JÖNKÖPING UNIVERSITY
School of Engineering

PROGRAMME SYLLABUS

Informatics: User Experience Design and IT Architecture (master), 120 credits

Programmestart: Autumn 2016

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PROGRAMME SYLLABUS

Informatics: User Experience Design and IT Architecture (master), 120 credits

Informatik: UX-design och IT-arkitektur (master), 120 högskolepoäng

Programme code:	TAIU6	**Programmestart:**	Autumn 2016
Confirmed by:	Dean 2016-03-30	**Education Cycle:**	Second-cycle level
Revised by:	Dean 2017-11-14		
Version:	1,1		
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Title of qualification

Degree of Master (120 credits) with a major in Informatics, specialisation in User Experience Design and IT Architecture

Programme overview

Background

Personal devices such as tablets, smartphones, and wearables are replacing desktop computers at the workplace and in the home. Work is often done on the go, in a mobile and ever changing environment – switching from one device to another and moving first from the office to the bus stop, and then home.

Since the emergence of the iPhone, user experience design has become central to making our interactions with all kinds of digital devices functional, productive, and inspiring – thus raising expectations when we use business IT systems. IT architectures fuel cross-channel, mobile, and cloud-based solutions. Companies and individuals move their data to the cloud, they use software as a service (SaaS), and they engage both socially and commercially via the Internet. Meanwhile, in the workplace, manufacturers have introduced intelligent robotics to automate production.

The underlying information systems supporting this shift are changing too, introducing new constraints and goals. This requires a new mindset, a rethinking of the way IT solutions are designed and architected to transform enterprise objectives into a creative user experience and to deliver a supportive IT architecture.

Objectives

The masters programme is intended for students with a bachelor in informatics, computer science, computer engineering, interaction design or similar who want to study user experience design and IT architecture as the driving forces for creation of usable products and services that can best achieve an expected impact in an organisational context.

This masters will equip you with knowledge and skills to tackle the challenge of transforming enterprise objectives into a creative user experience and delivering a supportive IT architecture. You will learn user experience design, IT architecture and enterprise architecture. You will be able to design and develop mobile and server-side solutions, as well as learn to master the

fundamentals of service design and cloud computing.

Post-graduation employment areas

The programme prepares for work in industry or for third-cycle courses and study programmes. With the experience provided by the programme, students will be able to work in a number of various positions after graduation. Students will be qualified to work in different roles such as user experience designer, interaction designer, information architect, IT architect or IT strategist, cloud solution architect, or enterprise architect.

Students will also be prepared for doctoral studies.

Research

A Masters degree qualifies to apply for further third-cycle education leading to a licentiate or doctoral degree.

Programme Supporting Research

The research environment in computer science and informatics has a strong emphasis on models and modelling as a useful tool for description, evaluation, requirement specification, design, and implementation of information systems (IS) and other IT artifacts. They are to be regarded both as independent stand-alone products/services, embedded components, and bundled components in production systems and products (System-of-Systems). In a system (product/service) lifecycle modeling and models are used for different purposes, on different abstraction levels, on different levels of details, and with different degrees of formalism. Emerging new products and services require a tight integration of what often is separated in many enterprises into enterprise-IT (i.e. the IT supporting business and administrative parts) and product-IT (i.e., what is built into the products or supporting industrial automation). Recent development in Cyber Physical Systems (CPS) and Internet of Things (IoT) has opened opportunities for integrating Product-IT and Enterprise-IT to meet future demands. The research environment in computer science and informatics is mainly working with three interlinked research areas: product driven enterprise architecture, data science, and knowledge based product engineering.

In product driven enterprise architecture the research aims at enterprise improvement through the combination of Product-IT and Enterprise-IT and knowledge intensive products/services. One of the main tools for working in this area is enterprise modelling or business modelling where we have developed methods, theories, and have substantial experiences to address these issues.

The data science research is working with developing machine learning algorithms for data analytics, when necessary utilizing high performance computing. Most of the research is applied, and often co-produced with industry. Application areas include drug discovery, health science, marketing, high-frequency trading, game AI, sales forecasting and gambling.

The research in knowledge-based product engineering focuses on using semantic technologies and knowledge modelling in engineering disciplines. The research aims at improving the product development process by achieving a better quality of the product, saving resources spent on the development or adding intelligent functionality to the product. An illustrating example is the use of ontological models for deriving test cases needed to perform testing of software products.

The connection with these research areas is realised through research-related courses (e.g. Enterprise Architecture and IT Architecture or Information Architecture and Semantic Technologies) and cases studies based on research projects. A Master's degree qualifies to apply

for further third-cycle education leading to a licentiate or doctoral degree.

Educational concept at the School of Engineering

All educational training at the School of Engineering in Jönköping (JTH), is determined by an educational concept. The concept offers a holistic perspective, where Business Community Contacts, Internationalisation and Entrepreneurial Drive are key words. Besides technical knowledge within the programme, Leadership and Communication, Professional Attitude and Sustainable Development are important parts of the concept.

Business Community Contacts means that JTH has an established collaboration with the business communtiy in various forms throughout the training. An example is the course located directly in the business community (Industrial Placement Course, IPC), which is part of all programmes. The aim with this course is to provide the students with an understanding for future professional tasks, and the ability to relate these to the training.

Internationalisation means that students e.g. are given the opportunity to train languages and intercultural communication through exchanges with foreign universities. JTH has approximately 70 partner universities all over the world, and participates in several international exchange programmes for students. There are opportunities to spend parts of the training abroad and account to the foreign credits in the exam. Due to this student exchange, a great number of courses at JTH are given in English.

Entrepreneurial Drive is received through the holistic perspective of the training programme. Significant is the exchange with the business community, the leadership training, the association with professional work in project based courses, and the economy elements, among other things. Leadership and Communication includes e.g. training in verbal and written communication, project based work, leading and motivating people and also to understand decision processes in companies and organizations.

Professional Attitude comes through basic knowledges in economics, marketing, and business planning. These knowledges are further developed and integrated in technical contexts. Engineers and technicians with such experiences are useful within a great number of areas in the business community.

Sustainable Development includes understanding of compatibility with a sustainable society and environmental and human aspects in the future productivity and products. The instructions are fully integrated in their technical context and treat social, economical and ecological aspects of sustainable development.

Project based Training is also a part of the educational concept. Assuming responsibility for projects of various sizes frequently occurs as a professional. As a preparatory step, the students are responsible for real projects in connection with the business community in some of the courses.

Student influence is a great and important part in JTH's continuous quality development. Through student representatives in all boards, councils and decision-making committees, the students actively influence their education.

Objectives

After the completion of the programme, students must meet the intended learning outcomes, as described in the Ordinance by Higher Education (m), and also the intended learning outcomes, as described by JTH (j):

Common learning outcomes

Knowledge and understanding

1. demonstrate knowledge and understanding in their main field of study, including both broad knowledge in the field and substantially deeper knowledge of certain parts of the field, together with deeper insight into current research and development work; and,(m)
2. demonstrate deeper methodological knowledge in their main field of study.(m)

Skills and Abilities

3. demonstrate an ability to critically and systematically integrate knowledge and to analyse, assess and deal with complex phenomena, issues and situations, even when limited information is available,(m)
4. demonstrate an ability to critically, independently and creatively identify and formulate issues and to plan and, using appropriate methods, carry out advanced tasks within specified time limits, so as to contribute to the development of knowledge and to evaluate this work,(m)
5.demonstrate an ability to clearly present and discuss their conclusions and the knowledge and arguments behind them, in dialogue with different groups, orally and in writing, in national and international contexts; and,(m)
6. demonstrate the skill required to participate in research and development work or to work independently in other advanced contexts.(m)
7. prove ability to independently apply acquired knowledge in practical work, and insights in future professional positions,(j)

Judgement and Approach

8. demonstrate an ability to make assessments in their main field of study, taking into account relevant scientific, social and ethical aspects, and demonstrate an awareness of ethical aspects of research and development work,(m)
9. demonstrate insight into the potential and limitations of science, its role in society and people's responsibility for how it is used; and(m)
10. demonstrate an ability to identify their need of further knowledge and to take re-sponsibility for developing their knowledge.(m)
11. prove insights in the professional engineering role and responsibility in the society, assuming human conditions and needs and the goals for economical, social and ecological sustainable development in the society,(j)
12. prove immersed ability to interdisciplinary manners and to apply a system perspective,(j)

Programme-specific learning outcomes

The intended learning outcomes provided for programmes, must also be met.

Knowledge and Understanding

13. display knowledge of the concepts and techniques of user experience design, cross-channel design and service design,
14. demonstrate comprehension of information architecture, information structuring and information modelling,
15. demonstrate comprehension of enterprise architecture, information system architecture and technology architecture,
16. demonstrate comprehension of the value of IT and the importance of its governance in organizations

Skills and Abilities

17. demonstrate skills of managing a design process for products or services that results in a good user experience on Web, mobile, wearable, and ambient platforms and devices,
18. demonstrate the ability to use semantic technologies and open data in an information product,
19. demonstrate the ability to create a cross-platform mobile application and a service-based server application,
20. demonstrate skills of creating a model of enterprise architecture and a high-level requirements specification based on an enterprise architecture

21. demonstrate the ability to work in cross-discipline teams during development of a product for the needs of specific users, organizations, or businesses,

Judgement and Approach

22. demonstrate an understanding of the role of usability, user needs, information architecture, channels, and services in a successful user experience
23. demonstrate the ability to ground the design of services within a business strategy and its deployment through an IT infrastructure,
24. demonstrate an understanding of how enterprise architecture and IT architecture can contribute to business and IT alignment

Contents

Programme principles

Instruction is in the form of lectures, seminars, exercises, laboratory sessions and project work. All courses are held in English. All final course examinations are in English.
Two courses (Enterprise Architecture and IT Architecture, and Entrepreneurial governance of IT) are common courses together with Jönköping International Business School. Three courses (Product Development in Cross-discipline Teams 1 & 2, and Product Specification and Requirements Management) are common with the Master's Programme Software Product Engineering.
Several courses include exercises/projects based on real-life scenarios. One type of courses includes lectures and labs where a group consists of two or more students. The other type of courses adds assignments that mean that students work in groups of several members and independently solve a problem. The results are reported in both written and oral form at the end.
The course Product Development in Cross-discipline Teams (parts 1 & 2) focuses on development of a product in a real-life-like scenario. The scenario for the product may originate from an external company or organisation, from a need internal to the University, or from an original idea from the students. The product will be developed through an Agile lifecycle, with clearly defined intermediate deliverable points.
The programme includes an independent degree project representing 30 higher education credits, in which students, individually or in groups of two students, prepare and present an assignment in the field of study of User Experience Design and IT Architecture, applying the knowledge accumulated during the programme and demonstrating the acquired skills. The degree project is as a rule carried out during the last term of the programme and preferably in close collaboration with a company or an organisation. The degree project might be also done at a foreign university, possibly in cooperation with local business.
The connection to the industry is realised in the Industrial Placement Course (IPC) course and degree project, when students often work in cooperation with the industry and solve problems connected to the enterprise operation. In several courses students need to work in groups of 3-4 persons to independently plan and carry out the solution of an assignment that is based on a real-life case. This lays the ground for learning communication and leadership in a group. Better understanding of economic effects of IT-use is addressed in term 2.

The program’s progression

The programmes' progression goes along three themes: design, technology, and business.

The course User Experience Design introduces the theoretical foundations of user experience, and details the core hands-on principles, methods, techniques, and deliverables that form the foundations of a sound design process. The resulting design process offers a user-centered approach not only to Web applications but also to mobile and wearable apps as well as to more traditional information systems. The design theme is continued in the course Development for Mobile, Wearable and Smart Devices, which starts with high-fidelity prototypes and wire-frames for mobile and wearable devices, and then proceeds with the design for smart devices and for the technology of connected devices. The course Information Architecture and Semantic

Technologies details the role of information architecture as a meaning-making structure and explains methods and techniques for modelling and structuring information including standard vocabularies and schemas. The course Cross-Channel User Experience and Service Design builds upon the previous ones and establishes product realization in the context of information systems as the realization of services through a shared information architecture that is deployed systemically through any number of channels pertaining to an activity-bound open ecosystem. It also introduces the design of services as a process-oriented middle-layer that brokers between the systemic model of information architecture and the channel-specific modes of interaction design.

The technology theme starts in the course Development for Mobile, Wearable and Smart Devices with cross-platform development of mobile applications with the help of mobile application frameworks and libraries based on JavaScript, HTML and CSS. The course Information Architecture and Semantic Technologies introduces linking to open datasets on the web as a means to enrich the information architecture of a digital product. Creation of semantic models and querying datasets are covered next to allow for richer semantic description to be included in an application. The course Development of Server-side Solutions continues with the basics of programming in Python and explains web frameworks for creation of server-side applications. Web services with REST API and databases are explained next. Enhancing web applications with semantic technologies and linked data concludes this course. Cloud-based architectures are introduced in the course Cloud Computing and Data Analytics. It proceeds with approaches for storing big amounts of data and analysing them.

The business theme is started with the course Enterprise Architecture and IT Architecture that provides the knowledge and skills of applying a holistic and systemic perspective on enterprises and enterprise architecture. The course explains a number of architectural layers, e.g. the business architecture, the information architecture, the solution architecture, and the technology architecture. Enterprise Architecture Management is introduced as one of the key activities to keep the IT of an organization aligned with the business challenges and activities. A connection between IT architectures and cloud computing is established in the course Cloud Computing and Data Analytics. Creating an enterprise architecture can help to specify IT solutions. The course Product Specification and Requirements Management deals with specifications of products and management of requirements to a product. The course Entrepreneurial governance of IT covers principles of enterprise governance of IT, IT governance frameworks, and approaches to enterprise governance of IT.

There are several courses that are cross-discipline but the real synergy of the three themes is leveraged in the course Product Development in Cross-discipline Teams (parts 1 & 2). This course focuses on development of a product in a real-life-like scenario. The scenario may originate from an external company or organisation, from a need internal to the University, or from an original idea from the students. The course draws upon the rest of the programme and puts into a joint action the skills from the areas of design, technology, and business. It requires analysis of a business to identify goals and process to be supported by an IT solution, be it a simple web app or enterprise system, transformation of the goals into design providing engaging user experience, and creation of an IT solution prototype based on the design.

The Industrial Placement course gives the students possibility to apply their knowledge and skills to practical problems. During a degree project the students need to enhance and deepen their knowledge on modern trends and discoveries in User Experience Design and IT Architecture as well as contribute with their own results to these areas. This requires abilities to understand the problem, compare different solutions to the problem, choose an appropriate solution and estimate the effect of this solution on the business.

Elective blocks 1 and 2

The student choose one elective course within the two blocks depending on when the Industrial Placement course take place.

Courses

Mandatory courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Cross-Channel User Experience and Service Design	6	Informatics	A1F	TCES27
Development for Mobile, Wearable and Smart Devices	6	Informatics	A1F	TDWS26
Development of Server-side Solutions	6	Informatics	A1F	TDVS27
Enterprise Architecture and IT Architecture	7.5	Informatics	A1N	TEAR27
Entrepreneurial Governance of IT	7.5	Informatics	A1N	TEGR26
Final Project Work in Informatics	30	Informatics	A2E	TEIV25
Industrial Product Realization, Process - Methods - Leadership	9	Production Systems, Product Development	A1N	TIFR26
Information Architecture and Semantic Technologies	6	Informatics	A1F	TSTS26
Industrial Placement Course in Informatics	9	Informatics	A1F	TNIS24
Product Development in Cross-discipline Teams - 1	6		A1F	TP1S26
Product Development in Cross-discipline Teams - 2	9		A1F	TP2S26
User Experience Design	6	Informatics	A1N	TUER26
Engineering of Socio-technical Systems	6		G1N	TUSG15

Elective courses

Course Name	Credits	Main field of study	Specialised in	Course Code
User Research[2]	7.5	Informatics	G1N	TABG17
Cloud Computing and Data Analytics[1]	6	Informatics	A1N	TCCR26
Leadership[1]	6	Production Systems	A1F	TLES26
Software Engineering - a Product Perspective[2]	6	Product Development	A1N	TMUR26

[1] Elective block 1

[2] Elective block 2

Programme overview

Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Industrial Product Realization, Process - Methods - Leadership, 9 credits	Development for Mobile, Wearable and Smart Devices, 6 credits	Cross-Channel User Experience and Service Design, 6 credits	Development of Server-side Solutions, 6 credits
User Experience Design, 6 credits	Information Architecture and Semantic Technologies, 6 credits	Enterprise Architecture and IT Architecture, 7.5 credits	Entrepreneurial Governance of IT, 7.5 credits
	Product Development in Cross-discipline Teams - 1, 6 credits		

Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
Industrial Placement Course in Informatics, 9 credits	Engineering of Socio-technical Systems, 6 credits	Final Project Work in Informatics, 30 credits	
Cloud Computing and Data Analytics [1], 6 credits	Product Development in Cross-discipline Teams - 2, 9 credits		
Leadership [1], 6 credits			
Software Engineering - a Product Perspective [2], 6 credits			
User Research [2], 7.5 credits			

[1] Elective block 1

[2] Elective block 2

Teaching and examination

Academic year is divided into two semesters and normally to courses are read in parallel. Examination forms and grades are given by each course plan, respectively. The programme overview shows the programme structure for both years and may be changed during the programme. For updated programme overview see http://www.jth.ju.se

Prerequisites

The applicant must hold the minimum of a bachelor's degree (ie. the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in informatics, computer science, computer engineering, interaction design (with relevant courses in web programming), or equivalent. Proof of English proficiency is required.

Continuation Requirements

In order to begin the second year, at least 30 credits from the programme's first year must be completed.

Qualification Requirements

To obtain a Degree of Master in Informatics, specialisation in User Experience Design and IT Architecture, students must complete a minimum of 120 higher education credits in accordance with the current programme syllabus, at least 60 of which must be in the main field of Informatics.
In addition a Degree of Bachelor of Science in Engineering/Degree of Bachelor of Science or an equivalent Swedish or foreign qualification is required.

Quality Development

Management councils , Head of Programmes, teachers and students work together with the development of the programmes and courses. All students get the opportunity to do a course evaluation after each completed course and before graduation time. The results of the evaluation are presented to the Head of Programmes, Head of Departments, Course Coordinators and to the Director of Education for further development.

Head of Departments, or corresponding, and Head of Programmes raise questions regarding the programme development within the Council of Programmes.
Student representatives, Director of Education and Study Counselor meet four times per year to discuss the recent completed courses within the programmes.
The chairman of students Educational Committee is a regular member in Council of Education.

Other Information

Course included in the programme can be read as a separate course, subject to availability.
Prerequisites are stated in the syllabus.

Non-EU/EEA/Switzerland citizens pay tuition fees at the current rate. For further information see http://www.hj.se, / / Tuition and Application Fee / /