I. Course Descriptions

13742 Enterprise Systems Architecture **3 Cr Hr** **00 ECTS**

Enterprise Software Architecture (ESA) is a strategic framework that defines the structural and operational blueprint of software systems deployed across an organization. It encompasses principles, patterns, and practices that guide the design, integration, and governance of software components, ensuring that they align with the organization's business objectives and technological environment. An effective ESA enables scalable, secure, and maintainable solutions that can support diverse business processes and adapt to changing needs. It incorporates considerations of system modularity, service orientation (e.g., SOA or microservices), data flow, platform interoperability, deployment models (cloud, on-premise, hybrid), and non-functional requirements such as performance, availability, and compliance.

13791 Research Methodologies **3 Cr Hr** **00 ECTS**

This course aims to introduce students to several research methods useful for academic and professional investigations of information practices, texts and technologies. It provides an understanding of the different decisions and steps involved in executing a research methodology. Students, after this course, will be able to understand the research terminology, ethical and research principles, challenges and processes and using the quantitative/qualitative and hybrid methods approaches to research. In addition to knowing the literature review process and the evaluation methods combined with analyzing and evaluating others' published research and reporting a project's results.

13743 Cloud Computing and Big Data **3 Cr Hr** **00 ECTS**

The course will introduce students to two major technologies: cloud computing and big data. The first part of the class will introduce the benefits of cloud computing as well as the challenges associated with it. The course will introduce different models of services that are common in cloud computing, namely: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). The class will discuss the types of clouds and benefits of each one as well as its cost model. The course includes studying current commercial offerings from major providers of cloud computing solutions like Amazon, Google, Microsoft and others. The second part of the course, Big Data, will explain the challenges by analyzing the huge amounts of data being generated by worldwide social media and web applications. The course will adopt a map-reduce framework (ex: Hadoop) to demonstrate the analysis of big data.

13784 Enterprise Web Development **3 Cr Hr** **00 ECTS**

This course explores advanced topics in Internet and Web technology; web services and applications components; Event handling: detection, notification, and response; Web applications development; Standard web services and protocols: WSDL, and UDDI, and SOAP; Design of web services and applications within a service-oriented architecture; Web application languages: HTML, XML, and scripting languages; Programming techniques for consumption and implementation of web services; Server web applications; Java servlets, and Java Server Pages; PHP basics; PHP forms and sessions; Databases connection with SQL and PHP.

13721 Enterprise Software Requirements and Design **3 Cr Hr** **00 ECTS**

This course covers techniques for gathering, analyzing, and managing requirements for large-scale enterprise software systems. You will learn how to translate business needs into functional and non-functional requirements, and how to design robust, scalable solutions that meet those needs.

13722 AI for Software Engineering **3 Cr Hr** **00 ECTS**

This course explores how artificial intelligence is transforming software engineering. You will learn how AI techniques are applied across the software development lifecycle, from requirements analysis to coding, testing, maintenance, and project management.

13723 Enterprise Project Management **3 Cr Hr** **00 ECTS**

This course focuses on managing large-scale, complex projects within enterprise environments. You will learn how to plan, execute, monitor, and control projects that involve multiple teams, stakeholders, and technologies.

13724 User Experience and Design **3 Cr Hr** **00 ECTS**

This course teaches how to design digital products that are usable, useful, and user-centered. You will learn principles of user experience (UX), interface design, and usability testing to create effective and intuitive systems.

13728 Real-Time and Embedded Systems **3 Cr Hr** **00 ECTS**

This course covers the design and development of real-time and embedded systems used in industries such as automotive, aerospace, healthcare, and consumer electronics. You will learn how to build systems that interact with hardware and meet strict timing and reliability constraints.

13725 Agile Software Development **3 Cr Hr** **00 ECTS**

This course focuses on Agile methods for building and delivering software in fast-changing environments. You will learn how to apply Agile principles, frameworks, and practices across the software development lifecycle.

13726 Software Testing and Quality **3 Cr Hr** **00 ECTS**

This course covers methods and tools for ensuring software quality through systematic testing. You will learn how to plan, design, execute, and automate tests to detect defects and ensure that software meets functional and non-functional requirements.

13782 Advanced Software Development **3 Cr Hr** **00 ECTS**

The course presents advanced software engineering topics using a modern programming language. This includes threads, and database-driven apps. In addition, it includes coverage for design patterns and implementing different software qualities according to the best practices in the industry.

13785 Emerging Technologies in Enterprise Software Engineering **3 Cr Hr** **00 ECTS**

This course explores cutting-edge technologies related to the enterprise software engineering field. Students will learn the principles, applications, and implications of emerging trends. Through case studies, technical reviews, and project work, students will develop the necessary skills to assess and adopt emerging technologies within enterprise environments.

13788 Big Data Analytics **3 Cr Hr** **00 ECTS**

This course provides a comprehensive exploration of data analytics techniques and tools tailored for processing and extracting insights from large-scale, high-dimensional datasets—commonly referred to as big data. Emphasizing both conceptual foundations and practical applications, the course covers scalable data management, distributed computing models, and advanced analytical techniques designed to operate efficiently on massive volumes of structured and unstructured data.

Students will gain hands-on experience with key components of the Apache Hadoop ecosystem, including

HDFS for distributed storage and MapReduce for parallel data processing. The course also introduces complementary technologies such as Apache Spark for in-memory analytics, Hive for declarative querying, Pig for data flow scripting, and NoSQL databases like HBase. Analytical methods span batch and real-time processing, statistical analysis, data mining, and machine learning at scale.

Through real-world case studies and lab-based assignments, students will learn to design and implement end-to-end data pipelines and analytics workflows that are robust, scalable, and business-relevant. The course also addresses critical challenges such as data quality, system performance, fault tolerance, and ethical considerations in large-scale data analysis.

13783 Enterprise Software Security **3 Cr Hr** **00 ECTS**

This course provides a foundation for building secure software by applying security principles to the software development lifecycle. These include requirements, design, implementation, testing, and maintenance. Topics covered include software development lifecycle, security in requirements engineering, secure software design and architecture principles, secure coding, application security vulnerabilities, and tools for code analysis and testing. Students will learn design methodologies and best practices for developing secure software illustrated in programming languages such as PHP and C.

13781 Enterprise Software Processes and Patterns **3 Cr Hr** **00 ECTS**

This course focuses on the development, deployment, and management of software within large, complex organizations. It covers topics like software development methodologies, and design patterns, all geared towards building and maintaining enterprise-scale software systems.

13787 Service-Oriented Computing **3 Cr Hr** **00 ECTS**

This course introduces the principles and practices of Service-Oriented Computing (SOC), focusing on the design, development, and integration of distributed systems based on service-oriented architecture (SOA). Students will explore core concepts such as service modeling, service composition, orchestration, web services (SOAP/REST), and related standards and protocols. The course emphasizes interoperability, scalability, and reuse in building flexible and loosely coupled software solutions.

13727 Special Topics in Enterprise Software Engineering **3 Cr Hr** **00 ECTS**

Topics will be assigned by the department on evolving techniques and related topics of enterprise system engineering to support the study plan and to encourage further research by students.

1. Thesis Courses

137990 Master Thesis **00 Cr Hr** **00 ECTS**

137993 Master Thesis **3 Cr Hr** **00 ECTS**

137996 Master Thesis **6 Cr Hr** **00 ECTS**

13799 Master Thesis **9 Cr Hr** **00 ECTS**

The student should be able to apply relevant knowledge and abilities, within the main field of study, to a given problem within given constraints, even with limited information, independently analyze and discuss complex inquiries/problems and handle large problems in advanced level within the main field of study reflect on, evaluate and critically review one's own and other scientific results. The student should be able to document and present his own work with strict requirements regarding structure, format and language usage.