



Study Guide

Master Program in Information Systems



1) Overview of the MSc Information Systems

The Master in Information Systems provides students with IT-related knowledge and skills with a particular emphasis on management and research topics. A well-balanced mix of theory and practice and the inclusion of state-of-the-art research findings give graduates the tools they need to question standard practices and develop innovative solutions.

The program follows the European “Design Science” approach: using Information Systems technology to actively improve the way companies conduct their business. Students learn to use modern information technologies to shape business processes according to IT’s potential and to optimize business information systems to meet business demands. The curriculum allows students to individualize their studies, and encourages them to reflect on what they have learned in a holistic context. Working independently and accepting responsibility for their work are additional important skills.

The Master in Information Systems was designed together with a board of leading Austrian stakeholders from industry and government to meet today's challenges and to give a solid basis for tomorrow's demands. After graduation, students are qualified for a wide spectrum of careers. Some of our graduates choose to become analysts and managers in IT departments of large companies, others excel as specialists in IT firms (hardware, software, services), some focus on business consulting or decide to found their own start-up companies.

2) Content and Structure

The curriculum for the master program in Information Systems ensures that students acquire a well-balanced mix of theoretical and practical knowledge. It consists of twelve compulsory core courses (common body of knowledge) and several elective blocks, including three IT specializations and four competence fields. The first year provides the basic knowledge mandatory for all students. It covers IT/business alignment aspects as well as Information Systems management and Information Systems development aspects. Building on this foundation, the second year of study offers a selection of IT specializations. Each student chooses one IT specialization and either a second IT specialization or two of the competence areas.

PROGRAM STRUCTURE*			120 ECTS
Information Systems and Organizations	Information Systems and Management	Information Systems and Development	
› Business Information Systems › Business Process Management › Data Mining and Decision Support Systems	› Innovation Management › Introduction to IT Law › IT Governance and Controlling › IT Strategy	› Database Systems › Distributed Systems › Information Systems Development › Theory of Computation › User-Centered Information Systems Design, Strategy and Technology	
14 ECTS	16 ECTS	20 ECTS	50 ECTS

Electives for choice (Two IT Specializations or one IT Specialization and two Competence Areas)		
IT Specializations	Competence Areas	
› Information Systems Engineering › Information Systems Processes › Information Systems Service Management	› Business Analytics › ICT Law › Information Systems Management and Accountability › Spatial Business Intelligence › Sustainable Information Systems	
20 ECTS each	10 ECTS each	40 ECTS
Master's Thesis		30 ECTS

* For details see: wu.at/infosys

You will find detailed information about the courses and electives under [point 5](#).

3) Course enrollments

First semester:

We usually split the new batch into two groups (only) in the first semester and all new students will be registered by the Program Coordinator. From the next semesters students have to register for their preferred courses via [LPIS](#). Students will receive further information on this process by email.

Later Semester:

We recommend to attend the courses in sequence (e.g. course 1, course 2 and then the seminar or course 1, then 2, 3, 4, ...). Except “Information Systems Processes” – these courses can be selected as you like.

It is possible to start some of the electives in summer term (2nd semester). Therefore, we commend to pass the recommended CBK-courses (indicated in point 5.2) in winter term.

4) How do I find a topic and advisor for my Master’s Thesis?

The institutes in the “Department of Information Systems and Operations” work on a wide variety of scientific topics. Because master’s theses often follow the research projects of the corresponding institutes, students can therefore choose from a wide range of different topic areas for their Master’s theses.

In general, it is recommended (but not mandatory) that each student chooses a topic which is related to her/his electives, i.e. a topic related to an IS Specialization or IS competence field. Moreover, it is also recommended to visit the institutes’ Web pages in order to get an overview of current research topics and recent scientific publications.

However, each institute has an own selection and application procedure for Master’s theses. Below, please find an overview of the different procedures (the institutes are listed in alphabetical order).

4.1 Institute for Information Business

The Institute of Information Business announces thesis topics each semester according to a pre-defined process: topics are announced on the institute’s Webpage and interested students are kindly requested to submit an expression of interest for one of the topics advertised on the institute’s Web page by a predefined cutoff date per email. Among those we assign topics in a kickoff workshop upon which each student starts the research on background literature and submits a research proposal. The research proposals will be evaluated, upon approval students are invited to consultation with their supervisor to discuss the thesis. The institute aims at concluding the thesis within a maximum duration of half a year, during which the students shall report regularly to their supervisors.

Further information can be found at: <https://www.wu.ac.at/en/infobiz/topics/how-to-write-a-thesis/>

4.2 Institute for Information Management and Control

The student is expected to identify a topic and an associated research problem based on personal research interests matched against research and teaching activities of the institute’s staff members. Potential supervisors can be found when browsing through the institute’s online resources (FIDES, homepages) or by contacting lecturers who are teaching related subjects. Once the candidate and the supervisor have agreed on a broad topic, the candidate needs to develop an approved full research proposal in a multi-step iterative process. Once the full proposal is approved, independent research work is expected. All further interactions with the supervisor are non-mandatory. It is, however, strongly suggested to include certain milestones and supervisor interaction in the proposal. The supervisor must be contacted and approve the final thesis before it is uploaded on learn@wu, where it is checked for cases of plagiarism.

Further information can be found at: <https://www.wu.ac.at/en/imc/teaching/bachelor-and-mastertheses/>

4.3 Institute for Information Systems and New Media

A Master’s thesis can be started at any time and in each semester. Prospective thesis topics follow the institute’s research profile, including (in alphabetical order): Data Analysis of Complex Systems, Evolvable Information Systems,

Information Systems Engineering (esp. model-driven engineering), Internet of Things, Scalable Learning Management Systems, Security Analysis and Security Engineering, as well as Social Network Analysis. In some cases, it is possible to extend projects that started in one of our courses towards a Master's thesis topic. In addition to topics suggested by the institute, students are welcome to propose a topic of their own choosing if that topic fits with the institute's research profile.

In general, the professors of the institute can be addressed at any time (e.g. via e-mail or in person after the courses). The general procedure for selecting a thesis topic is as follows:

1. Visit the Web pages of prospective thesis advisors to get an overview of their research interests and recent publications. Afterwards, address the prospective advisor either in person or via email to schedule an initial meeting. In case you consider proposing an own topic, it is recommended to also send a one-page outline of your topic.
2. In the initial meeting, the advisor will present the general subject area, sketch potential Master's thesis topics, and answer your questions concerning these topics. Furthermore, the advisor will provide you with some introductory/background literature for getting acquainted to the corresponding topic.
3. After reading the introductory literature, usually after 2-4 weeks, we schedule a second meeting where the details of the thesis are discussed in order to reach an agreement on the actual topic of your thesis (i.e. the research question you will be working on).
4. After agreeing on a topic (including a corresponding working title for the thesis), you start working on your thesis (i.e. we do *not* ask you to write a detailed research proposal).
5. While working on the thesis, we schedule regular meetings for discussing your progress as well as any type of thesis-related questions (reaching from text formatting questions, over related work, to questions concerning the software tools you are using, for example).

Further information on the institute can be found at: <http://nm.wu.ac.at/>

4.4 Institute for Information Systems and Society

The student should contact one of the academic staff members and seek a conversation on the desired master thesis. Upon this first conversation the decision is taken jointly with the student whether the Master's thesis can take place, on what subject matter and in what time frame.

Further information can be found at:

- <https://www.wu.ac.at/ec/student-courses/thesis-projects/>
- <https://www.wu.ac.at/ec/student-courses/thesis-projects/masters-thesis/>

4.5 Institute for Production Management

The student should send a proposal to the respective lecturer.

4.6 Master's Thesis Guide:

<https://www.wu.ac.at/en/students/my-program/masters-student-guide/masters-thesis/>

5) Course Descriptions

5.1 CBK Courses

5.1.1 Business Information Systems

The course aims to show the relationships between the operational processing of information to provide goods and services and the derivation of management information from these operational data. To illustrate these relationships, Peter presents important types of Information Systems from a technical point of view and Manuela presents the adequate management control methods. Typical functionalities are derived from business processes and their potential implementation in IT systems is shown. Methods to analyse the data generated in these systems are presented as well as their integration in the processes to manage a company. The importance to establish a close connection between operational processes and the Information Systems to derive information for management decisions is stressed.

5.1.2 Business Process Management

The course is designed to set the participants in the state of understanding and applying techniques and methods of:

- process identification
- process modeling with BPMN
- process discovery
- process analysis
- process redesign based on redesign heuristics
- process automation with business process management systems
- process intelligence and process mining

Furthermore, students get familiar with the recent research discussion in this field. The course builds on Lecturing, Group work, and student presentations.

5.1.3 Data Mining & Decision Support Systems

The course provides an introduction into data mining and decision support and provides an overview of basic concepts and methods in classification, regression, and unsupervised learning. Additionally, students will get some hands-on experience with widely used Python data mining libraries, such as Pandas, Scikit-Learn, and Statmodels. After completing the course, students will know how to handle a number of basic data mining methods and how to apply these methods to real world data sets in Python.

5.1.4 Innovation Management

Innovation management introduces students to theories and tools relevant in IT product innovation. They are first introduced to the theoretical foundations of product- and process innovation and discuss the merits and challenges of pioneering markets. Then they learn about strategic technology management and new forms of engaging users/crowds into innovation processes. Finally, wise IT leadership is discussed in-depth and methods are taught, which allow for a value-based ethical planning of IT roadmaps.

5.1.5 Introduction to IT Law

Driven by technologies like computers, wireless communications and the internet, the so called “information society” leads to a fast-growing field of law dealing with the legal aspects of these technologies. This lecture shall provide an overview of and introduction to IT-Law and primarily deals with the following topics:

- Legal protection of computer software and databases
- Telecommunication, Privacy and Media Law
- Distant Selling and Consumer Protection Regulations
- E-Commerce Law

5.1.6 IT Governance and Controlling

The course will cover the following topics:

- Overview of IT Governance and Controlling
- IT investment appraisal methods and frameworks
- Enterprise IT programme management
- IT Performance measurement and reporting
- IT project controlling (scope and change management)
- Project network controls
- Support tools and frameworks
- An introduction to CobiT and internal control systems

5.1.7 IT Strategy

This class discusses various aspects of an IT strategy, starting with the value IT brings to the business and the alignment between business and IT. We will then look in depth at the functional, organizational and behavioral components of an IT strategy, so that students are able to participate and drive IT strategy development in a business environment.

5.1.8 Database Systems

The course will cover the following topics:

- Entity-Relationship Model
- Relational Model
- SQL Structured Query Language

Advanced Database Systems beyond SQL & RDBMS:

- NoSQL Databases
- Graph Databases
- Processing Streams & Complex events

5.1.9 Distributed Systems

In this course the following topics will be discussed:

- the basic characteristics of distributed systems;
- architectures of distributed systems;
- problems related to the communication in distributed systems;
- methods and techniques to address such problems;
- different types of middleware;
- software patterns for distributed systems;
- an introduction to graph theory and graph algorithms.

The course focuses on generic concepts, techniques, methods, and open standards for distributed systems.

5.1.10 Information Systems Development

The focus of this course is model-driven (software) development. We will discuss established concepts, techniques, and methods for:

- the specification of graphical and textual software languages
- the specification of domain-specific (modeling) languages
- the mapping between models on different abstraction layers
- the verification of software artifacts
- the application of software patterns

In addition, we will give an overview for the process aspects of software development.

5.1.11 Theory of Computation

This course gives a short introduction into fundamental mathematical properties of computer hardware and software. In studying this subject we seek to determine what can be and what cannot be computed, how quickly, with how much memory, and of which type of computational model. Computational problems are strongly related to the recognition of particular languages, that is, sets of strings over same given alphabet. Thus we will study various types of automata and characterize the kind of languages that can be recognized by their respective type of machine.

5.1.12 User-Centered Information Systems Design, Strategy & Technology

User-Centered Information systems design introduces students to theoretical and practical guidelines and principles for designing and evaluating computer systems with users' needs as the primary focus. Topics covered include: fundamental concepts and theories of human-computer interaction, relevant aspects of psychology (mostly human cognition, but also emotion), techniques for evaluating usability of systems, and approaches for implementing design ideas.

5.2 Specializations

5.2.1 Specialization: Information Systems Engineering

Offered by: Institute for Information Systems and New Media

Recommended CBK-courses: [Information Systems Development](#) + [Distributed Systems](#)

The specialization focuses on the analysis and the engineering of information systems. The corresponding courses provide students with higher level software engineering skills, and address topics ranging from large scale internet-based systems to applications based on constraint devices such as in Internet-of-Things (IoT) applications and wearable computing. Aside from generic concepts and methods, the specialization covers practical topics and provides development skills as well as the theoretical foundations and practical application of (social) network analysis.

ISE Course 1: Dynamic Programming Techniques

The course introduces higher level software engineering and object-oriented programming techniques necessary for developing highly flexible application systems. Students will learn to identify, model, and implement software features based on the concepts of software product lines and domain specific languages.

Topics:

- Introduction to principles of software architecting (coupling, cohesion, interface abstraction)
- Recap: Object-oriented design and programming
- Object-oriented programming in dynamic languages and scripting languages
- From object-oriented to feature-oriented programming
- Designing and implementing embedded domain-specific languages (DSLs)
- Implementing software patterns, in particular: OO design patterns

ISE Course 2: Information System Engineering for Scalable Systems

The course addresses the skills necessary to develop highly scalable business information systems, starting with traditional aspects occurring in the design and operation of web-based systems used by a large number of participants. The course provides knowledge about the principles of performance engineering for scalable systems, ranging from server technologies to scalable database technologies.

Topics:

- Scalable Information systems in business environments
- Requirements of Web-Frameworks
- Large scaled Information Systems “in the wild”
- Techniques for implementing large scaled Business Information Systems
- Scalable Web Applications
- Data aspects: scaling out, scalable data, distributed database systems

- State of the art technology (Bootstrap, Ajax, SPA, NaviServer, MongoDB)

Goal: At the end of the course every student will have the competence to develop a highly scalable web-based information system.

ISE Course 3: Information Systems Engineering for the Internet of Things (IoT) and Wearable Devices

The miniaturization of computing devices has led to an emerging class of computing appliances which are often categorized as Internet-of-Things (IoT) or wearable devices. Due to a cost degression and the large amount of corresponding open source software, the development of smart appliances became feasible for application software developers.

In this course, students will learn to identify, categorize, and understand the major transitions and challenges that appear in the development of classical computing devices (such as Servers, PCs, Smartphones) as well as novel, intelligent, and programmable devices which have the potential to change the way how we interact with our environment.

Goal: During the course, every student will develop his/her own “smart thing”, that communicates with other smart things. Another goal is that the smart things developed in the student’s projects should interact with each other using (Internet-based) M2M communication.

ISE Course 4: Analysis of Complex Networked Systems

Today, most complex systems have an underlying network structure. Examples of such networked systems include power grids, transportation systems, predator-prey networks, computer networks, or social networks. This course introduces students to the (data) analysis of complex networked systems. Among other things, students learn how and when to apply different network measures to answer questions such as “Who is important in a network and why?” or “How robust is a network against failures or targeted attacks?”. Aside from the theoretical background, students will use software tools to apply their knowledge in the analysis of different types of (real-world) networks.

Topics:

- Stochastic Graph Models
- Flows and Cuts (What is the maximum flow of energy, data, or goods in a network ?)
- Centrality measures (Who is important in a network and why ?)
- Spreading processes (e.g. epidemic spreading, information cascades)
- Network robustness

Goal: After the course, students understand the definition and the purpose of different network measures. Moreover, they will be able to apply a network analysis tool and interpret different measures that the tool provides.

ISE Course 5: Project Seminar

During the project seminar, students apply the skills they acquired during courses 1 to 4 in order to conduct a scientific project. Prospective topics are drawn from the subject areas discussed in the preceding courses of the specialization. In particular, student can choose a topic from a predefined set of options presented in a briefing session. These topics originate from the institute’s research fields as well as current projects and will provide the students with a deeper understanding for scientific research. Every topic is suited for further academic development and has potential for practical usage and for contribution to open source projects.

Goal: Students engineer and develop a software-based system and systematically evaluate the results. Each student project is based on current research results and state-of-the art techniques.

5.2.2 Specialization: Information Systems Processes

Offered by: Institute for Information Business

Recommended CBK-courses: [Information Systems Development](#) + [Business Process Management](#)

This specialization focuses on the interaction between business processes and information systems:

Course 1: Formal Foundations of Business Process Modeling

This course discusses the formal foundations of business process modeling. A specific focus is on Petri nets as a language for specifying behavior. Techniques for verification and behavioral analysis are discussed, and illustrated with tools such as Woped.

Course 2: Business Process Analytics

This course discusses the challenges of moving from a conceptual process model towards a full-fledged implementation of a process. Business process management systems are investigated and practically used to implement a process in a practical scenario.

Course 3: Datawarehouse Management with SAP BW: An Introduction

This course covers the implementation of a data warehouse system including the design phase on a conceptual and logical level until the concrete use of a data warehouse system in reporting and analysis.

Course 4: Marketing and Retail

This course covers the new product development (NPD) Process and models for NPD, including questionnaire design and sampling, segmentation analysis, basic price optimization, price differentiation, and pricing at constrained supply.

Course 5: Integration of Business Processes in SAP ERP

This course covers the foundations of SAP's ERP system and its application to support logistics. A specific focus is on the materials management and sales and distribution modules. Also, the customization of the system is discussed.

5.2.3 Specialization: Information Systems Service Management

This specialization consists of the two Competence Areas "Information Systems Management & Accountability" + "Sustainable Information Systems". You will find more information on the courses under the item 5.3.1 and 5.3.2

5.3 Competence Areas

5.3.1 Competence Area: Information Systems Management & Accountability

Offered by: Institute for Information Management and Control

Recommended CBK-course: [IT Governance and Controlling](#)

Course 1: Information Systems Project and Risk Management

This course focuses on the following topics:

- Entities in the Information Society
- Cultural Diversity and Local Content
- Enabling ICTs
- ICTs for Development and Inclusion
- ICTs for Learning and Creativity

Course 2: IS Accountability and Performance Management

This course includes a major research or practice assignment, which needs to be designed and completed as a professional project. This project assignment can be based on the given topics or relate to additional elements suggested by the lecturer or student within the broader subject field:

- Central Concepts and Mechanisms
- Information Security Management
- Leadership and Management Accountability
- Stakeholder Analysis
- External Accountability and IS Compliance

5.3.2 Competence Area: Sustainable Information Systems

Offered by: Institute for Management Information Business

Recommended CBK-course: [User-Centered Information Systems Design](#)

Course 1: Ethical Computing

The first course introduces students to various human values relevant in IT design. We discuss what these values stand for in the human world and how machines can cater to them; such as knowledge, freedom and control over machines, trust in machines, friendship through and despite machines, health through machines and polite machines.

Course 2: Privacy and Security

The second course in this specialization deals with **privacy and security** in particular. Students are introduced to what privacy stands for, how it is being regulated in Europe and in the US and how technologies can be built systematically to recognize data protection- and security issues.

Course 3: Research Seminar

The third course is a **seminar** the content of which changes on a yearly basis depending on guest professors invited or industry partners found. In the past, we did projects such as "hacking Facebook" with Max Schrems, developing new business models for the drone manufacturer Schiebel or discussing virtue ethics with Professor Charles Ess.

5.3.3 Competence Area: ICT Law

Offered by: Information and Communication Technology and Intellectual Property Law Group

Recommended CBK-course: [Introduction to IT-Law](#)

Course 1:

This course discusses the impact computers and information technologies are having on the substantive Austrian and European Law. It aims to deepen the knowledge and skills students have previously gained in the course "Introduction to IT-Law".

Course 2:

The course deals with issues of public law relevant for ICT. The focus will be on legal relations between individuals and the state authorities. ICT-relevant fundamental rights, the scope of their guarantees and the impact on users and providers of ICT; the functioning of effective remedies when these rights are infringed.

Course 3: Seminar

Within the scope of this seminar students shall deepen their knowledge previously gained in the course "Introduction to IT Law" and "ICT Law 1". Current ICT-related topics will be discussed on basis of recent (European and inter/national) judgments and decisions.

5.3.4 Competence Area: Business Analytics

Offered by: Institute for Information Business

Recommended CBK-course: [Database Systems](#), Data Mining & Decision Support Systems

The IT Competence Field Business Analytics (BA) aims at teaching advanced Methods in the areas of Business Analytics, Data Science and Artificial Intelligence.

This competence field addresses needs for modern enterprises to react on the increasing demand for data-driven businesses and technologies. On top of basic methods on data management students have studied already in the above-mentioned CBK courses they shall learn about foundations and applications of advanced, emerging technologies and methods around Business Analytics, ranging from Artificial Intelligence to Data Governance, and principles of algorithmic fairness.

Course 1: Advanced Business Analytics and Artificial Intelligence

This course will give an overview of machine learning and other artificial intelligence methods in business applications. We will introduce, discuss, and apply hands-on different AI methods and tools, including currently trending function-based AI (Deep Learning methods), but also model-based AI (declarative problem solving), as well

as hybrid approaches connecting the two worlds (e.g. Semantic technologies, Knowledge Graphs) with a focus on solving business challenges in several case studies.

Course 2: Data & Algorithmic Governance:

This course focuses on gaining the fundamental knowledge necessary to enable fair, transparent, explainable, and accountable data analytics, with a particular emphasis on the academic, industrial and societal relevancy of the corresponding principles, tools, and technologies.

Course 3: Research Seminar

Within the scope of this seminar students shall deepen their knowledge gained in the previous courses of the competence field and ideally combine them. We will suggest advanced methods and topics from current scientific research particularly also our active research which shall be worked upon in small groups or individually, with a focus on preparing students to survey and apply cutting-edge methods for business and data analytics.

6) Additional Courses

To widen your competence additional courses outside of the IS Master can be found in the course catalog of [Learn@WU](#) and in the section of the VVZ "[Additional Courses for Master Programs](#)".

7) General information

LPIS:	WU's online course and exam information and registration system.
VVZ:	WU's online course catalog.
Learn@WU:	Online platform for WU students
Study Service Center:	is the central contact point for students and potential students on Campus WU. It is located in the LC (2 nd Upper Level).
Study Support:	Information about Students IDs, Changing personal data, tuition fees,...
GIS Campus Map:	with this virtual map it is possible to locate every room, office, restaurant, shop,...
Campus Tour:	At the beginning of the winter term a guided Campus Tour for the new students will be organized.

8) Social Events

Kick-Off:	During the first two weeks of October we organize a Kick-Off meeting for the new batch to get to know the faculty and all master's students in an informal setting at the buffet. Further details and the exact date will be sent out by email.
Christmas Party:	In December all students will be invited to the Program's Christmas Party where traditional Austrian Christmas cookies and other snacks will be offered.
Teambuilding-Event:	At the end of the summer term a teambuilding-event will be organized for and with the students.

9) InfSysNetwork – Our Information Systems Club

The network of Information Systems was brought to life by students of the master program Information Systems (WU Vienna) and acts as a non-profit organization.

The goal of the club is to connect current students, alumni, companies with an interest in this specific area and like-minded people with each other. For this purpose they will host a number of events during each semester for their members.

For details, see: <https://infsysnetwork.com/>



10) Center of Excellence

The Center of Excellence Is a permanent Honors Program intended to encourage and support high potential and high-performing students. Information can be found here: <https://www.wu.ac.at/en/students/my-program/masters-student-guide/honors-programs-and-volunteering/wucoe/>