PROGRAMME SYLLABUS
User Experience Design and IT Architecture (master), 120 credits

Programmestart: Autumn 2017

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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 degree programmes at the School of Engineering at Jönköping University (JTH) follow an education concept. The concept can be seen as consisting of a number of different aspects that have to be included in the degree programmes in order to guarantee their quality and appeal as well as their ability to produce professionally skilled, in-demand students. The concept places special emphasis on collaboration with industry and internationalisation as two essential tools in developing successful programmes attracting many applicants.

In the concept for the Master's programmes, there are common learning outcomes regarding the areas leadership, project management, internationalisation, and sustainable development. There is also an Industrial Placement Course (IPC) included in all programmes, whereby students put their theoretical knowledge into practice. IPC is a 9 credit course (5 weeks practise at a company), and it is also possible to complete the course abroad.

Internationalisation means that, for example, the opportunity is provided to practise languages and intercultural communication through student exchanges with foreign universities. JTH has around 70 partner universities around the world, and takes part in a number of international student exchange programmes. There is an opportunity to spend part of the study period abroad and to accredit studies abroad towards the degree. All Master's programmes at JTH are given completely in English.

Objectives
After the completion of the programme, students must meet the intended learning outcomes, as described in the Higher Education Ordinance by Degree of Master, (1-9) and also the intended learning outcomes, as described by JTH:

Common learning outcomes
Knowledge and understanding
1. demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work
2. demonstrate specialised methodological knowledge in the main field of study

Skills and Abilities
3. demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
4. demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
5. demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences
6. demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity
JTH. prove ability to apply acquired knowledge in practical work
JTH. prove ability to collaborate effectively in teams, especially in the presence of a strong multicultural dimension

Judgement and Approach
7. demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
8. demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used

9. demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning

JTH. prove understanding of future professional engineering roles, including a sound awareness of an engineer's ethical responsibilities towards society and the need for economic, social and ecological sustainable development

JTH. prove ability to embrace interdisciplinary approaches through the application of a system perspective

Programme-specific learning outcomes

Upon completion of the program, the intended learning outcomes provided for programme must also be met.

Knowledge and Understanding

10. display knowledge of the concepts and techniques of user experience design, cross-channel design and service design,

11. demonstrate comprehension of information architecture, information structuring and information modelling,

12. demonstrate comprehension of enterprise architecture, information system architecture and technology architecture,

13. demonstrate comprehension of the value of IT and the importance of its governance in organizations

Skills and Abilities

14. 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,

15. demonstrate the ability to use semantic technologies and open data in an information product,

16. demonstrate the ability to create a cross-platform mobile application and a service-based server application,

17. demonstrate skills of creating a model of enterprise architecture and a high-level requirements specification based on an enterprise architecture

18. 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

19. demonstrate an understanding of the role of usability, user needs, information architecture, channels, and services in a successful user experience

20. demonstrate the ability to ground the design of services within a business strategy and its deployment through an IT infrastructure,

21. 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.

Programme 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.

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 Specification and Requirements Management	6	Product Development	A1F	TPKS26
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

Elective courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Cloud Computing and Data Analytics[1]	6	Informatics	A1N	TCCR26
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	Product Development in Cross-discipline Teams - 2, 9 credits	Final Project Work in Informatics, 30 credits	
Cloud Computing and Data Analytics [1], 6 credits	Product Specification and Requirements Management, 6 credits		
Software Engineering - a Product Perspective [2], 6 credits			

[1] Elective block 1

[2] Elective block 2

Teaching and examination
Throughout the academic year, typically, two courses are taken in parallel. Examination forms and grades are given by each course module, respectively. The programme overview shows the programme structure for both years and may be changed during the programme. For updated programme overview visit http://www.ju.se

Prerequisites
The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) with at least 90 ECTS credits in informatics, computer science, computer engineering, interaction design (with relevant courses in webprogramming),

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 (120 credits) with a major in Informatics, specialisation in User Experience Design and IT Architecture, students must complete a minimum of 120 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.
Representatives of students and programme managers gather continuously to discuss the recently completed programme courses.

Other Information
If formal competence is missing, the applicant's substantial competence is tested if the applicant has acquired equivalent knowledge in some other way. The aim is to assess the collective competence and if the applicant has the opportunity to meet selected training. Substantial competence can be about knowledge and experience from working life, long-term mobility or other courses.

Course included in the programme can be read as a separate course, subject to availability. Prerequisites are stated in the syllabus.
Admission is under "Admission arrangements for first and second level" at Jönköping University.

This syllabus is based on "Regulations and guidelines for education at undergraduate, postgraduate and doctoral studies at Jönköping"