AALBORG UNIVERSITET

STUDIEORDNING FOR KANDIDATUDDANNELSEN I LEDELSE AF DIGITAL KOMMUNIKATION, 2019

CAND.IT.
KØBENHAVN

MODULER SOM INDGÅR I STUDIEORDNINGEN

INDHOLDSFORTEGNELSE

GOVERNANCE AND STRATEGIES

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The project builds on knowledge obtained during the first semester project.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about the importance of the social and business environment in which technologies are used
- Must be able to understand the role of standardisation processes for innovation and in market developments

SKILLS

- Must be able to apply theories, methodologies and empirical knowledge for analysing market developments and governance
- Must be able to apply knowledge on technology, business and regulatory developments for analysing and developing appropriate business models and business strategies
- Must be able to analyse industry sectors and markets using and producing communication, media and information technologies
- Must be able to assess the main regulatory issues in relation to ICT infrastructures, services, and content

COMPETENCES

- Must have competencies in applying an interdisciplinary approach using theories, methodologies and empirical knowledge for analysing specific issues with relation to communication, media and information technologies
- Must have the competency to analyse the interaction between technologies, institutions, organisations and markets in a system perspective

TYPE OF INSTRUCTION

Project work

EXAM

PREREQUISITE FOR ENROLLMENT FOR THE EXAM

- An approved PBL competency profile is a prerequisite for participation in the project exam

EXAMS

Name of exam	Governance and Strategies
Type of exam	Oral exam based on a project
ECTS	15
Assessment	7-point grading scale
Type of grading	External examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Regulering og strategier
Module code	ESNDCLK2P1
Module type	Project
Duration	1 semester
Semester	Autumn
ECTS	15
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

INTERNET SERVICES AND GOVERNANCE

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

Objectives:

The student shall have knowledge about the economics of provision of electronic communication services and infrastructures.

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about e-government services and citizen access
- Must have knowledge about the techno-economics of Internet infrastructures
- Must be able to demonstrate insight into governance structures of the Internet
- Must have knowledge about convergence and its impact on regulation and governance
- Must have knowledge about regulation of competition, user access, and scarce resources
- Must have knowledge about Internet organisations and the standardization process for internet technologies
- Must have knowledge about network neutrality, unbundling and vertical separation of Internet infrastructures
- Must have knowledge about consumer rights issues in relation to provision of Internet services

SKILLS

- Must be able to analyse the economic and technological conditions which influence governance and market structure of electronic communication infrastructures
- Must be able to apply economic theory for analysis of market conditions for provision of Internet services
- Must be able to analyse the role of data protection and privacy in provision of public and private internet services
- Must be able to analyse the digital transformation of the public sector and policy issues involved in this process.

COMPETENCES

- Must be able to discuss and evaluate Internet policies at the national and international level
- Must be able to demonstrate development of his/her knowledge, understanding, and ability to make use of socio-economic methods within the fields of Internet services and governance

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Internet Services and Governance
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Internet-services og regulering
Module code	ESNICTEK2K6N
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

USER EXPERIENCE AND COMPUTER ETHICS

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must understand the concepts of human computer interaction, interaction design and user experience and the relation between them
- Must have knowledge of different input and output modes for interactive systems, also in a historical perspective
- Must have knowledge of different methods for designing interaction of ICT systems
- Must have knowledge of different strategies for planning the interaction design of ICT systems
- Must understand the concept and applicability of computer ethics

SKILLS

- Must be able to apply the concepts of usability and user experience both to screen-based and non-screen-based interactive systems
- Must master different design methods and techniques for creating and testing interactive systems, including non-screen-based systems
- Must be able to identify possible computer ethical issues related to a ICT system and / or its use context
- Must be able to discuss user cognitive models and other descriptions of users
- Must be able to reflect critically on methodological challenges in data from and about users as a source for design
- Must be able to evaluate interactive systems using techniques from interaction design and Human Computer Interaction

COMPETENCES

- Must have the competency to reflect on the implications of using different methods and techniques for interaction design, including user involvement, and for evaluating systems
- Must have the competency to analyse the social context in which the use of ICT takes place
- Must have the competency to discuss concepts of privacy, user sovereignty and personalisation in relation to design dilemmas in the design of interactive systems

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	User Experience and Computer Ethics
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Brugeroplevelse og computer-etik
Module code	ESNICTEK2K8N
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

SUMMER SYMPOSIUM II

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

The course is offered in collaboration between PLUS and AAU in accordance with AAU regulations.

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about broad range of advanced scientific theories and their applicability for designing a research project
- Must have knowledge about scientific methodology including the relationship between inductive and deductive methodologies.
- Must have knowledge about scientific methods including the use of qualitative and quantitative methods in their projects
- Must have knowledge about interdisciplinary approaches, including combining approaches from media science and engineering science

SKILLS

- Must be able to discuss the concept of scientific methods
- Must be able to apply different scientific methods for a particular problem
- Must be able on basis of a specific relevant topic work on definition of an advanced research project
- Must be able in the definition of the project: define problem definition and argue for the choice of methodology and theoretical framework, methods, and source of data to be used

COMPETENCES

- Must have competencies in use of scientific methods
- Must have competencies in setting up a report as a scientific document
- Must have competencies in presenting their work in the summer symposium and reflect on the comments from fellow students, senior teachers and industry representatives and update the initial outline after the summer symposium

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Summer Symposium II
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Sommer symposium II
Module code	ESNDCLK3K1
Module type	Course
Duration	1 semester
ECTS	5
Language of instruction	English
Location of the lecture	Other location
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

DESIGN AND MARKETS

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds upon knowledge obtained in the first two semester projects.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must be able to understand technology as socio-technical systems where the context of use is pivotal for the value of communication, media and information (CMI) technologies
- Must have knowledge on new organizational forms, new business concepts and changes in the market conditions.

SKILLS

- Must be able to identify and apply relevant theories for the synthesis and evaluation of the studied situation
- Must be able to apply knowledge of green ICT and managerial economics as presented in the mandatory semester courses
- Must be able to identify situations of CMI technology related implications for the market
- Must be able to analyse the conditions and implications of use of communication, media and information technologies for individual users, groups, organizations and society by drawing on technical, organizational and techno-economic perspectives

COMPETENCES

- Must have the competencies to distinguish between design and market implications at individual, group, organizational or societal level
- Must have the competencies to perform and analysis of the conditions and implications of communication, media and information technologies in a specific market context
- Must have the competencies to combine theories from different technology, organizational and socio-technical areas to create a multi-faceted understanding of the “problem”
- Must have the competencies to focus on a particular situation of use or a new phenomenon related to new CMI technologies; it could be the conditions and implications related to an organization engaging in outsourcing, or it could be the conditions and needs for new standards

TYPE OF INSTRUCTION

Project work

EXAM

EXAMS

Name of exam	Design and Markets
Type of exam	Oral exam based on a project
ECTS	10
Assessment	7-point grading scale
Type of grading	Internal examination

Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Design og markeder
Module code	ESNDCLK3P1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	10
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

MANAGERIAL ECONOMICS AND ENTREPRENEURSHIP 2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge on theories of entrepreneurship
- Must have knowledge on technology management
- Must have knowledge on product, process and market innovation
- Must have knowledge on servitization of manufacturing industries and industrialization of service industries
- Must have knowledge on internationalization strategies
- Must have knowledge on business eco-systems
- Must have knowledge on financial analysis including accounting

SKILLS

- Must be able to apply a costing and pricing strategy for products and services
- Must be able to apply a basic financial analysis and investment and risk analysis
- Must be able to evaluate the benefits and disadvantages of a change management process
- Must be able to evaluate the pros and cons of insourcing and outsourcing

COMPETENCES

- Must have competences in how to apply economic terms to practical managerial circumstances
- Must have competences in preparing a business plan
- Must have competences in assessing a competitive business strategy

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Managerial Economics and Entrepreneurship
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Erhvervsøkonomi og entrepreneurskab
Module code	ESNICTEK3K8N
Module type	Course

Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

INNOVATION AND BUSINESS MODELS

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge on theories regarding business development based on communication, media and information technologies, including network economics, information economics, transaction costs analysis, and business ecosystems
- Must have an understanding of theories on innovation

SKILLS

- Must be able to apply theories and methodological tools on specific company and technology cases
- Must be able to evaluate the application of business models in different business areas

COMPETENCES

- Must have the competencies to discuss the links between different design elements of business models: customer value, organisation, technology and financial issues
- Must have acquired the knowledge and skills to explain the key linkages between the different theories of the course, and use these critically in an analysis of market trends and business models
- Must have acquired the ability to combine knowledge on technological solutions with business development and business potential
- Must master theories and methodological tools to analyse and suggest appropriate and innovative business models for companies, which are offering communication, media and information services and products and using these solutions in their business operations

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Innovation and Business Models
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Innovation og forretningsmodeller
Module code	ESNICTEK1K5N

Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must be able to understand the relevance of the chosen problem in relation with telecommunication, infrastructure, entrepreneurship and innovation that includes specific knowledge for the kernel of the problem and the technical context
- Must be able to understand at synthesis level relevant theories and methods in a way that underlines important properties, and thus document the knowledge about the applied theories, methods and delimitations within the problem field

SKILLS

- Must be able to design, develop or analyse a comprehensive service or solution that is solidly technically founded, meets end-user requirements and is validated from a market and business perspective
- Must be able to undertake a thorough analysis of specific applications for technology choices, strategic decisions and innovation
- Must be able to analyse the possible methods to solve the problem, describe and assess the application of the chosen methods and how these influence the project results

COMPETENCES

- Must be able to synthesize and describe the chosen problem and apply relevant theories, methods and experimental data
- Must have competencies in innovation and entrepreneurship within the field of ICT
- Must be able to contribute to the creative use of technologies to resolve user needs and improve organizational processes

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

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	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Kandidatspeciale

Module code	ESNDCLK4P1
Module type	Project
Duration	1 semester
Semester	Spring
ECTS	30
Language of instruction	English
Location of the lecture	Campus Copenhagen
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

IDENTITY AND ACCESS MANAGEMENT

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The module builds on knowledge obtained in the module “Internet technologies and service archi-tectures” or similar.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must be able to explain the concepts of security, privacy and trust
- Must be able to explain the concepts of attributes, claims, assertion and claims-based identities
- Must have knowledge about the principles and methods for access control, authentication, authorisation and identification
- Must be able to explain the key concepts and principles of identity management
- Must have knowledge of key management, certificates, tokens and credentials
- Must have knowledge about state-of-the-art principles and guidelines for protecting users’ privacy
- Must have knowledge of state-of-the-art technologies and frameworks for fine-grained management of personal attributes
- Must be able to understand the concepts of linkability and unlinkability and state-of-the-art principles for establishing trust
- Must have knowledge about security architectures, including policies and policy management
- Must have knowledge of national identity management frameworks such as NemID / MitID

SKILLS

- Must be able to discuss the differences between physical identities and online digital, virtual and partial identities
- Must be able to identify the personal attributes that are needed to perform a given task
- Must be able to apply methods for privacy protection, encryption, access control, authentication and authorisation as a part of service development, including privacy by design principles
- Must be apply to apply state-of-the-art technologies for realising advanced services with privacy protection, e.g. OAuth and OpenID Connect
- Must be able to analyse and design information flow and architectures for secure ICT services and solutions
- Must be able to design applications and services incorporating security elements (e.g. payment, authentication), different assurance levels, and management of user identities (authentication, authorisation, privacy protection)

COMPETENCES

- Must have the competency to design secure services and security architectures with controlled exchange of attributes between stakeholders and minimal disclosure of personal information
- Must be able to discuss and reflect on management of personal information for access to resources and for personalisation of services

TYPE OF INSTRUCTION

Types of instruction are listed in §17; Structure and Contents of the Programme.

EXAM

EXAMS

Name of exam	Identify and Access Management

Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Identitets- og adgangshåndtering
Module code	ESNICTEK2K2
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The course builds on knowledge obtained during the bachelor courses in “Linear Algebra” and “Introduction to Probability and Applied Statistics“.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge of data modelling in form of preparing data, modelling data, and evaluating and disseminating the results.
- Must have knowledge about key machine learning concepts such as feature extraction, cross-validation, generalization and over-fitting, prediction and curse of dimensionality.
- Must have knowledge about different machine learning principles, algorithms, techniques and be able to define and describe fundamental problems and consequences within machine learning.
- Must have knowledge about basic recommender system principles, techniques, algorithms and be able to define and describe fundamental problems and consequences within these.

SKILLS

- Must be able to discuss how the data modelling methods work and describe their assumptions and limitations.
- Must be able to map practical problems to standard data models such as regression, classification, density estimation, clustering and association mining.
- Must be able to select and apply a range of different machine learning algorithms and techniques on specific problems.
- Must be able to select and apply the basic recommender system algorithms and techniques on specific problems.

COMPETENCES

- Must have the competency to solve machine learning related problems in a practical context.
- Must have the competency to apply machine learning algorithms and analyse the results

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

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	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Maskinlæring
Module code	ESNICTEK2K7N
Module type	Course
Duration	1 semester
Semester	Spring
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

COMMUNICATION SYSTEMS

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about advanced PHY layer technologies and principles such as spectrum usage and limitations, advanced modulation and multiplexing techniques, and channel coding in selected systems
- Must have knowledge about mobile systems and technologies in the light of 3G, 4G and beyond 4G
- Must have knowledge about access technologies like mobile cellular access
- Must have knowledge about Machine Type Communication (MTC) and similar 5G technologies
- Must have knowledge about network architectures (densification, Cloud Radio Access Network, Software Defined Networking, Network Function Virtualization)
- Must have knowledge about Digital broadcast networks (radio and TV) such as cable, satellite and terrestrial networks
- Must have knowledge about wired (broadband) networks such as DSL-, cable TV- and fibre-based infrastructures

SKILLS

- Must be able to explain the principles and technologies used in advanced PHY layers
- Must be able to discuss the mobile systems / technologies, network architectures, access technologies, and MTC technologies
- Must be able to evaluate the strengths and weaknesses in the use of traditional mobile networks, wireless or broadcast networks for mobile TV/radio transmission.

COMPETENCES

- Must have the competency to analyse and assess the potentials and limitations of existing and future PHY layer technologies in selected systems
- Must have the competency to identify and discuss the key technologies and standards for broadband and broadcast networks and the properties of networks that are essential for supporting services
- Must have the competency to analyse and assess the potentials and limitations of existing and future mobile cellular technologies including MTC technologies.

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Communication Systems
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Kommunikationssystemer
Module code	ESNICTEK1K4N
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

INTERNET TECHNOLOGIES AND SERVICE ARCHITECTURES

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge about the structure of the Internet and its design principles
- Must have knowledge about the principles and technologies of different web generations (Web 1.0, 2.0, 3.0, …) and their implications for services
- Must have knowledge of content networking principles, including representation, identification and transport of web objects
- Must have knowledge of the main standardisation bodies and the process of developing specifications and standards for Internet technologies
- Must have knowledge of user agents and their functionality, in particular the use of JavaScript and HTML5
- Must have knowledge about programming models and interfaces for Internet services, in particular REST, SOAP and Web Services
- Must have knowledge about session-based services such as instant messaging and streaming media, including session initiation and management and the main protocols
- Must be able to explain the concepts of "service", "service enablers" and "service architectures"
- Must have knowledge of different methods for "enrichment" of services: User involvement, personalisation, use of context information, extracting value from large amounts of data, etc.
- Must have knowledge of common service architectures, e.g. Service Delivery Platforms, Service-Oriented Architecture (SOA), and cloud architectures

SKILLS

- Must be able to analyse and discuss the relation between user needs and different types of services
- Must be able to analyse the requirements that a given service imposes on servers, networks and terminals and their relation to the user experience provided by the service
- Must be able to design ICT services with distributed content, including controlled exposure of resources and access to these, and making use of state-of-the-art Internet technologies
- Must be able to design services for real-time messaging and streaming media
- Must be able to analyse and discuss the characteristics of different service architectures

COMPETENCES

- Must have the competency to assess the potential and applicability of state-of-the-art Internet technologies, programming models and architectures in order to realise a given functionality

TYPE OF INSTRUCTION

Types of instruction are listed at the start of §17; Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Internet Technologies and Service Architectures
Type of exam	Written or oral exam
ECTS	5

Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Internetteknologier og tjenestearkitekturer
Module code	ESNICTEK1K6N
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

CYBER SECURITY AND TRUST

2020/2021

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge of standards addressing top cyber security challenges
- Must have knowledge of effective measures that cyber security programs should take
- Must have knowledge of trusted and open architectures
- Must have an understanding of device security trends and threats associated with “Bring your own device” (BYOD)
- Must have knowledge of (mobile) device management and integrity factors for trusted and untrusted devices
- Must have knowledge of strong user and machine authentication based on valuable assets
- Must have knowledge of hardware-based encryption (“Security on chip”) for higher performance
- Must have knowledge of technologies already embedded in enterprise endpoints
- Must have knowledge of cyber attacks
- Must have knowledge of behavioural profiling and intrusion prevention tools for layer defences
- Must have knowledge of security services and policies within public and private cloud networks

SKILLS

- Must be able to identify requirements and create policies to establish a consistent architecture
- Must be able to monitor, detect and respond to anomalies in the cyber-space
- Must be able to analyse the integrity of the platform to ensure that no unauthorised use has occurred.
- Must be able to design and implement different levels of trust in open architectures.

COMPETENCES

- Must have the competency to design cyber security measures for enterprises
- Must have the competency to discuss end-to-end standards to enable seamless security in an open ecosystem.
- Must have the competency to discuss the business potential and implications of trusted ecosystems

TYPE OF INSTRUCTION

Types of instruction are listed in §17, Structure and contents of the programme.

EXAM

EXAMS

Name of exam	Cyber Security and Trust
Type of exam	Written or oral exam
ECTS	5
Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Cyber-sikkerhed og tillid
Module code	ESNICTEK3K4
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

ALGORITHMIC CONTENT EXPOSURE

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The course builds on knowledge obtained in the modules “Internet technologies and service architectures” and “Machine Learning”.

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must have knowledge of principles for algorithmic selection of content, e.g. as used in recommender systems
- Must have knowledge of the key standards of media formats and representation of digital
- content
- Must have knowledge of standards for metadata and annotation
- Must have knowledge of methods for dealing with Digital Rights Management (DRM)
- Must have knowledge of methods for indexing and handling of unstructured content, e.g.
- user generated content, in combination with structured media content
- Must be able to understand how to manage and optimise content adaptation and delivery to meet the limitations of various types of networks and terminals and dynamic context

SKILLS

- Must be able to discuss strategies for algorithmically managed exposure of digital content
- Must be able to prepare and integrate multimedia content in a service, including associated metadata
- Must be able to analyse the role and interests of content producers, aggregators and providers in the value chain or value network of a service
- Must be able to analyse problems and solutions for the distribution of digital media content and select appropriate strategies for media distribution

COMPETENCES

- Must have the competency to analyse and evaluate systems and solutions for algorithmically managed exposure of content, e.g. recommender systems
- Must have the competency to advice content providers and non-technical persons on systems for algorithmic management of content.
- Must have the competency to analyse technical aspects of content and media management in a larger political-social-economical context

TYPE OF INSTRUCTION

Types of instruction are listed in § 17.

EXAM

EXAMS

Name of exam	Algorithmic Content Exposure
Type of exam	Written or oral exam
ECTS	5

Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Algoritmisk eksponering af indhold
Module code	ESNICTEK3K6N
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
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

GREEN ICT - SUSTAINABLE BUSINESS DEVELOPMENT

2020/2021

PREREQUISITE/RECOMMENDED PREREQUISITE FOR PARTICIPATION IN THE MODULE

The course builds on knowledge obtained in the module “Innovation and Business Models” (formerly “Entrepreneurship, Innovation and Business Models”).

CONTENT, PROGRESS AND PEDAGOGY OF THE MODULE

LEARNING OBJECTIVES

KNOWLEDGE

- Must be able to understand the concept of sustainability and perspectives relating to CSR
- Must have knowledge about various levels of ICT effects on the environment
- Must be able to identify existing, new and emerging hardware, software and communication technologies for energy saving
- Must have knowledge about the role of ICT in energy consumption and energy efficiency
- Must have knowledge about different energy/GHG management standards and guidelines
- Must have knowledge about sustainability maturity models
- Must have knowledge about methods for assessing the potential environmental impacts of ICT products and services

SKILLS

- Must be able to recognise the possible application area in which the deployment of ICT is expected to lead to better energy efficiency and to estimate their relative importance
- Must be able to apply theories, methodologies for analysing sustainable business development
- Must be able to understand and evaluate sustainability/CSR policies and practices
- Must be able to apply the green ICT strategies
- Must be able to estimate energy consumption impacts attributable to the introduction of various ICT services, considering both direct and indirect energy use
- Must be able to evaluate the rebound and induction effect within the ICT field
- Must be able to judge the usefulness of the different scientific methods for analysis of the ICT related energy efficient systems

COMPETENCES

- Must have the competency to apply and integrate sustainability in an interdisciplinary way, considering user, technology and market aspects.
- Must have the competency to independently define and analyse scientific problems within the area of Green ICT

TYPE OF INSTRUCTION

Types of instruction are listed in § 17.

EXAM

EXAMS

Name of exam	Green ICT - Sustainable Business Development
Type of exam	Written or oral exam
ECTS	5

Assessment	7-point grading scale
Type of grading	Internal examination
Criteria of assessment	The criteria of assessment are stated in the Examination Policies and Procedures

FACTS ABOUT THE MODULE

Danish title	Grøn IKT - Bæredygtig forretningsudvikling
Module code	ESNICTEK3K7N
Module type	Course
Duration	1 semester
Semester	Autumn
ECTS	5
Language of instruction	English
Empty-place Scheme	Yes
Location of the lecture	Campus Copenhagen
Responsible for the module	Ove Kjeld Andersen

ORGANISATION

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