appropriate way to optimize the system and minimize noise.
- Must be able to set up audio systems according to relevant standards.

COMPETENCES

- Based on the acquired knowledge, the student should be able to critically evaluate systems and specifications within audio and acoustics with a basis in human sound perception.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

EXAM

EXAMS

Name of exam	Human Sound Perception and Audio Engineering
Type of exam	Written or oral exam
ECTS	5
Assessment	Passed/Not Passed
Type of grading	Internal examination
Criteria of assessment	As stated in Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Menneskets lydopfattelse og audio teknik
Module code	ESNSPAK2K2
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

APPLIED ENGINEERING PSYCHOLOGY

2018/2019

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The student obtains a deeper understanding of the use of product and design psychological methods through immersion in a selected area of concern.

LEARNING OBJECTIVES

KNOWLEDGE

- Have a deepened understanding of the use of product and design psychology methods

SKILLS

- Acquire knowledge on a chosen topic within the programmes core areas.
- Can analyse problems based on the product and design psychology.
- Can synthesize selected parts of a solution.

COMPETENCES

- Can analyse a problem based in technical and psychological theories and methods
- Can prepare and document solutions – for example in the form of a prototype substantiated by experimental results.

TYPE OF INSTRUCTION

Project work documented in a report or a scientific paper, in conjunction with edited work sheets documenting details of the project

EXAM

EXAMS

Name of exam	Applied Engineering Psychology
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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Anvendt produkt- og designpsykologi
Module code	ESNPDPK3P1
Module type	Project
Duration	1 semester

Semester	Autumn
ECTS	30
Empty-place Scheme	Yes
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

ACADEMIC INTERNSHIP

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

An academic internship agreement approved by the company, an AAU supervisor and the study board for electronics and it (ESN).

The academic internship must have a scope that correspond the ECTS load.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The student stays in a company with the purpose of learning and applying theories and methods to address engineering problems in an industrial context. In addition, the student will be introduced to business procedures and policies.

LEARNING OBJECTIVES

KNOWLEDGE

- Has knowledge about the organization of the company and business procedures and policies.
- Has knowledge about performance measures in the company.
- Has developed a fundamental business sense.
- Has knowledge of the competence profile of the program and how the academic internship contributes to the competence profile.
- Has gained deepened knowledge into engineering theories and methods within the program.

SKILLS

- Can initiate and ensure the completion of an agreement for the academic internship, with learning objectives corresponding to the semester at the master's program.
- Can apply analytic, methodological and/or theoretic skills to address advanced engineering problems in an industrial context.
- Can contribute in a professional manner to company objectives as an individual and in teams in accordance with the project management model applied in the company.
- Can collaborate and communicate with peers, managers and others.
- Can document the academic internship in a report and defend it orally.

COMPETENCES

- Can discuss and reflect on the learning outcomes of the academic internship.
- Can discuss the need for knowledge transfer between academia and industry.
- Has a deepened understanding of the academic interests to pursue in the master's thesis and possible job positions to aim at after graduation.

TYPE OF INSTRUCTION

Project work

EXAM

EXAMS

Name of exam	Academic Internship

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 Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Projektorienteret forløb
Module code	ESNPDPK3P2
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	30
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design

MASTER'S THESIS

2018/2019

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge obtained during the 1st - 3rd semester

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Have knowledge, at the highest international level of research, of at least one of the core fields of the education
- Have comprehension of implications of research (research ethics).

SKILLS

- Can reflect on a scientific basis on their knowledge.
- Can argue for the relevance of the chosen problem to the education including specifically account for the core of the problem and the technical connections in which it appears
- Can account for possible methods to solve the problem statements of the project, describe and assess the applicability of the chosen method including account for the chosen delimitation and the way these will influence on the results of the product
- Can analyse and describe the chosen problem applying relevant theories, methods and experimental data
- Can describe the relevant theories and methods in a way that highlights the characteristics and hereby document knowledge of the applied theories, methods, possibilities and delimitations within the relevant problem area
- Can analyse and assess experimental data, including the effect the assessment method has on the validity of the results.

COMPETENCES

- Can communicate scientific problems in writing and orally to specialist and non-specialist.
- Can control situations that are complex, unpredictable and which require new solutions.
- Can independently initiate and to perform collaboration within the discipline and interdisciplinary as well, and to take professional responsibility.
- Can independently take responsibility for his or her own professional development and specialization.

TYPE OF INSTRUCTION

As described in the introduction to Chapter 3.

Problem based project oriented project work individual or in groups of 2-3 persons

EXAM

EXAMS

Name of exam	Master's Thesis
Type of exam	Oral exam based on a project thesis, it has to include experimental work and has to be approved by the study board. The amount of experimental work must reflect the allotted ECTS.
ECTS	60

Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	As stated in the Joint Programme Regulations http://www.en.tech.aau.dk/education-programmes/Education+and+Programmes/

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale
Module code	ESNPDPK4P2
Module type	Project
Duration	2 semesters
Semester	Spring
ECTS	60
Location of the lecture	Campus Aalborg
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

Study Board	Study Board of Electronics and IT
Department	Department of Electronic Systems
Faculty	Technical Faculty of IT and Design