European Masters Programme in Software Engineering (EMSE)
Academic Programme
2016-2018 onwards

The academic programme lasts two years and is divided in 4 semesters.

It develops along *learning paths* which foresee students to attend one year (60 ECTS) at each of two universities of the Consotium.

At the submissio, candidates must choose a learning path

There are 12 learning paths:

	1° anno – 1. Jahr	**2°anno – 2. Jahr**
1	unibz	UNIKL
2	unibz	UPM
3	unibz	OY
4	UNIKL	unibz
5	UPM	unibz
6	OY	unibz
7	UNIKL	OY
8	UNIKL	UPM
9	OY	UNIKL
10	OY	UPM
11	UPM	OY
12	UPM	UNIKL

The study currculum is compounded of the modules Foundations, Advanced Topics in Software Engineering, Transversal Skills, Free Choice, Internship and Thesis according to the following schema, which also illustrate the range of credits for each module and their temporal distribution

1st Year		**2nd Year**			
1st semester	**2nd semester**	**3rd semester**		**4th semester**	
Foundations		**Internship**	8-14 CP	**Thesis**	30 CP
Verification and Validation (EMSE -VV)	8-12 CP				
Empirical Software Engineering Research (EMSE - ESER)	8-10 CP				
Software Process and Project Management (EMSE - SPPM)	8-16 CP				
Requirements and Design of Software Systems (EMSE - RDSS)	8-14 CP				
Advanced Topics in Software Engineering			8-18 CP		
Transversal Skills			12-16 CP		
Free Choice			12 CP		

The courses that belogn to the module “Foundations”, are:

- Software Process and Project Management (EMSE – SPPM)
- Requirements and Design of Software Systems (EMSE – RDSS)
- Verification and Validation (EMSE - VV)
- Empirical Software Engineering Research (ESEM – ESER)
  Each course is compulsory and has 8 ECTS as mimimum number of credits in all the possible learning paths.

The courses under the module “Advanced Topic in Software Engineeringhave no less than 8 ECTS.

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The courses under the “Transversal Skills” module are distributed along three semsters.

The Internship has at least 8 ECTS.

The fourth semster is dedicated to the work (30 CFU).

1.1 Learning paths

1.1.1 Learning path: unibz-OY

First year unibz

Courses	ECTS	Exam
Annual Courses		
Software Process and Project Management (EMSE-SPPM)	16	yes
1° semester		
Requirements and Design of Software Systems (EMSE-RDSS)	8	yes
Advanced Statistics for Data Mining	12	Pass/Fail
2° semester		
Verification and Validation (EMSE-VV)	8	yes
Empirical Software Engineering Research(EMSE-ESER)	8	yes
Advanced Topic in Software Engineering (EMSE-ATSE)	8	yes
Total	**60**	

Second year OY

Courses	ECTS	Exam
1° semester		
Internship (EMSE –Int)	14	Pass/Fail
Interaction Design (EMSE – TS)	4	Pass/Fail
Free Choice	12	yes
2° semester		
Thesis	30	
Total	**60**	

1.1.2 Learning path: unibz-UKL

First year unibz

Courses	ECTS	Exam
Annual Courses		
Software Process and Project Management (EMSE-SPPM)	16	yes
1° semester		
Requirements and Design of Software Systems (EMSE-RDSS)	8	yes
Advanced Statistics for Data Mining	12	Pass/fail
2° semester		
Verification and Validation (EMSE-VV)	8	yes
Empirical Software Engineering Research (EMSE-ESER)	8	yes
Advanced Topic in Software Engineering (EMSE-ATSE)	8	yes
Total	**60**	

Second year UNIKL

Courses	ECTS UKL	Esame/ Prüfung	SSD	Tipo/Art
1° semester				
Internship (EMSE –Int)			8	Pass/fail
Advanced Topic in Software Engineering (EMSE -ATSE)			6	yes
Grid and Cloud Computing (EMSE – TS)			4	Pass/fail
Free Choice			12	yes
2° semester				
Thesis			30	
Total			**60**	

1.1.3 Learning path: unibz-UPM

First year unibz

Courses	ECTS	Exam
Annual Courses		
Software Process and Project Management (EMSE-SPPM)	16	yes
1° semester		
Requirements and Design of Software Systems (EMSE-RDSS)	8	yes
Advanced Statistics for Data Mining	12	Pass/fail
2° semester		
Verification and Validation (EMSE-VV)	8	yes
Empirical Software Engineering Research (EMSE-ESER)	8	yes
Advanced Topic in Software Engineering (EMSE-ATSE)	8	yes
Total	**60**	

Second year UPM

Courses	ECTS	Exam
1° semester		
Internship (EMSE –Int)	14	Pass/fail
Management, Relationships and Communication in Working Groups (EMSE-TS)	4	Pass/fail
Free Choice	12	yes
2° semester		
Thesis	30	
Total	**60**	

1.1.4 Learning path: OY-unibz

First year OY

Courses	ECTS	Exam
Annual Courses		
Verification and Validation (EMSE-VV)	10	yes
Requirements and Design of Software Systems (EMSE-RDSS)	11	yes
1° semester		
Software Process and Project Management (EMSE- SPPM)	10	yes
Empirical Software Engineering Research (EMSE-ESER)	9	yes
2° semester		
Advanced Topic in Software Engineering (EMSE- ATSE)	10	yes
IT Infrastructure (EMSE-TS)	5	Pass/fail
Mobile and Social Computing (EMSE-TS)	5	Pass/fail
Total	**60**	

Second year unibz

Courses	ECTS	Exam
1° semester		
Internship (EMSE –Int)	8	Pass/fail
Advanced Topic in Software Engineering (EMSE- ATSE)	8	yes
Research Methods (EMSE-TS)	2	Pass/fail
Free Choice	12	yes
2° semester		
Thesis	30	
Total	**60**	

1.1.5 Learning path: UKL-unibz

First year UKL

Courses	ECTS	Exam
Annual Courses		
Verification and Validation (EMSE-VV)	12	yes
Requirements and Design of Software Systems (EMSE-RDSS)	12	yes
1° semester		
Advanced Topic in Software Engineering (EMSE- ATSE-I)	8	yes
Performance Modeling of Distributed Systems (EMSE-TS)	4	Pass/fail
Product Line Engineering (EMSE-TS)	4	Pass/fail
2° semester		
Software Process and Project Management (EMSE-SPPM)	8	yes
Empirical Software Engineering Research (EMSE-ESER)	8	yes
Process Modeling (EMSE-TS)	4	Pass/fail
Total	**60**	

Second year unibz

Courses	ECTS	Exam
1° semester		
Internship (EMSE –Int)	8	Pass/fail
Advanced Topic in Software Engineering (EMSE- ATSE)	8	yes
Research Methods (EMSE-TS)	2	Pass/fail
Free Choice	12	yes
2° semester		
Thesis	30	
Total	**60**	

1.1.6 Learning path: UPM-unibz

First year UPM

Courses	ECTS	Exam
Annual Courses		
Verification and Validation (EMSE-VV)	10	yes
Requirements and Design of Software Systems (EMSE-RDSS)	14	yes
Empirical Software Engineering Research (EMSE-ESER)	10	yes
1° semester		
Software Process and Project Management (EMSE-SPPM)	8	yes
Critical Software (EMSE-TS)	3	Pass/fail
Software Engineering Economics (EMSE-TS)	3	Pass/fail
2° semester		
Advanced Topic in Software Engineering (EMSE- ATSE)	6	yes
Interaction Design (EMSE-TS)	6	Pass/fail
Total	**60**	

Second year unibz

Courses	ECTS	Exam
1° semester		
Internship (EMSE –Int)	8	Pass/fail
Advanced Topic in Software Engineering (EMSE- ATSE)	8	yes
Research Methods (EMSE-TS)	2	Pass/fail
Free Choice	12	yes
2° semester		
Thesis	30	
Total	**60**	

1.2 General syllabus of "Foundations"

Software Process and Project Management (EMSE – SPPM)

Building the capacity and ability to define, manage and improve software process and project are the main focus of this topic. The course includes techniques and methods for managing the process of development and coordinating project artefacts in all its stages. The students will also be introduced to techniques of decision-making for software processes.

Requirements and Design of Software Systems (EMSE – RESD)

Students will acquire skills and competencies resulting from the conception, negotiation, documentation and maintenance of software requirements in a specific domain and environment. Requirements analysis aims at reviewing, assessing, prioritizing, and balancing the software requirements by developing technical specifications for building a system that will meet the needs of the stakeholders. Design of software systems aims at identifying or building software components that define the characteristics and quality of a system. The students are exposed to problem-solving techniques that allow the synthesis of software solutions satisfying the requirements of the system.

Verification and Validation (EMSE -VV)

The topic defines the principles and practices of verification and validation of software systems. Verification methods aims at checking that the elements of the system meet prescribed software specification. In other words, the system must be built right. The verification process also aims to define and apply any procedures and actions to restore compliance with the requirements. The validation aims at assessing whether the implemented system meets the requirements / needs of stakeholders. In other words, the system must be the right one.

Empirical Software Engineering Research (EMSE - ESER)

This topic defines the paradigms, methods, and techniques of scientific investigation in software engineering. Students learn how to conduct experiments, surveys and studies in real environments as well as how to mine, measure, and analyse data and software artefacts.

1.3 Advanced Topic in Software Engineering (EMSE – ATSE)

Students can choose from the following list:

Insegnamenti/ Lehrveranstaltung	**CFU/ KP**	**Ateneo / Universität**
Advances in Software Engineering	10	OY
Advances in Software Systems	10	OY
Advanced Project Management	6	UKL
Advances in Software Engineering	6	UKL
Advances in Requirement Engineering	8	UKL
Applied Automata Theory	8	UKL
Middleware for Heterogeneous and Distributed Information Systems	8	UKL
Software Quality	8	UKL
Advanced Internet Technologies	8	unibz
Advanced Programming Techniques for Software Engineering	8	unibz
IT and service management	8	unibz
Lean start up	8	unibz
Advances in Software Engineering	6	UPM
Agent Based Software Engineering	6	UPM

1.4 Transversal Skills (EMSE-TS)

Insegnamento/ Lehrveranstaltung	CFU/ KP	Semestre/ Semester	Esame/ Prüfung	Ateneo/ Universität
Interaction Design	4	3	Idoneità/ Eignung	OY
IT Infrastructure	5	2	Sì/Ja	OY
Mobile and Social Computing	5	2	Sì/Ja	OY
Performance Modeling of Distributed Systems	4	1	Idoneità/ Eignung	UKL
Process Modeling	4	2	Sì/Ja	UKL
Product Line Engineering	4	1	Sì/Ja	UKL
Grid and Cloud Computing	4	3	Sì/Ja	UKL
Advanced Statistics for Data Mining	12	1	Idoneità/ Eignung	unibz
Research Methods	2	3	Idoneità/ Eignung	unibz
Critical Software	3	1	Sì/Ja	UPM
Software Engineering Economics	3	1	Sì/Ja	UPM
Interaction Design	6	2	Idoneità/ Eignung	UPM
Management, Relationships and Communication in Working Groups	4	3	Idoneità/ Eignung	UPM

1.5 Free Choice

Students can choose 12 ECTS from the following list of courses.

Any other course proposed by the student must be approved by the Joint Board.

2 Allegato A

Elenco degli insegnamenti suggeriti per la categoria a libera scelta (Free Choice)

1. Anlage A

Verzeichnis der zur Verfügung stehenden Wahlfächer (Free Choice)

Insegnamento / Lehrveranstaltung		
Advances in Software Engineering	10	OY
Advances in Software Systems	10	OY
Interaction Design	4	OY
IT Infrastructure	5	OY
Mobile and Social Computing	5	OY
Research Methods	5	OY
Software Engineering Research	7	OY
Advanced Project Management	6	UKL
Advances in Requirement Engineering	8	UKL
Advances in Software Engineering	6	UKL
Applied Automata Theory	8	UKL
Automotive Software Engineering	8	UKL
Concurrency Theory	8	UKL
Empirical Model Building and Methods	4	UKL
Grid and Cloud Computing	4	UKL
Interaction Design	6	UKL
Middleware for Heterogeneous and Distributed Information Systems	8	UKL
Performance Modeling of Distributed Systems	4	UKL
Process Modelling	4	UKL
Product Line Engineering	4	UKL
Protocol Engineering	4	UKL
Regression and Time series analysis	8	UKL
Software Engineering Seminars	4	UKL
Software Quality	8	UKL
Advanced Internet Technologies	8	unibz
Advanced Programming Techniques for Software Engineering	8	unibz
Advanced Statistics for Data Mining	12	unibz
IT and service management	8	unibz
Lean start up	8	unibz

Mobile System Engineering	8	unibz
EMSE Project	8	unibz
Research Methods	2	unibz
Seminars in Software and IT Engineering	4	unibz
Statistical methods	4	unibz
Seminars in Machine Interaction	4	unibz
Advances in Software Engineering	6	UPM
Agent Based Software Engineering	6	UPM
Agile Software Development: Agile Practices and Agile Usability	4	UPM
Challenges for accessible computing for people with functional diversity	4	UPM
Critical Software	3	UPM
Data Engineering	4	UPM
Distributed and Outsourced Software Engineering	4	UPM
Interaction Design	6	UPM
Management, Relationships and Communication in Working Groups	4	UPM
Software Engineering Economics	3	UPM