THE EUROPEAN MASTERS PROGRAMME IN SOFTWARE ENGINEERING
EMSE

CONSORTIUM REGULATIONS

This document illustrates the European Masters Programme in Software Engineering (EMSE) and contains references to EMSE web pages.

The European Masters Programme in Software Engineering programme aims at educating new generation of software engineers and researchers who meet the requirements of European software practice today.

The European Masters Programme in Software Engineering programme is a 120-ECTS Master of Science programme offered by a consortium of four universities the Free university of Bozen-Bolzano, Italy (coordinator), the University of Oulu, Finland, the university of Kaiserslautern, Germany, The University Politécnica de Madrid, Spain and supported by a worldwide network of research institutions and companies.

Participants study one year in each of two universities of the consortium. At graduation, students receive a double or joint degree. The study plan incudes a mandatory Internship and a course of local language each year.

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PARTNER UNIVERSITIES:

Freie Universität Bozen – Libera Università di Bolzano,
P.za Università, 1
I–39100 – Bolzano, Italy
(hereinafter referred to as “UNIBZ”)

Technische Universität Kaiserslautern,
Gottlieb–Daimler–Straße 47
67663 Kaiserslautern, Germany
(hereinafter referred to as “UNIKL”)

University of Oulu,
Pentti Kaiteran katu 1
FI–90570 Oulu, Finland
(hereinafter referred to as “OY”)

Universidad Politécnica de Madrid,
Av. Ramiro de Maeztu, 7
28040 Madrid, Spain
(hereinafter referred to as “UPM”)

collectively referred as “Institutions” and when referred to as a common entity, representing EMSE, the term “Consortium” is used. Associate Partners and Advisory Boards of EMSE are from now on collectively referred to as “Task Force.” The term master candidate and candidate is used interchangeably. “Scholarship holder” refers to a student that has a Consortium or Erasmus Mundus scholarship. “Self–paying student” is any other EMSE students.

I Programme Objectives

EMSE is a joint MSc programme offered by the Institutions with the objective of:

- Educating future software engineers to meet the requirements of today international software practice and research;
- Cooperating in students exchange according to the strategic vision and tactics of the Bologna framework. To this aim, the Institutions will mutually recognize study and exam achievements, the final grades following the agreed study schema and thesis co-supervision and according to the ECTS system;
- Exchanging scholars in order to foster the scientific collaboration, to further develop the curriculum and to share didactic and administrative experience.

II Programme Language

The programme language is English.

III Admitting and host institution

UNIBZ is the "admitting institution" to which students apply and enrol to the program. Institutions at which students are resident are "host institutions." Each student resides in at least two host institutions.

IV Coordinating and Partner Institutions

UNIBZ shall be referred to as "Co-ordinator." The other institutions are referred to as "Partners." All Institutions will proactively collaborate to guarantee a successful coordination process.

V Governing bodies

The EMSE programme is governed by two cooperating bodies: the Joint Board and the Task Force.

VI Joint Board

The Consortium sets up a Joint Board. Each partner shall appoint one member. Every partner has one vote. The Joint Board meets at least twice a year out of which one physically at UNIBZ. Any partner can call for an extra meeting. The meetings can be physical or by video conferencing. The quorum consists of the attendance of at least one commission member from each partner.

The Board is ultimately responsible for all tasks implied by this agreement, and aims at running a successful joint degree program. Among these, the following tasks are included:

- Govern the Consortium and its changes;
- Define and change EMSE regulations;
- Determine and manage tuition fees;
- Selection and placement of candidates;
- Define and update the EMSE curriculum;
- Ensure the quality of the program, its further development, and its implementation;
- Report to all participating institutions;
- Manage additional third party funds;
- Administer joint funds raised by the partners for the purpose of the joint degree program;
- Student advising and complaints management;
- Partner dispute resolutions;
- Invite and select scholars.
- Evaluate candidacies as member of the Task Force

The Joint Board is to be consulted if any partner intends to change their part of the EMSE study program; whether due to local regulations, or national law and regulations.

Public decisions will be announced at the official Consortium's website. All partners agree to observe those decisions.

The Joint Board shall work in strict collaboration with the Task Force and commits to explore

new opportunities for the development of EMSE. The Joint Board and the Task Force collaborate for sustaining and developing the programme.

VII Task Force

The Task Force includes all the Institutions and a representative of each of advisory boards, companies, and research centres. Representatives are selected by their experience with EMSE and with industrial environment. The Task Force meets at least one time per year. The meeting can be physical or virtual and it is independent from the Joint Board meetings.
The Task Force works in strict collaboration with the Joint Board and commits to explore new opportunities for the development of EMSE.

The major activities of the Task Force are

- Fund rising
- EMSE marketing
- Curriculum synchronization with industry, ICT market, and research
- Management of the Internship Programme (Companies inclusion or exclusion, Students evaluation, quality monitoring)

The Task Force advises the Joint Board on new directions for the employability of the EMSE students whereas the Joint Board reports to the Task Force of the actual learning outcome and statistics on students' performance.
The Task Force evaluates the curriculum quality and the students learning outcome in terms of the employability of the students in industry and research.

VIII Staff management

Each Institution will have one local administrative Co-ordinator and one academic representative. UNIBZ will have a project manager and an academic Co-ordinator. Local offices will form an administrative network grouped by competence (e.g., group of international relation offices). The project manager will be responsible of coordinating the overall network acting also as reference point for students and scholars of EMSE.
The academic Co-ordinator will be the representative of the Joint Board for the Erasmus Mundus offices and in any other occasion in which EMSE programme needs to be represented by one person.
Each Institution shall, at its own expenses, compensate their own resources employed for the programme and assume no responsibility for the compensation of the other Institutions' resources.

IX Official web site of the Consortium

The official Consortium website is http://emse.inf.unibz.it.

X Structure of the Joint programme

EMSE is a programme of two years through the achievement of 120 ECTS. Students gain 60 ECTS at each host institution according to their mobility schema (see X.1). Additionally, students gain 4 ECTS for local language or culture courses. At each institution, a tutor advises EMSE students on their learning path (see X.1).

The joint curriculum is structured in knowledge areas: core areas, Partner-specific topic in

software engineering, empirical software engineering research, transversal skills, an internship, and a master thesis. A learning path includes all the knowledge areas in **Error! Reference source not found.** distributed over a learning mobility schema (see X.1). Learning paths with the exact definition of the subjects and ECTS taught in each of areas are publicly available at the EMSE web site.

Foundations are taught during the first year in each learning path. Advanced Topics in Software Engineering topics and transversal skills are taught during the first three semesters. All students must complete an internship during their third semester. The thesis work is performed in the fourth semester.

Table 1: The EMSE Curriculum

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

At the end of the first year, students attend a Summer school in Software Engineering offered by the Consortium. The attendance is optional for self-paying students and compulsory for scholarship holders. No fee is charged for the school. Optionally, students can also be selected to attend the school a second time at the end of their second year. Upon request of the student, the Joint Board decides whether the student can attend the school a second time.

Institutions accept study credits and study achievements of students on the basis of the grades obtained in each of the core areas, Partner-specific topic in software engineering, empirical software engineering research topics, and master thesis. Institutions can accept study achievements at course level if the two tutors agree (see X.1).

X.1 Mobility schema

The mobility schema foresees one year (60 ECTS) in each of two Institutions of the Consortium. The host Institution of the first year ("First Institution") is responsible to welcome the new students and provide all the services needed for the students' entrance in Europe and for the local admission procedure. The First Institution will also transmit the students' transcript of records to the Second Institution and control of fulfilment of the EMSE mobility rule.

The host Institution of the second year ("Second Institution") is responsible to welcome and provide all the services for the local admission procedures. The Second Institution will also support students in the procedure of thesis submission and defence (see XV).

Learning paths for every pair of Institutions are available for each possible mobility schema, (i.e., for Institution A and Institution B, the Consortium offers the learning paths (A,B) and (B,A)). In addition, students may visit one of the associate partners for their internship or thesis work. Students are jointly monitored by two tutors, one from each of their host Institutions.

X.1.1 Mobility rule

Students can move to the second-year Institution only if they gain 52-60 ECTS at the first host Institution by the beginning of the academic year of the Second Institution. The Join Board will decide to expel the students that do not achieve the 52 credits. Such students exit the EMSE programme and can finish their master studies in the local master programme of the first-year host institution.

Scholarship holders shall attend the annual summer school on software engineering at the end of their first year (see X). The Join Board will decide to expel those students who do not attend the school. Such students exit the EMSE programme and can finish their master studies in the local master programme of the first-year host Institution.

XI Participation to the Programme

XI.1 Prerequisites for Participation

All students intending to study in EMSE programme must apply through the on-line portal of EMSE http://emse.case.unibz.it/submissions/index.php. Yearly, the Joint Board decides the deadlines for application (see VI).

XI.2 Application

A complete description of the application procedure (highlighting the application deadline) is publicly available at the website http://emse.case.unibz.it/.

The application tool is on line at http://emse.case.unibz.it/submissions/index.php and it is also reachable from the EMSE official Consortium web site.

The application requires the following data: personal information, short curriculum vitae, entrance qualification (BSc on Software Engineering, Computer Science or equivalent degree), proof of proficiency in English language, other degrees (either on computer science and other disciplines), preferred mobility scheme and issues related to the Erasmus Mundus scholarship or any other scholarship offered by the EMSE Consortium.

Some of the requested data should be supported by the appropriate documents. They are:

- Copy of the applicant's passport.
- Copy of the entrance qualification (BSc on Computer Science or comparable degree).
- Copy of the certificate of proficiency in English language.
- Copies of other degrees (either on computer science or other disciplines) if available.

Due to restrictions placed by the partner universities, the following items will also be requested:

- The BSc on Computer Science (entrance qualification) should be legalised by The Hague Apostille Stamp to verify its authenticity.

- A certification of the subjects taken by the applicants during their degrees (BSc on Computer Science), along with the marks obtained and the number of hours/credits devoted to each subject.

XI.3 Information about scholarships

The website http://emse.inf.unibz.it contains information about any scholarship offered by the Consortium, including the eligibility of applicants and the application procedure.

XI.4 Eligibility criteria for admission

The eligibility criteria to participate to EMSE are:

- Respect the application deadline.
- Provide proof of proficiency in English language: The EMSE requests TOEFL (> 550/213), IELTS (> 6.0) or equivalent certificates. Providing an English certificate is encouraged. In exceptional cases, the consortium will conditionally accept a personal interview (face to face or videoconference) to assess the level of proficiency instead of the certificate. Applicants accepted using this procedure should obtain the TOEFL or equivalent certificate while enrolled in the master.
- Have been awarded a BSc on Software Engineering, Computer Science, Computer Engineering, or comparable degrees. Special cases of applicants with different but related Bachelor degrees need to explicitly state in the application and contact the consortium. Degrees should have been legalized by means of the Hague Apostille Stamp.
- Provide certificate of the subjects taken during their degrees, along with the marks obtained and the number of hours/credits devoted to each subject (i.e., Transcript of Records).

XI.5 Application deadlines

There are two admission sessions. Applicants for Erasmus Mundus Scholarships, other scholarships that require it, or applications that need to undergo a visa process must apply by the first deadline, (December 31st, if not otherwise announced).

XI.6 Submission procedure

The submission procedure is completely described in the official Consortium web site.
Applicants apply on line by the deadline (first and second deadline). Applicants should fill out the application form and enclose the required documents. Required documents will be accepted after the deadline, provided that all administrative decisions will be conditional until complete documentation is submitted. All enclosed documents will be accepted in digital (scanned) form. English will be the language used in all administrative procedures.

XI.7 Receipt of applications

Interested people can contact any partner university to get information about the EMSE programme. Applicants also get information in the website http://emse.case.unibz.it/ and write an email to the emse-secretariat@unibz.it .
Applicants fill and submit the on-line application form uploading all the needed documents in the web portal http://emse.case.unibz.it/submissions/index.php.
The Co-ordinator receives all the application forms and checks the formal criteria for admission. All Institutions have access to the form and the uploaded documents through the web portal.
Any administrative decision taken on the basis of the information provided by the applicant in the application form, but without a supporting document, will be conditionally accepted upon the presentation of the corresponding documentation. Such documentation will be requested in the acceptance letter, along with a deadline to provide it. Deadlines will be stated on a case-by-case

basis.

XI.8 Check of respect of formal criteria for all applications

The online portal automatically warns applicants of missing documents. In addition, before the admission deadline, the project co-ordinator checks whether all appropriate documents have been attached to the application form.
The project co-ordinator checks whether the absence of some documents is justified. If not justified, the project co-ordinator contacts applicants to request them.
In case in which applicants do not provide a certificate of English proficiency, the project co-ordinator asks the Consortium whether applicants will be waived. For those waived applicants, the Consortium will carry out a personal interview to assess the level of English proficiency.
The project co-ordinator will check whether applicants have provided a copy of the passport, as a proof of nationality.
In case of Erasmus Mundus award, the project manager will check the applications, to ensure that applicants have signed that they comply the requirements of Erasmus Mundus framework.

XII Selection

The selection will be performed in compliance with the European Charter of Researchers and the Code of Conduct for the Recruitment of Researchers
(http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter and
http://ec.europa.eu/euraxess/index.cfm/rights/codeOfConduct).

XII.1 Timing:

By the first submission deadline:

- Formal admission criteria check will be finished within 7 days. Nevertheless, all received applications will be checked as they are received, to ensure completeness and ask applicants for missing information.
- Selection of applicants will be performed within next 15 days.

By the second deadline

- Formal admission criteria check will be finished within 7 days. Nevertheless, all received applications will be checked as they are received, to ensure completeness and ask applicants for missing information.
- Selection of applicants will be performed within next 15 days.
- Selection of applicants will be performed no later than July 31st.

XII.2 Qualitative selection criteria

Applicants will be scored according to:

- Language skills: They will be qualified as either acceptable or non-acceptable.
- Type of entrance qualification. They will be ranked for relation with the Software Engineering discipline
- Study results: They are calculated as a weighted average of the marks obtained on every degree subject
- Work experience and professional qualifications: Only experience in software-related tasks (including education) will be considered.
- Motivation and willingness: Candidates will be ranked according to their interest in undertaking studies in the software engineering field, and according to their interest in the EMSE programme in particular.

Each criterion is assigned a weight so that the minimum score is 0 and the maximum 100 points. Weights and voting scale are defined in the "Admission and selection EMSE chapter.
In addition to those weights, the study results are further weighted using the ranking of the university where the student got his degree as parameter. The use of the university ranking is intended to correct the distortion in the selection procedure caused by the high qualifications that typically have students coming from non-demanding, low-quality universities. Those students have better scores than students from high-ranking universities where courses are harder to pass. Without this second weighting, those students would have more chances to being admitted or even to be proposed for a scholarship.

XII.3 Selection procedure

The project manager will make available to the Consortium the submitted applications along with the related documentation. For each applicant, assessments will be performed by the project manager and revised by members of the Joint Board. In case it is needed the Joint Board appoints a Selection Committee to perform the selection evaluation. The Selection Committee must include an academic representative of all the Institutions. Divergence is managed by consensus between involved parties. To finish the assessment process, every member of the Joint Board should formally approve the assessments.
The Joint Board will promote equal opportunity as stated in the European Charter for Researchers..

For each learning path an equal number of places are assigned. Yearly, the Joint Board decides the total number of places. The Joint Board will check and formally approve the ranked list. Once approved, available places will be filled sequentially using the ranked list.

XIII Enrolment procedure

Admitted students register to EMSE directly at UNIBZ. Yearly, the Joint Board decides the registration deadlines.
UNIBZ provides admitted students with official letters of acceptance to the programme and transmits the list of registered students and their learning paths to the corresponding Institutions well in time to proceed with the local admittance procedure.
At registration deadlines, UNIBZ collects the first instalment of the EMSE tuition fee (see XVI). There are two registration deadlines corresponding with the two application sessions.
Each institution is responsible to follow students with the enrolment in its local information system and ensure that students provide the necessary documents for the enrolment in the local system.
Each partner institution will also render assistance to the incoming students for visa application, finding appropriate accommodation and legalising their residence status in the corresponding country.

XIV Principle of participation for students

Students participating in the programme under the term of this agreement will be subject to the following principles:

- Students will be responsible for covering all costs such as travel costs, living costs during the stay (including accommodation, books, equipment, consumables, study fees, and student union fees) and other expenses.

- Students must have purchased a health insurance policy in the country where they attend courses.
- Students participating under this agreement shall be subject to the rules and regulations of the host institution during the entire duration of their stay. They will also have the rights and duties enjoyed by other students enrolled at the host institution.
- Students participating under this agreement shall be subject to the rules and regulations of the Consortium during the entire duration of their stay. Those rules are specified in the official Consortium website. All students have the same rights and duties regardless of where they study.

XV Conferral of the Degree

All students of EMSE study one year at each of two universities of the Consortium following the learning path and its mobility schema chosen in their application (see X and X.1).
Institutions shall recognize automatically the credits gained by students at other partners according to their learning path.
Students may perform their thesis work or Internship at any of the Programme or Partner countries. In case the students perform these activities at the Partner countries, they have to submit their request to the Joint Board no later than three months before the commencement of the Internship or thesis. The initiation, development, and submission of the thesis must follow the EMSE master thesis regulation.
The master thesis is submitted and defended at the Second Institution. The thesis is co-supervised by two teachers of universities that hosted the student and eventually in addition co-supervised by a representative of the associated partner at which the student has further performed the thesis work. All supervisors are invited as members of the defence commission.
Students having successfully passed all requirements of the joint programme will be awarded a double degree from the two full institutions of the Consortium.
A joint degree will be issued as soon as all partners have defined their internal procedures. In this case, the thesis will be defended in front of a joint jury.
In any case, the degree will correspond to the Italian “Laurea Magistrale in Informatica,” the German degree “Master of Science,” the Finnish “Filosofian maisteri, pääaine tietojenkäsittelytiede,” and the Spanish “Máster Universitario en Ingeniería del Software - European Master on Software Engineering.”

XVI Students’ Participation Costs and Tuition Fees

There is a common fee for studying in the EMSE programme. Yearly, the Joint Board decides the exact amount. The Co-ordinator collects the common fee.
For the first year students: a portion of the total amount (“First Instalment”) is collected when students register to the programme (see XIII). The reminder (“Second Instalment”) is collected at the beginning of the EMSE academic year. Yearly, the Joint Board decides the amount of the two installments.
For the second year student: the Co-ordinator collects the whole tuition fee (First plus Second Instalment) at the beginning of the academic year.

The fee includes any local costs that students must afford to participate in the programme such as local tuition fee, social taxes, and insurance, and participation to the Software Engineering Summer School. The fee also comprises additional costs arising from the management of students in the EMSE programme such as scholarship management, financial management, dedicated

insurance procedure management, management of students' records and study within the Consortium, internship placements, EMSE advertisement and marketing etc.

One month after the beginning of the academic year, the Co-ordinator distributes the Second Instalment of the first and second year students to the Institutions. In case it is needed and upon decision of the Joint Board, the Co-ordinator can compensate for eventual reimbursement of eligible costs (e.g., students have erroneously paid the tuition fee at the Partner). The coordinator keeps the First Instalment of all the students. This amount will constitute a financial reserve used to cover unbudgeted costs of the co-ordinator (cost for the project manager, insurance unexpected costs, etc). In the annual meeting, the co-ordinator reports the financial balance to the Joint Board.
Eventually, remaining money at each Partner will be used for EMSE related activities and support.

XVII Mobility under the Erasmus Charter For Higher Education (ECHE)

The Institutions are additionally signing mobility, bilateral agreements under the ECHE charter. The agreement allows to support students with no other mobility scholarships and to further attract good students.

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XVIII Standard framework of student selection procedures

XVIII.1 Calling for Student Applications

1.1. **Description of the study programme:** A complete description of the EMSE programme is publicly available at the website http://emse.case.unibz.it/. This website contains: general description, programme objectives and learning outcomes, subjects taught, learning paths, universities involved, consortium people, points of contact in the different partner universities, complete application information, admission criteria (including language requirements), mobility schemes, diplomas awarded, Erasmus Mundus Scholarship information and other scholarships, and tuition fees. The web site also include on alumni and a dedicated page for the EMSE Task Force. Here, companies and research centers can be informed about their role in the EMSE consortium and apply to become an associate partner.

1.2. **Application**: A complete description of the application procedure (highlighting the application deadline) is publicly available at the website http://emse.case.unibz.it/. The application is on line at http://emse.case.unibz.it/submissions/index.php and it is also reachable from the EMSE main web page http://emse.case.unibz.it/.
The application requires the following data: personal information, short curriculum vitae, entrance qualification (BSc on Software Engineering, Computer Science or equivalent degree), proof of proficiency in English language, other degrees (either on computer science and other disciplines), preferred mobility scheme and issues related to the Erasmus Mundus scholarship or any other scholarship offered by the EMSE Consortium.
Some of the requested data should be supported by the appropriate documents. They are:

- Copy of the applicant's passport.
- Copy of the entrance qualification (BSc on Computer Science or comparable degree).
- Copy of the certificate of proficiency in English language.
- Copies of other degrees (either on computer science or other disciplines) if available.

Due to restrictions placed by the partner universities, the following items will also be requested:

- The BSc on Computer Science (entrance qualification) should be legalised by The Hague Apostille Stamp to verify its authenticity.
- A certification of the subjects taken by the applicants during their degrees (BSc on Computer Science), along with the marks obtained and the number of hours/credits devoted to each subject.

1.3. Information about scholarships and their conditions: As stated in sections I.1.1 and I.1.2 of this document, the website http://emse.inf.unibz.it contains information about the scholarships, including the eligibility of applicants and the application procedure.

1.4. Formal criteria for admission to the course: Minimum criteria for admission to the course are:

a. Respect the application deadline.

b. Provide proof of proficiency in English language: The EMSE requests the B2 level of the Common European Framework of Reference (CEFR) equivalent to TOEIC= 605-780, TOEFL paper 513-547, TOEFL CBT=183-210, TOEFL IBT=65-78, IELTS=5.5-6.0, Cambridge exam= FCE, VEC on line=66-73. In exceptional cases, the consortium will conditionally accept a personal interview (face to face or videoconference) to assess the level of proficiency instead of the certificate. Applicants accepted using this procedure should obtain the TOEFL or equivalent certificate while enrolled in the master.

c. Have been awarded a BSc on Software Engineering, Computer Science or Computer Engineering, in Mathematics or physics with adequate knowledge ad competences in Software Engineering (according to the most recent ACM guidelines). Special cases of applicants with different but related bachelor degrees need to contact the consortium to study their particular circumstances. Degrees should have been legalized by means of The Hague Apostille Stamp.

d. Provide certificate of the subjects taken during their degrees, along with the marks obtained and the number of hours/credits devoted to each subject.

1.5. Application deadlines: There are two admission sessions. The first deadline, (December 31st if not otherwise announced) for applicants of Erasmus Mundus Scholarships or other scholarships that requires it, or that need to undergo a visa process. The second deadline (July 15th if not otherwise announced) is for any other applicants.

1.6. Qualitative selection criteria: Applicants will be scored according to:

a. Language skills.

b. Type of entrance qualification (BSc on Software Engineering, Computer Science, Computer Engineering, Mathematics or Physics with adequate knowledge in Software Engineering).

c. Study results.

d. Curriculum vitae et studiourum (including work experience and professional qualifications).

e. Motivation and willingness.

1.7. **Submission procedure:** Applicants should apply by the deadline (first and second deadline). Applicants shall fill the application form out and enclose the required documents. Required documents will be accepted after the deadline, provided that all administrative decisions will be conditional until complete documentation is submitted. The Application form, as all documents, will be submitted on line at https://emse.case.unibz.it/submissions/index.php. All enclosed documents will be accepted in digital (scanned) form. English will be the language used in all administrative procedures.

1.8. Selection timing:

a. By the first submission deadline

(i) Formal admission criteria will be finished within 7 days. Nevertheless, all received applications will be checked as they are received, to ensure completeness and ask applicants for missing information.

(ii) Selection of applicants will be performed within next 15 days.

(iii) If funded, proposal of Erasmus Mundus Scholarships will be submitted to the Agency by the due date.

b. By the second deadline

(i) Formal admission criteria will be finished within 7 days. Nevertheless, all received applications will be checked as they are received, to ensure completeness and ask applicants for missing information.

(ii) Selection of applicants will be performed within next 15 days.

(iii) Selection of applicants will be performed no later than July 31st.

XVIII.2 Receipt of applications and check of respect of formal criteria for all applications

2.1. How are applications assigned within the consortium for checking the formal criteria?

a. Interested people can contact any partner university to get information about the EMSE programme. Applicants also get information in the website http://emse.case.unibz.it/ and write an email to the emse-secretariat@unibz.it .

b. Students fill and submit the on-line application form uploading all the needed documents in the web portal http://emse.case.unibz.it/submissions/index.php At this stage the applicant select the learning path according to the mobility period.

c. The Coordinating institution receives all the application forms for checking the formal criteria for admission. All partners have access to the form and the uploaded documents through the web portal.

2.2. How do you check the respect of the formal criteria for admission of applicants to the course?

a. The online portal warns applicants of the missing documents. In addition, the EMSE administrative coordinator checks whether all appropriate documents have been attached to the application form.

b. The EMSE administrative coordinator checks whether the absence of some documents is justified. If not justified, the EMSE administrative coordinator contacts applicants to request them.

c. In case that applicants do not provide a certificate of English the EMSE administrative coordinator asks the Consortium whether applicants will be waived. For those waived applicants, the EMSE Consortium will carry out a personal interview to assess the level of English proficiency.

2.3. (in case of EM funding) How do you check the respect of the formal criteria for an Erasmus Mundus scholarship?

a. The EMSE administrative coordinator will check whether applicants have provided a copy of the passport, as a proof of nationality.

b. The EMSE administrative coordinator will check the application form, to ensure that applicants have signed that they comply the requirements of the Article 2 of the programme Decision.

2.4. How does the consortium deal with requests for complementary information (e.g. on the recognition of degrees) or with documents that still need to be submitted e.g. (proof of language abilities)?:

a. The EMSE Coordinator asks for any missing information.

b. Any administrative decision taken on the basis of the information provided by the applicant in the application form, but without a supporting document, will be conditionally accepted upon the presentation of the corresponding documentation. Such documentation will be requested in the acceptance letter, along with a deadline to provide it. Deadlines will be stated on a case-by-case basis.

2.5. Who takes the decision on respect of (or lack of respect of) formal criteria?: The EMSE administrative coordinator, in coherence with the procedure outlined in I.2.2.

XVIII.3 Quality assessment of applications

3.1. Describe your qualitative selection criteria:

a. Language skills: They will be qualified as either acceptable or non-acceptable.

   (i) *Acceptable*: The applicant has provided certificate of proficiency or successfully passed the personal interview.

   (ii) *Not acceptable*: Otherwise.

b. Type of entrance qualification (BSc on Computer Science or other degrees): Four cases will be considered:

   (i) *BSc Software Engineering or Computer Science* plus additional courses related to EMSE.

   (ii) *BSc on Computer Science, Mathematics or Physics plus additional courses related to EMSE or equivalent.*

   (iii) *BEng on related engineering disciplines* (such as Computer Engineering, Telecommunications, etc.).

   (iv) Mathematics and Physics with adequate knowledge in Software Engineering

   (v) *Other bachelor degrees*

c. Study results: They are calculated as a weighted average of the marks obtained on every degree subject. Four cases will be considered:

   (i) *Outstanding* (3-4 in a GPA scale 1-4).

   (ii) *Very good* (2-3 in a GPA scale 1-4).

   (iii) *Good* (1.5-2 in a GPA scale 1-4).

   (iv) *Poor* (1-1.5 in a GPA scale 1-4).

d. Work experience and professional qualifications: Only experience in software-related tasks (including education) will be considered. There are three cases:

   (i) *Extensive*: The applicant has more than 3-years experience.

   (ii) *Some*: The applicant has less than 3-years experience.

   (iii) *None*: The applicant has not working experience.

e. Motivation and willingness: Three cases will be considered:

   (i) *High*: The applicant highlights the importance of EMSE for her/his career.

   (ii) *Medium*: The applicant clearly express interest in the EMSE.

   (iii) *Low*: The applicant does not show a clear interest in the EMSE.

3.2. How are these criteria weighted?: Weights has been assigned so that the minimum score is 0 and the maximum 100 points. They are the following:

a. Language skills: A weight is not assigned to this criterion. Applicant will need to be found "Acceptable". An applicant qualified as "Not acceptable" will be not considered for admission.

b. Type of entrance qualification: This criterion has been assigned a weight of 4.

c. Study results: This criterion has been assigned a weight of 4.

d. Work experience and professional qualifications: This criterion has been assigned a weight of 1.

e. Motivation and willingness: This criterion has been assigned a weight of 1.

In addition to those weights, the study results are further weighted using the ranking of the university where the student got his degree as parameter.
The use of the university ranking is intended to correct the distortion in the selection procedure caused by the high qualifications that typically have students coming from non-demanding, low-quality universities. Those students have better scores than students from high-ranking universities where courses are harder to pass. Without this second weighting, those students would have more chances to being admitted or even to be proposed for a scholarship.
Ranking data is obtained from www.webometrics.info. Weighting is as follows:

- If university's ranking <= 1000 then the students gets the 100% of the points obtained in the "study results" criterion.
- If 1000 < university's ranking <= 3000 then the students gets the 75% of the points.
- If 3000 < university's ranking <= 5000 then the students gets the 50% of the points.
- Otherwise, the students gets the 25% of the points.

3.3. **Which assessment form or check list do you use (please provide a copy)?** A copy of the assessment instrument in included in Annex 1.

3.4. **Which voting scale is used (verbal, numerical, alphanumerical)?**

a. Language skills: No points are assigned to this criterion.

a. Type of entrance qualification (BSc on Computer Science or other degrees): This criterion has been assigned a weight of 4.

(i) BSc on Software Engineering or Computer Science plus additional courses related to EMSE ..... *10 points*

(ii) BSc on Computer Science, Mathematics or Physics plus additional courses related to EMSE or equivalent ..... *7 points*

(iii) BEng on related engineering disciplines ..... *3 points*

(iv) Mathematics or Physics with knowledge in SE *1points*

(v) Any other bachelor degree ..... *0 points*

b. Study results: This criterion has been assigned a weight of 4.

(i) Outstanding ..... *10 points*

(ii) Very good ..... *7 points*

(iii) Good ..... *3 points*

(iv) Poor ..... *0 points*

c. Work experience and professional qualifications: This criterion has been assigned a weight of 1.

(i) Extensive ..... *10 points*

(ii) Some ..... *5 points*

(iii) None ..... *0 points*

d. Motivation and willingness: This criterion has been assigned a weight of 1.

(i) High ..... *10 points*

(ii) Medium ..... *5 points*

(iii) Low ..... *0 points*

3.5. **By whom are the candidates assessed?** The EMSE administrative coordinator will perform the first assessment of candidates. Partner universities will perform subsequent assessments.

3.6. **Is each application assessed twice?** Yes, it is. The EMSE administrative coordinator will make available to the Consortium the submitted applications along with the related documentation. For each applicant, assessments will be performed by the EMSE administrative coordinator and one of the partner universities, chosen on the basis of the student mobility preferences. The EMSE administrative coordinator will make available all assessments to the Consortium.

3.7. **If so, which procedure is applied to approach diverging notations?** Divergence is managed by consensus between involved parties.

3.8. **How are the assessment results finalised and consolidated? What is the role of each partner in this process?** The Joint Board is composed by representatives of each partner university. To finish the assessment process, every member of the Joint Board should formally approve the assessments.

XVIII.4 Selection decision

4.1. **Ranking/clustering of applicants:** The EMSE administrative coordinator will check the criteria stated in the Erasmus Mundus programme decision and the call for proposals regarding geographical distribution, higher education institutions, gender and Asian windows.

When any of those criteria imply that some applicants should be excluded from the list of scholarships, the Secretary will assign those applicants scoring lower to the scholarship reserve list.

The Joint Board will promote gender balance. Concretely, when two applications have similar quality, and one of these applications belongs to a female applicant, she will be promoted over her male counterpart in the ranked list.

The Joint Board will decide whether to include disadvantaged applicants (handicapped, belonging to minority groups, etc.), or applicants with special characteristics. The same criteria than for female applicants will be applied.

4.2. **Describe how the final selection decision is taken:** The total number of places assigned to EMSE will be divided into to groups: Third-country students (50% of the places) and European students (50% of the places). The Joint Board will check and formally approve the ranked list. Once approved, available places will be filled sequentially using the ranked list.

4.3. **Describe the composition of the Joint Board:** The Joint Board will be composed by the contact persons of the partners' universities, plus the Consortium Coordinator. In case that any member of the Joint Board were unable to attend a meeting, she/he will be able to delegate a third person belonging to her/his university.

4.4. **Describe the working method of the Joint Board:** The working method will be as follows:

a. The Joint Board will receive the ranked list composed by the EMSE administrative coordinator as stated in sections I.3.8.b and I.4.1. It also will receive all application forms along with the appropriate documentation. Web-based support will be provided for this task.

e. The Joint Board will check the ranked list (as stated in section I.4.2) and perform the modifications indicated in section I.4.1. (special treatment for disadvantaged applicants and applicants with special characteristics).

f. The Joint Board will formally approve the ranked list.

g. The Joint Board will assign places to students.

The meetings of the Joint Board will probably be carried out using video-conference

support.

4.5. **Describe the content of the minutes and explain who signs them:** The minutes will be signed by all the meeting attendants. Their composition will be the following:

a. Meeting attendants.

h. Initial and modified ranked lists. All modifications to the ranked list will be justified.

i. Final decision.

ANNEX 1. APPLICANT ASSESSMENT INSTRUMENT

Date:_____ Reviewer:_____
Status: □ Draft □ Final Violates 12-month rule: □ Yes □ Seems not

APPLICANT

Family name: _____ Gender: ☐ Female ☐ Male

First name: _____ Country: _____

Higher education institution: _____ Ranking: _____

Total score: _____

SELECTION CRITERIA

Language skills:

__ Acceptable: The applicant has ☐provided certificate of proficiency, ☐successfully passed the interview, ☐is a native English speaker, ☐his/her language of instruction was English.

__ Pending: The applicant has not provided proof of proficiency and the personal interview is pending.

__ Not acceptable: Otherwise.

Entrance qualification:

__ BSc ☐Software Engineering, or ☐Computer Science plus additional courses related to EMSE. The degree was _____ finished.

__ BSc on Computer Science or equivalent. The degree was _____ finished.

__ BEng on related engineering disciplines (such as Computer Engineering, Telecommunications, etc.). The degree was _____ finished.

__ Mathematics or Physics with .adeguate knowledge in Software Enineering The degree was _____ finished.

__ Any other bachelor degree. The degree was _____ finished.

__ Unknown. Documentation not provided.

Study results:

__ Outstanding (3-4 in a GPA scale 1-4).
__ Very good (2-3 in a GPA scale 1-4).
__ Good (1.5-2 in a GPA scale 1-4).
__ Poor (1-1.5 in a GPA scale 1-4).
__ Unknown.

GPA calculated as:

__ Provided in transcript
__ Recalculated or __ calculated as simple average:
__ Documentation not provided

Work experience and professional qualifications:

__ Extensive: The applicant has more than 2-years experience.
__ Some: The applicant has less than 2-years experience.
__ None: The applicant has not working experience or does not provide documentation.

Motivation and willingness:

__ High: The applicant highlights the importance of EMSE for her/his career.
__ Medium: The applicant clearly express interest in the EMSE.
__ Low: The applicant does not show a clear interest in the EMSE or does not provide documentation.

ANNEX 2. STUDENT SELECTION GRID

XVIII.4.1.1

Rank	Family name	First name	Gender	Country	Higher education institution	Scores						Geographical/higher education issues	Gender issues	Special characteristics
						University ranking	Degree	Study results	Work experience	Motivation	Total			
1														
2														
3														
4														
5														
6														
...														

XIX Master Thesis Work

This chapter details the special requirements that have to be fulfilled for the successful implementation and examination of a Master Thesis within the EMSE programme. Note that these outlines the rules that have to be followed **in addition** to the rules for carrying out a thesis project at your 2nd Year University (2YU). In order for your thesis to be approved it must first and foremost be accepted at the 2YU; the rules below outline what you additionally must do since you are on a Master program shared between multiple universities.

Students have a **limited time** to make their thesis or they will need to pay a fee again. All 4 EMSE universities have strong restrictions on the thesis timing. If a student does not finish the thesis within the second academic year s/he will need to enroll and pay the EMSE tuition fee (1,500€) for the third academic year at the consortium as the enrollment to the third academic year is not cover by any previous payment of the student. The student might also experience problems with the VISA since the grant will have expired already.

The master thesis is a theoretical or theoretical/practical assignment, involving a detailed study of a specific topic. Through their master thesis, students are expected to demonstrate an ability to understand, analyse and synthesize advanced knowledge, beyond what they have demonstrated during the courses. Ideally, the student should be able to innovate proposing and developing new products or processes as part of their thesis.

The 2YU will assign you a supervisor (S) who will give you guidance and advice with your Master thesis.

Regarding the procedure to get a co-supervisor (CS) from the student's 1st Year University (1YU):

- The assignment of a CS is done through the partners contact points (CP)
- Do not contact anybody in your 1YU directly yourself.
- The student must contact the 2YU CP asking for a CS. Send her/him an e-mail in CC to your S.
- The 2YU CP will contact the 1YU CP and the 1YU CP will assign the student a CS.
- The student will be informed about who is his/her CS by the 2YU CP.

Regarding the relation with the CS:

1.- The students must send the CS a thesis **proposal** as soon as they are able to write a thesis proposal**,** the sooner the better.

2.- It is a student responsibility to keep the CS **updated** on how the thesis is progressing. An e-mail every month or couple of months is enough. The CS will if appropriate give comments on thesis improvement.

Regarding the thesis defence:

1.- The S is the person who decides if the thesis is ready for the defence.

2.- The thesis defence will be performed in the 2YU.

3.- The thesis need to be accepted by the 1YU. To get that approval:

- The student must send the thesis by e-mail to the CS with CC to: S, 1YU CP, 2YU CP.
- The 2YU will give a go or not go for the defence.
- The thesis cannot be defended until the CS gives his/her ok for proceeding with the defence

4.- Before the defence both supervisors (S & CS) will reach an agreement on the grade for the thesis. Meaning the CS has a word on the grade. The grade proposed by the two supervisors is a recommendation; the final grade is decided during the defence.

5.- The student must follow the 2YU regulations for proceeding with the defence.

6.- It is appropriate that the student (with CC to the S) invites the CS to be virtually present during the defence, just in case s/he would like to.

7.- The students need to send a pdf final version of the thesis to: S, CS, 1YU CP, 2YU CP.

<u>Regarding diploma issuing:</u>

1.- Notice that the thesis defence does not imply the issuing of the diploma. The student should follow the local regulations of 1YU and 2SU for requesting the two diplomas.

2.- Every university has its local contact points to start diploma issuing

XX STUDENT ADVISORY SERVICE

General advice is given by the Service Center for International Students. This includes application,
selection, visa, housing, insurance, enrollment, tuition and social fees, registration, graduation, living and studying.
The local coordinators at partner universities give advice relating to course requirements, examinations,
mobility or any other study-related matters.
A Study PLan Advisor is assigned to the students at their arrival .

XXI EXAMINATION STRUCTURE AND LANGUAGE

The master examination consists of module examinations, the master thesis and its defense.
(A module examination completes a module. It may consist of several partial examinations.
The form of examination is specified in the module description.
Module examinations will be taken during the course of studies.
The examination language is English.

XXII SYLLABI

XXII.1 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.

XXII.2 ADVANCED TOPIC IN SOFTWARE ENGINEERING

Module	Ateneo /
Advances in Software Engineering	OY
Advances in Software Systems	OY
Advanced Project Management	UKL
Advances in Software Engineering	UKL
Advances in Requirement Engineering	UKL
Applied Automata Theory	UKL

Middleware for Heterogeneous and Distributed	UKL
Software Quality	UKL
Advanced Internet Technologies	UNIBZ
Advanced Programming Techniques for Software	UNIBZ
IT and service management	UNIBZ
Lean start up	UNIBZ
Advances in Software Engineering	UPM
Agent Based Software Engineering	UPM

OY: descriptions available at https://weboodi.oulu.fi/oodi/

Advances in Software Engineering
In the module, the student will be introduced to frameworks for product line engineering in large scale software production and maintenance process and techniques in software production. Then will be supplied with basic understanding of RESTful Web Services and related technologies. Upon completing the required coursework, the student is able to design and implement different components of a RESTful Web Service including the Web client. The student becomes familiar with basic technologies to store data on the server, serialize data in the Web and to create Web based clients.

Advances in Software Systems
The objective of this course is to introduce the art of perfomance-related modeling of complex systems of different tye like, embedded, distributed, legacy etc.

UKL: descriptions available at http://wwwagse.cs.uni-kl.de/EMSE/Lectures/

Advanced in Software Engineering
The first objective of this module is to introduce the art of perfomance-related modeling of complex distributed systems.
Content: Performance dimensioning of planned systems, Performance control of running systems Quality of service guarantees in distributed systems, Resource management in distributed systems
The focus will be on different analytical methods for performance modeling, Tail-bounded Network Calculus, MGF-bounded Network Calculus, Application examples / case studies
The second part of the module is dedicated to mastery of special formal and stochastic techniques for safety and reliability analysis of software and systems. In addition to identifying and evaluating risks, the acceptance of risk is considered.

Advances in Project Management
In contrast to industrial production processes the traditional questions of maximum profit input and output quantities recede more and more into the background in the service and information

production in favor of an efficient Management of potential factors over time. The lecture will first compare different modeling languages from production planning, business information and informatics (i.e. networks, EPKs, Petri nets, process algebra) concerning their powerful description for different classes of processes. Then we will analyze whether and in what manner a process optimization can be implemented on the basis of these models concerning given target criteria. Finally we will demonstrate by means of Yield Management processes and Cooperative Supply Chain Scheduling, how in house consideration of processes can be extended to a cross company consideration with multiple autonomous actors and how incentive problems can be challenged in such Multi Agent Systems.

Advances in Requirement Engineering
This course explores new frontiers in Requirement Engineering also in domain non-IT specific. The course describes all activities of the model-based development of software systems from the requirements analysis to code generation. As application, based on state-of-the-art technologies, current research achievements but also industrial practice, it provides solutions to the specific problems of the regarded domain. It thus enables the student to apply the techniques for the model-based development of complex non-IT specific software systems.

Applied Automata Theory
Content: Finite state systems, Büchi automata, MSO and Büchi's theorem, LTL and Presburger arithmetic, Recursive programs, Pushdown automata, pre* and post*, Bounded context switching Tree automata, Rabin's theorem, Parameterised systems, Regular model checking, LTL(MSO), Quotients, abstraction, and extrapolation

Middleware for Heterogeneous and Distributed Information Systems
Content: IS Architecture Concepts, Distributed Transaction Processing, Data Integration DB-Gateways (ODBC, JDBC, SQLJ), Web-based DB Access, Distributed Objects and Components (CORBA, EJB, J2EE - transactions, persistence, security, integration of legacy systems), Message-Oriented Middleware (message queuing, message brokering), XML (fundamentals, XML as an integration technology), Web Services (fundamentals, extensions for robust web services), Business Processes (modelling, workflow management, transactional workflows, orchestration of web services), E-Business Integration

Software Quality
Relevant techniques for software quality assurance are presented.
Content: Dynamic Testing, Static Analysis Techniques, Measures, Dataflow Anomaly Analysis, Review and Inspection Techniques, Formal Proof Techniques

FUB: descriptions available at http://www.unibz.it/en/inf/progs/courses/default.html

Advanced Internet Technologies
The objective of this course is to provide a comprehensive knowledge regarding Internet Technologies. This will include a significant study on design and development of web applications as well as mobile web applications. The course is not on a specific programming language; however, for simplicity most examples will be taken from Java or C++/C#.

Content: Web application design and development, J2EE, Ajax, Web services, Mobile application frameworks, Reliability and scalability, Security and privacy, Grid computing

Advanced Programming Techniques for Software Engineering
To be defined

IT and service management
The module provides a comprehensive overview of IT and IT service management as a whole and of its many specific parts. The course covers in parallel service based management approach and more general topics related to IT, such as: the role and tasks of an IT manager; management and staffing of an IT team; dealing with internal and external customers; managing IT projects (including budget, people, and other resources); understanding available and potential software solutions; ensuring security and compliance with various IT related standards, laws and regulations; learning about different techniques for risk management and disaster recover; working with users; etc. Service-based management of IT is covered on the basis of the Information Technology Infrastructure Library (ITIL, v.3) and includes all five stages of the service lifecycle: service strategy, service design, service transition, service operation, and continual service improvement.

Lean start up
The module introduces to learn by trying out the initial idea, measure it to validate what the effect was, experimentation, iterative product release, measure progress, evaluation of the business idea, finding a business model, customer discovery and validation, operating and decision making in chaos with insufficient data.

UKL: descriptions available at http://emse.fi.upm.es/en/asignaturas.html

Advances in Software Engineering
This module explores modern software development methods in Software Engineering like agile or distributed. The application of such method can vary focusing on different key characteristics of the final software product like usability or accessibility for people with functional diversity. Advanced verification techniques are also discussed together with new frontiers of software maintenance related to data mining.

Agent Based Software Engineering
The module aims at preparing students to have a vision of the different specific and emergent aspects of the Software Engineering, and to go further in some of them and to understand what nowadays software engineering procedures can and cannot reach, their limitations and their possible future evolution.
Content: Introduction to agents, Agent Oriented Software Engineering, Agent Oriented Analysis, Agent Oriented Architectural Design, Agent Oriented Detailed Design, Agent Implementation

XXII.3 TRANSVERSAL SKILLS

Module	CFU/ KP	Ateneo / Universität
Interaction Design	4	OY
IT Infrastructure	5	OY
Mobile and Social Computing	5	OY
Performance Modeling of Distributed Systems	4	UKL
Process Modeling	4	UKL
Product Line Engineering	4	UKL
Grid and Cloud Computing	4	UKL
Advanced Statistics for Data Mining	12	UNIBZ
Research Methods	2	UNIBZ
Critical Software	3	UPM
Software Economics	3	UPM
Interaction Design	6	UPM
Management, Relationships and Communication in	4	UPM

OY: descriptions available at https://weboodi.oulu.fi/oodi/

Interaction Design

The course explains the role of human interaction with products and services, explains the factors and problems related to it to motivate interaction design, and teaches some methods for analysis, evaluation and design of interactions. After completing the course, the student can assess the role of human interaction with information technological products or services and identify factors and problems related to it within a practical design case.

IT Infrastructure
After completing the course, students are able to judge, compare and apply data communications concepts to various situations encountered in industry; identify general concepts and techniques of data communications; explain the technology of the Internet; identify the most important server and storage architectures and the main mechanisms for providing high-capacity processing and storage capacity; and explain the regulatory environment.

Mobile and Social Computing
Upon completing the course the student is able to implement mobile user interfaces, implement online social network applications, explain the fundamental concepts of context awareness and online communities.

UKL: descriptions available at http://wwwagse.cs.uni-kl.de/EMSE/Lectures/

Performance Modeling of Distributed Systems
The course introduces to different techniques for performance evaluation and modelling(measurement , simulation, and analysis), statistical planning and evaluation of experiments, simulation techniques as for example random number generation, analytical methods (queueing networks, network calculus), and application examples / case studies

Process Modeling
The lecture provides basic knowledge in the area of modeling processes. The major goals are to learn about important aspects of real-life processes and related international standards, to get basic insights into modeling custom-tailored processes, and to learn about advantages and disadvantages of existing process modeling notations and tools. Moreover, basic project planning and control techniques based upon explicitly defined process models are taught.

Product Line Engineering
The lectures introduce to basic concepts of product lines (commonality, variability, decisions), role and concepts of architectures (styles, patterns, and scenarios), implementation technologies (MDA, Preprocessors, aspect-orientend development), Technology transfer (Adaptation and adoption of technologies, migration strategies), Reverse-Engineering (basic and detailed analyses, reconstruction of architectural views and structures), Domain analysis (product map, management of varying requirements and system characteristics)

Grid and Cloud Computing
The lectures introduce to introduction to the topic "Grid", Foundations of service-oriented architectures, From Web Services to Grid Services, OGSA/OGSI and WSRF (resource description), QoS considerations, Virtual organisations, SLAs, Monitoring / accounting / billing, Access systems (access, AAI (certificates, policies,infrastructure)), Management (technical / economic)

FUB: descriptions available at http://www.unibz.it/en/inf/progs/courses/default.html

Advanced Statistics for Data Mining
This course has two objectives. First, to provide students with a sound basis in data mining tasks and techniques. Second, to ensure that students are able to implement and use data mining algorithms to solve important research problems.

Research Methods
This course provides research methods for students in computer science.Students are expected to read the assigned material; lectures are aimed at clarifying concepts, answering students' questions, and taking up some of the assigned problems.

UPM: descriptions available at http://emse.fi.upm.es/en/asignaturas.html

Critical Software
The module introduces to safeware concepts, like design, IEC61508 standard, and related human and organizational factors.
Software Engineering Economics
The module will discuss to the value based decision making. After completion of the course the student will be able to generate a project cash flow, compute its economic value in real like situations, and make value-based economic decisions about project acceptance and selection.

Interaction Design
The goal of these lectures is to illustrates interaction design as part of the software development Process. Content: HCD and Requirements Engineering, Envisioning design, A broadened scope for usability, User Participation in Development, Collaboration and global development, Evolution
& maintenance, Specific interaction paradigms

Management, Relationships and Communication in Working Groups
The course introduces to communication paradigms and development personal skills through known paradigms (like Conflict Solving, Inter cultural differences management, Emotional Intelligence, Social Engineering etc.)

XXII.4 FREE CHOICE

Description of thecourse are available at the following URL

FUB http://www.unibz.it/en/inf/progs/courses/default.html
OY https://weboodi.oulu.fi/oodi/
UKL http://wwwagse.cs.uni-kl.de/EMSE/Lectures/
UPM http://emse.fi.upm.es/en/asignaturas.html

Module	CFU/ KP	Ateneo / Universität
Course description available at https://weboodi.oulu.fi/oodi/at		
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
Middleware for Heterogeneous and Distributed Information	8	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	4	UPM
Challenges for accessible computing for people with	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	4	UPM
Software Economics	3	UPM

XXIII Exchange of Scholars

The Partners intend to foster the exchange of lecturers and researchers aiming at cross-fertilization in teaching through research. Scholars are selected by their expertise in the field of Software Engineering or in disciplines that have direct impact on the research and didactics in Software Engineering.

Scholars must stay between a min of two and a max of eight weeks if not otherwise decided by the Joint Board. Scholars must bring concrete added value to the delivery of EMSE programme (teaching, research, promotion activities...). Each Programme or Partner country scholar must come from different higher education institutions. Scholars must sign a contract and a report to the Co-ordinator within three weeks after the end of the stay. The payment of monthly instalments will start after receipt of a copy of the tickets and the signed contract but at the earliest one week before the beginning of the stay.

Selection rules:

- In case of Erasmus Mundus award, scholarship are provided according to the Erasmus Mundus framework
- Institutions must send their proposals related to scholar's invitations to UNIBZ by May every year and at least three months in advance of the commencement of the visit.