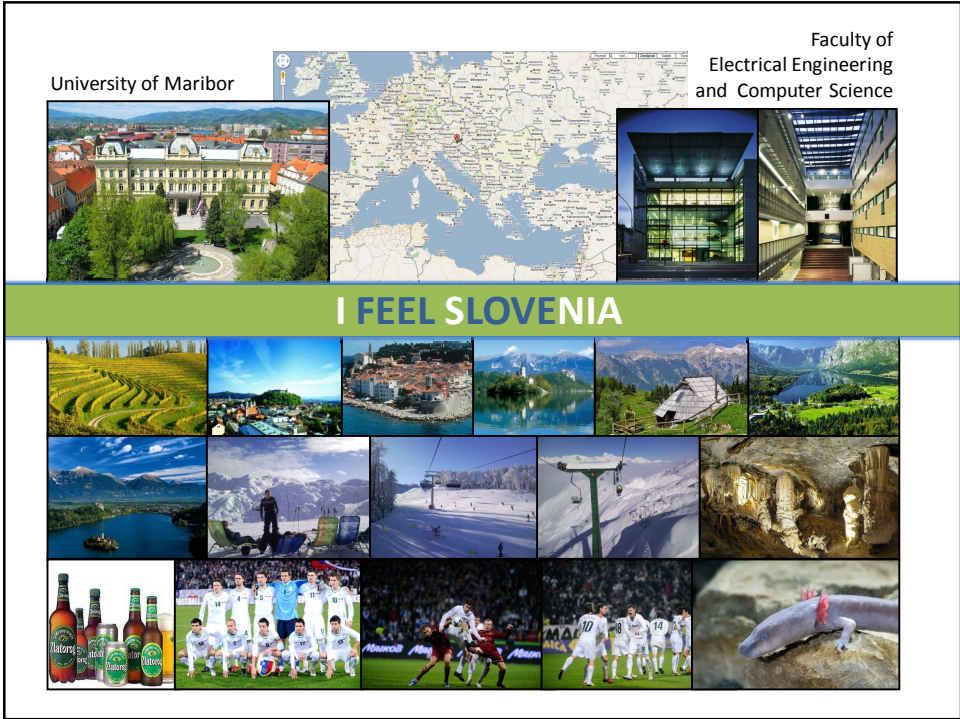


Teaching Advanced Topics in Software Engineering at Institute of Informatics, FERI Maribor

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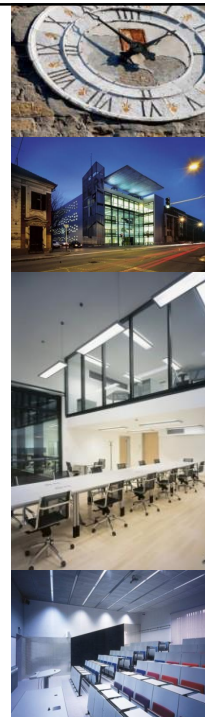


Agenda

- “ FERI – a brief history
- “ Renewed and new study programmes @FERI
 - . ICT Study Programs at FERI
 - “ Bologna Level 1
 - “ Bologna Level 2
- “ Advanced topics in SE taught at the Institute of Informatics, FERI Maribor
- “ Conclusions

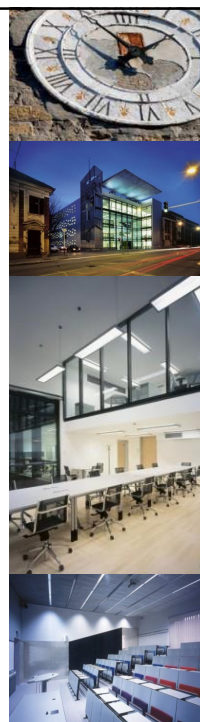
FERI – A brief history

- 1959 A two-year Junior Technical College founded
- 1973 The Junior Technical College was transformed into the four-year Technical College
- 1985 Renamed into the Faculty of Technical Sciences
 - “ At the beginning, the Department of Electrical Engineering offered only one programme - **Electrical Engineering** (with two tracks Electronics and Power Engineering).
 - “ Later, **Automation, Computer Science and Information Technology** were added.
- 1993 In cooperation with the Faculty of Economics and Business, the interdisciplinary programme Industrial Engineering was introduced.



FERI – A brief history

- 1994 On 21st December, the Parliament of the Republic of Slovenia passed the Ordinance on the Transformation of the University of Maribor, which transformed the Department of Electrical Engineering and Computer Science into the Faculty of Electrical Engineering and Computer Science.
- 2005 The programme **Telecommunications** was introduced
- 2006 The programme **Media Communications** was introduced.
- 2007 Renewed and new Bologna programmes were introduced in the academic year 2007/2008.



Institutes @FERI

- “ Academic and research work is conducted at the following institutes:
 - . Institute of Automation
 - . Institute of Electronics and Telecommunications
 - . Institute of Power Engineering
 - . Institute of Robotics
 - . Institute of Computer Science
 - . **Institute of Informatics**
 - . Institute of Mathematics and Physics
 - . Institute of Media Communications
- “ The institutes are divided into 30 laboratories.
- “ 300+ staff members
- “ 2500+ students

Renewed and new study programmes @FERI

First cycle:

- “ Bachelor's – academic:
 1. Electrical Engineering
 2. Computer Science and Information Technologies
 3. Informatics and Technologies of Communication
 4. Telecommunications
 5. Media Communications
 6. Industrial Engineering – option Electrical Engineering
 7. Mechatronics

- “ Bachelor's – professionally:
 1. Electrical Engineering
 2. Computer Science and Information Technologies
 3. Informatics and Technologies of Communication
 4. Mechatronics

Renewed and new study programmes @FERI

Second cycle:

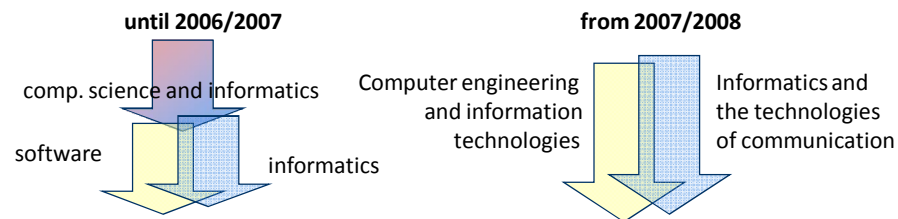
- Master's:
1. Electrical Engineering
 2. Computer Science and Information Technologies
 3. Informatics and Technologies of Communication
 4. Telecommunications
 5. Media Communications
 6. Industrial Engineering – option Electrical Engineering
 7. Mechatronics

Third cycle:

- Doctoral:
1. Electrical Engineering
 2. Computer Science and Informatics
 3. Media Communications

Evolution of computer science and informatics study programmes

- “ Study programme Computer Science and Informatics
 - . Established study program with 20 years of experience
 - . Good employment possibilities for graduates
 - . Scope: from the theoretical concepts of computer engineering, covering all aspects of developing applications and information support



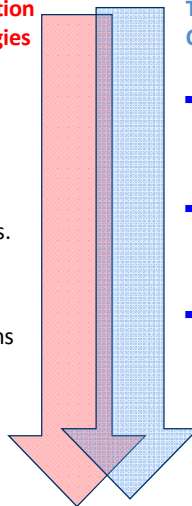
FERI: the 2 ways of comp. science and informatics

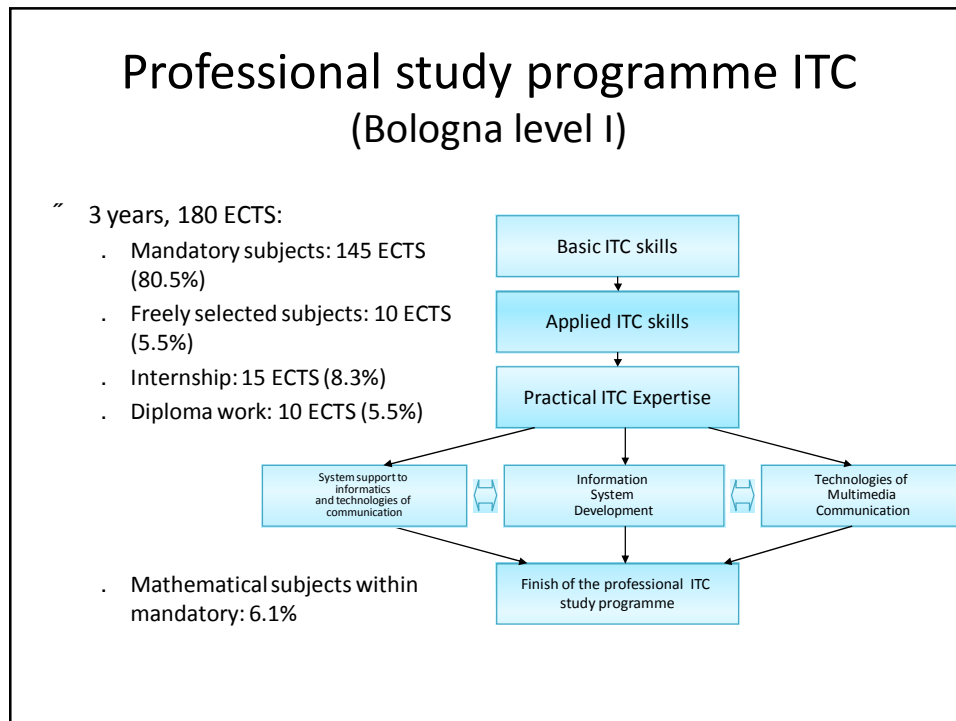
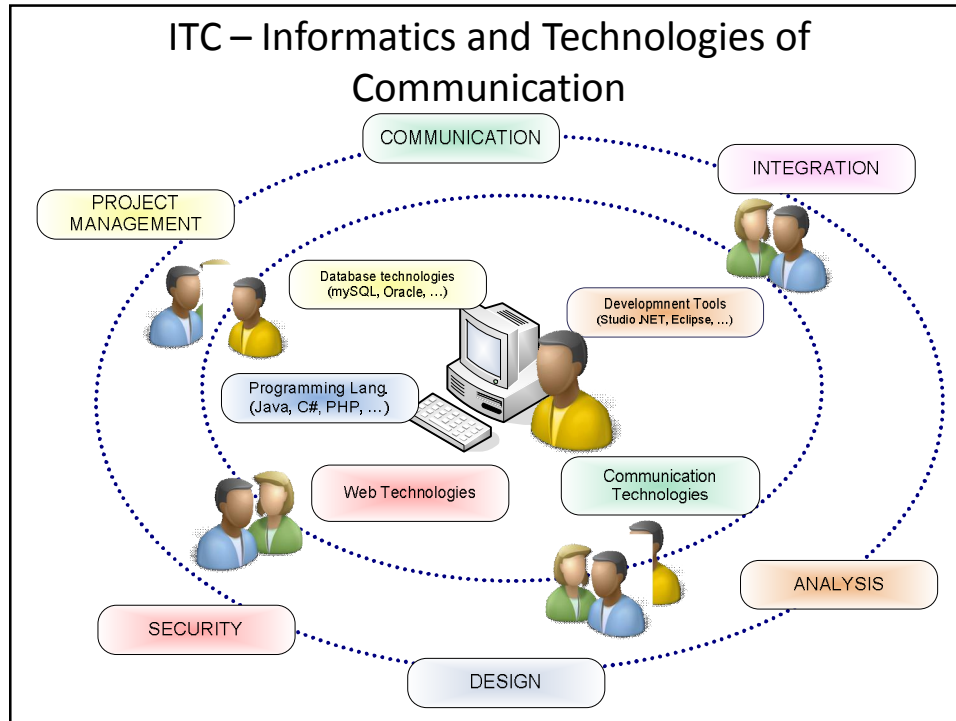
Computer engineering and Information Technologies

- Study about computers, its hardware and mathematical concepts, internal structure.
- The focus is on computers and other IT, their functional concepts.
- The objective is the preparation/development of computer systems (operating systems, compilers, applications, system software, ...)

Informatics and Technologies of Communication

- Study about using computers for solving user-based and business-based problems.
- The focus is on solving ITC tasks with computers and other IT.
- The objective is the design/development of information solutions (information systems, data centers, business IS, media solutions, ...)





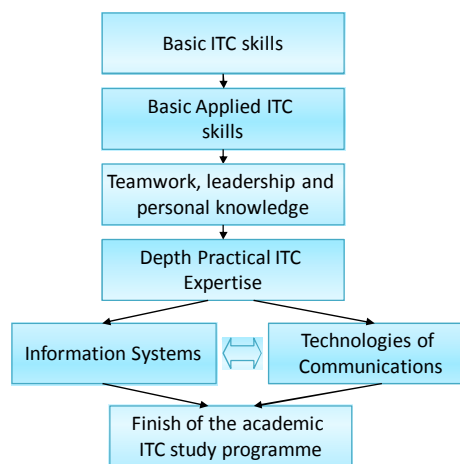
Year 1	1. sem	Informatics and technologies of communication Communication and teamwork Mathematics I ICT basics From the problem to the code		
	2. sem	Advanced Software Programming Data Structures The use of multimedia systems Web technologies and annotation languages SQL programming		
Year 2	3. sem	Databases I Discrete Mathematics Information System Architectures IS Design and Development Project Management and Communication Optional Subject 1*		
	4. sem	Dynamic Web Solutions Decision Support Systems Introduction to Computer Security Application Development Tools Information processes		
Year 3	5. sem	Study option System support to informatics and technologies of communication	Study option Information System Development	Study option Technologies of Multimedia Communication
		Optional Subject 2 ICT Management ICT System Support Information Management Data Warehousing and reporting Information Networks And Equipment	Optional Subject 2 Data Organizing and Processing Requirements Engineering and Management Development of Information Services Design Patterns Databases II	Optional Subject 2 The use of multimedia communications and services Computer Graphics and Animation Communication and content management Portals And Knowledge Systems Visual communications
	6. sem	Information Systems Development Environments Internship Diploma work		

ICT - Bologna level I courses (professional study program)

* Student can choose any optional subject from high professional study programmes at the University of Maribor (free elective subject).

Academic study program ITC (Bologna level I)

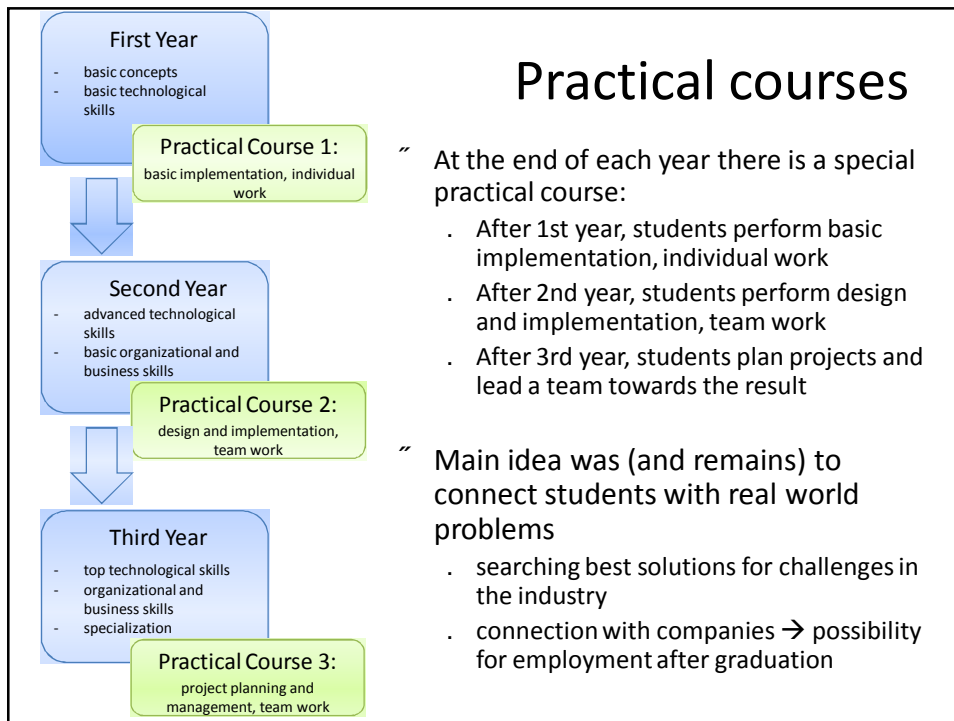
- 3 years, 180 ECTS:
- . Mandatory subjects: 96 ECTS (53%)
 - . Practical course: 18 ECTS (10%)
 - . Optional modules: 24 ECTS (13%)
 - . Freely selected subjects: 36 ECTS (20%)
 - . Diploma work: 6 ECTS (3%)
-
- . Non-mandatory subjects: 33%
 - . Mathematical subjects within mandatory: 12,5%



Year 1	1. sem	Introduction to information systems Problem solving with programming Computer Systems Basics Methodologies and Technologies of Communication Mathematics I	
	2. sem	Object-Oriented Programming in Java Databases I Basics of Web Technologies <i>Optional subjects 1*</i> Practical Course I	
Year 2	3. sem	Development of Information Systems Mathematics II Decision Making Models and Systems Integrated development environments and group communications <i>Optional subjects 2*</i>	
	4. sem	Discrete structures Business process modeling IS Architectures and Patterns Portal Technologies and Knowledge Management Practical Course II	
Year 3	5. sem	Study option Information Systems Security and protection System Convergence and Integration Auditing Information Systems Portal Technologies and Knowledge Management <i>Optional subjects 4*</i>	Study option Technologies of Communications Security and protection System Convergence and Integration Normative Aspect of Information Society and Electronic Communication Development of ubiquitous information solutions <i>Optional subjects 4*</i>
	6. sem	Project Management Statistics <i>Optional subjects 5*</i>	
		Practical Course III Diploma work	

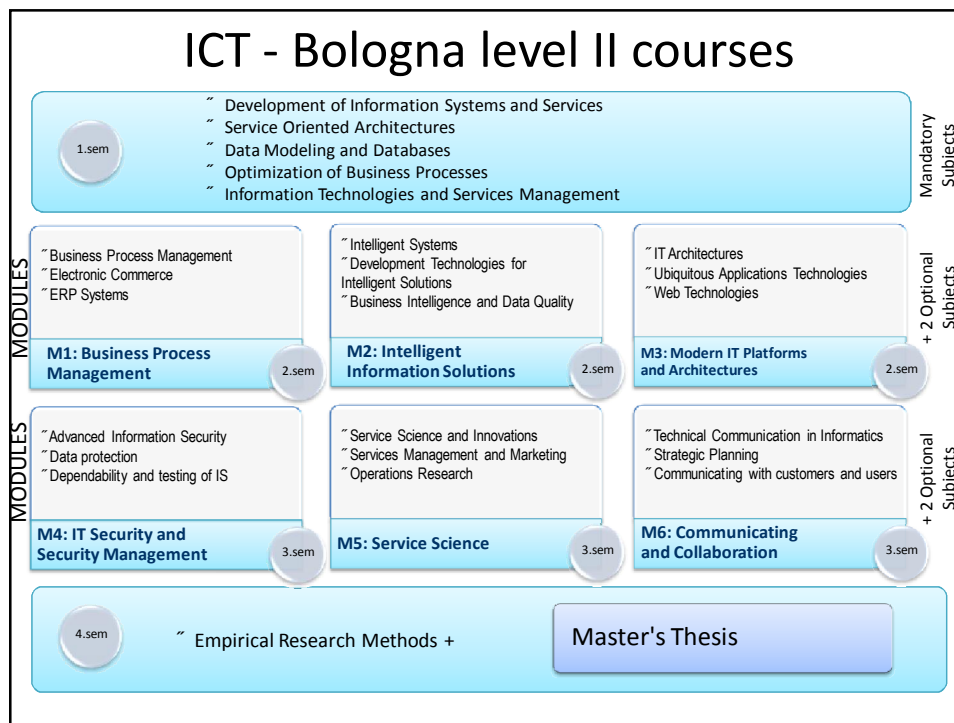
ICT - Bologna level I courses (academic study program)

* Student can choose any subject from the university programmes at the Faculty of Electrical Engineering and Computer Science



Bologna level II – The essence of the study programme

- “ Consolidate the leading role in education in the field of IT, IS and ICT services.
 - . Placing positive experience of the past decades and the latest trends in the second cycle study program.
- “ The emphasis is on
 - . in-depth technology skills and upgrading of skills related disciplines, which enables the student to operate in heterogeneous groups in the field of technology and services.
- “ The modular design of the study programme.
 - . Compulsory courses in the 1st semester refresh and extend basic knowledge of informatics.
 - . Contextual rounded modules provide specialist knowledge



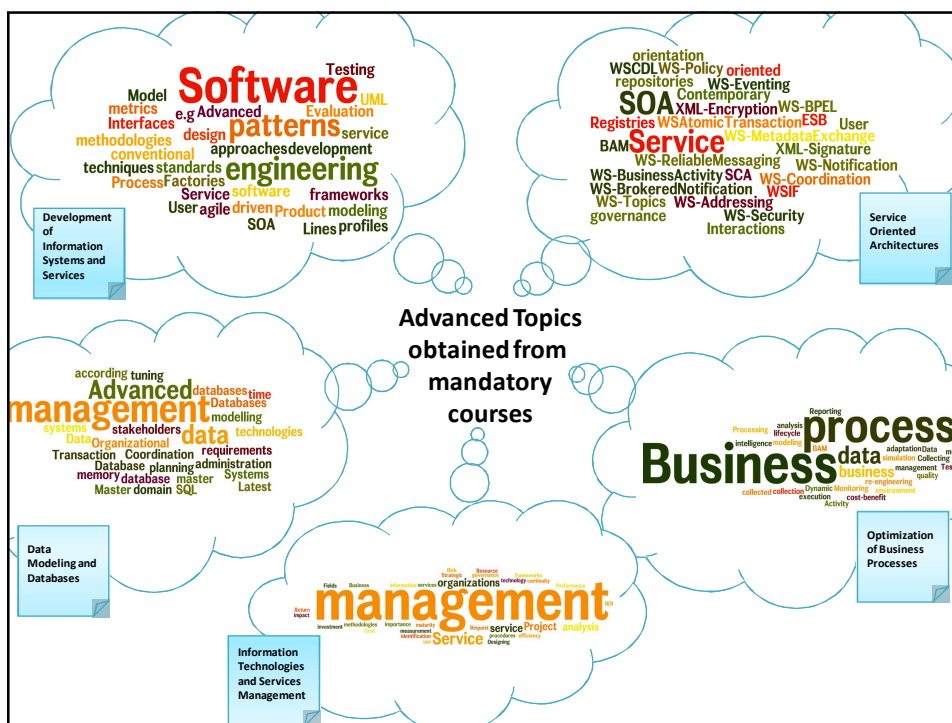
Study program ITC (Bologna level II)

- “ 2 years, 120 ECTS:
 - . Mandatory subjects: 36 ECTS (30%)
 - . Subjects from selected modules: 36 ECTS (30%)
 - . Freely selected subjects: 24 ECTS (20%)
 - . Master work: 24 ECTS (20%)

- . Non-mandatory subjects: 50%

Advanced Topics in SE

- “ Courses are regularly updated in order to be able to teach advanced principles of designing and implementing advanced ICT solutions and IS, based on different modern software development approaches, using contemporary software, software architectures and platforms
- “ Mandatory and optional courses cover appropriate advanced SE topics in depth
 - . software requirements, software design, software construction, software testing and management, software configuration management, software engineering management, software engineering process, software engineering tools and methods, software quality
- “ Based on the mandatory and selected subjects/modules, students acquire advanced theoretical knowledge and technical competences about different topics



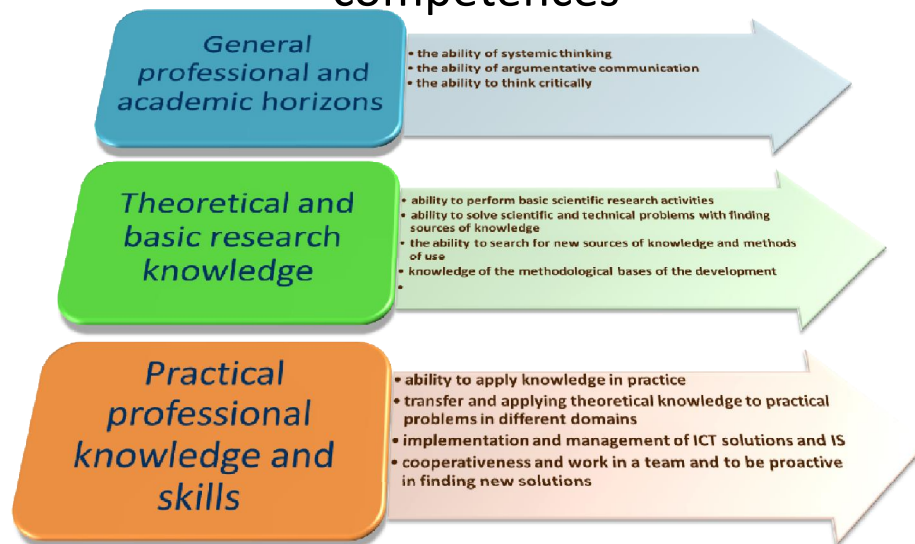
Empirical Research Methods

- “ In the last semester, all students attend the mandatory course Empirical Research Methods, in order to
- . obtain theoretical and practical knowledge about research methods, relevant to SE,
 - . make students aware of key aspects of current software engineering research
 - . familiarize students with the state-of-the-art in terms of what problems can be solved and what are the current exciting challenges.
 - . develop necessary skills to allow students to contribute to the software engineering research community

Final result

“ After completing the mandatory and selected courses, students are able to take advantage of obtained knowledge in complex systems design, realization, evaluation, analysis, and application of modern technologies and tools in the context of a problem

Final result: A wide range of competences



Supported by companies and institutions

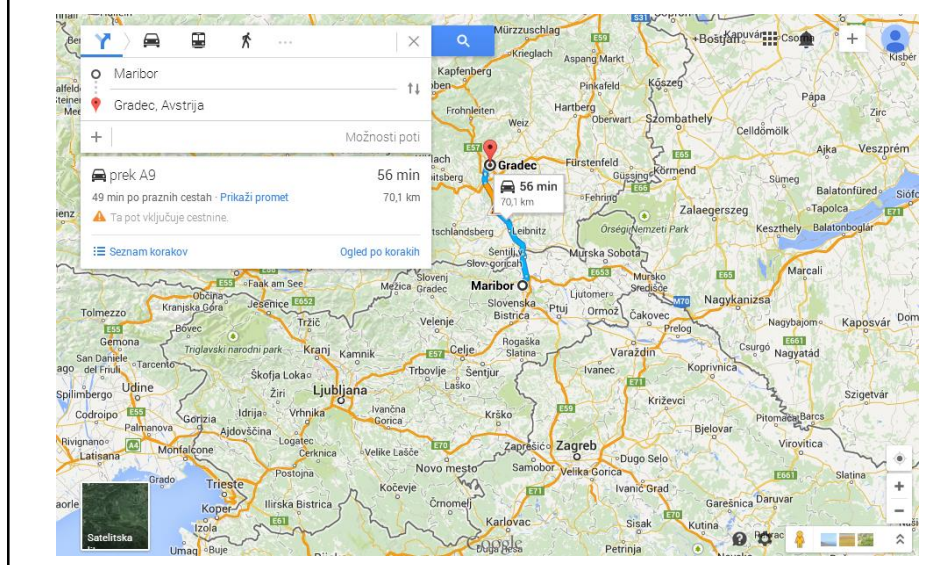
~ Direction and content of the study programme is supported by a number of companies and institutions that are willing to employ graduates of ITC in accordance with their needs

- . Gospodarska zbornica,
- . Microsoft d.o.o.,
- . ORACLE Software d.o.o.,
- . ELES Elektro-Slovenija, d.o.o.,
- . ComTrade Slovenija,
- . Iskratel, d.o.o.,
- . Marand Inženiring d.o.o.,
- . RTV Maribor,
- . Gama System d.o.o.,
- . Aditus d.o.o.,
- . Intera d.o.o.,
- . Viris d.o.o.,
- . Humanopolis d.o.o.,
- . Inceptum d.o.o.,
- . Telapolis d.o.o.,

25

. ...


Lately, companies in Austria also started to benefit 😊



Challenges

- “ Although we have to conduct research and stay in touch with newest technology, development methodologies, today the biggest challenge is not about WHAT to teach, but HOW
- “ How to get attention of students during classes?
- “ How to prevent students’ e-absence (absence of mind)?
- “ How to prevent students going to FB, GTalk, and different social media sites
- “ In last years we are experiencing students, which
 - . have little or no intention to study, and
 - . don’t want to be challenged, and
 - . have no interests
- “ Today students could easily be described as a generation of

„I don’t have to“



Study Year	Average Grade
2006/07	8.2
2007/08	7.4
2008/09	7.8
2009/10	7.9
2010/11	7.7
2011/12	7.6
2012/13	7.4

Successful students

- “ ADORA
<http://adora-med.com/>
- “ An interactive physician’s assistant enabling a unique presentation of patient’s information before and during surgical procedures. ADORA is a product of expert field knowledge, modern information and communication technologies as well as advanced hardware providing seamless user experience with its simple use of contact-free interaction. It enables innovative and pragmatic surgery planning and execution.
- “ ADORA was developed with help of Medical Center Maribor which is the second largest medical center in Slovenia. Doctor’s actively participated during design and testing of our solution.





Conclusion

- “ The study programme ICT (and also CIS) was established based on more than 20 years of experience
 - ICT study programme covers various basic and advanced theoretical concepts in software engineering, application development and information support
 - Courses are being regularly updated in order to give students up-to-date knowledge and skills

- “ Although we were (and still are) in recession, our students (or at least best ones) after graduation usually quickly get an employment
 - employment possibilities abroad (Austria, etc.) are even bigger



**Thank you for your
attention!**

<http://www.feri.uni-mb.si>

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