Politecnico
di Milano

Software Engineering 2

Brief description of the course organization

Course objectives

- To offer an overview of the principles and techniques of software engineering
- Topics
  - Software lifecycles, standards, project management and metrics
  - Specification languages
    - Alloy
  - Requirements analysis
  - Software architectures and implementation platforms
    - JEE
  - Validation and verification

… for those who graduated here

- Ingegneria del Software 1 focused on development of small scale OO systems
  - Lifecycles
  - Specification and design of a software module
  - Design patterns
  - Some principles concerning documentation
  - Module verification
  - Configuration management
- Software Engineering 2 more focused on development of complex systems, attention to
  - Requirements engineering
  - Architectural design,
  - All kinds of verification perspectives,
  - Project management, effort estimation

Course style

- This is a **graduate course**
- We require interaction and active participation
  - In class during lectures
  - During the development of a (optional) project
- BTW… do not try to study on slides only
- We are experimenting with
  - Innovative and interactive teaching methods
    - “flipped classes”
    - Various forms of (optional) projects
  - Interaction with companies during projects
    - we will try to replicate last year's experience

Instructors

- Students from A to L: Elisabetta Di Nitto
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- Students from M to Z: Matteo Rossi
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- Exercises
  - Mersedeh Sadeghi (mersedeh.sadeghi@polimi.it)
  - Enrico Gargantini (enrico.gargantini@mail.polimi.it)

- The course schedule is published on the web site
- The two classes proceed in parallel

Logistics

- Each group of students (A-L and M-Z) is further split into 2 groups:
  - Group 1: students whose person id is odd
    - i.e., in 10XXXXXY, Y is odd
  - Group 2: students whose person id is even
    - i.e., in 10XXXXXY, Y is even
- Lectures will be online only, through Webex
  - Mostly (but not always) on Wednesday morning, 8.15-11.15
  - For all students, A-Z
- Exercise sessions will be done in person, and they will be replicated for each group
  - Group 1: Tuesday morning, 10.15-12.15
    - Di Nitto: De Donato room
    - Rossi: room 8.1.1
  - Group 2: Thursday morning, 10.15-12.15
    - Di Nitto: room 3.0.3
    - Rossi: room 2.1.4

Book and other material

- Hans Van Vliet
  - Software Engineering: Principles and Practice, 3rd edition
- Ghezzi, Jazayeri, Mandrioli
  - Ingegneria del software: Fondamenti e Principi, Pearson Education Italia
  - Fundamentals of Software Engineering, Prentice Hall
- http://beep.metid.polimi.it/
  - Slides, tools, exercises, interesting links, various info on exams, schedule variations, newsgroup and forum

Assessment: rules (NEW!)

- One final written exam (WE)
  - Score from 0 to 32
  - Focus on all topics presented in the course
  - Longer than in past years
  - 2 parts:
    - A part similar to past years (3 exercises on all course topics) (WE1)
    - A part that concerns the writing of a requirement or design document (WE2)
      - Given the short description of an application, identify requirements, define architecture
    - Each part is up to 16 points
- **Or** ….

Assessment: alternative approaches

- Building blocks:
  - WE1 part of the written exam
  - A project, assigned by us, focusing on requirements analysis and design aspects (R&DD)
  - The implementation and testing of the assigned project (I&T)
  - A research-oriented project on some aspects of software engineering (RP)
- The score of each "building block" is up to 16 points
- You can decide the "mix" of building blocks, with some constraints

Assessment: possible combinations

- You can take
  - WE1 + WE2 or …
  - R&DD and (WE1 or I&T or RP)
- Exam is passed if you get ≥9 points for each building block you take

- Note that R&DD, I&T and RP will be assigned only during this winter session

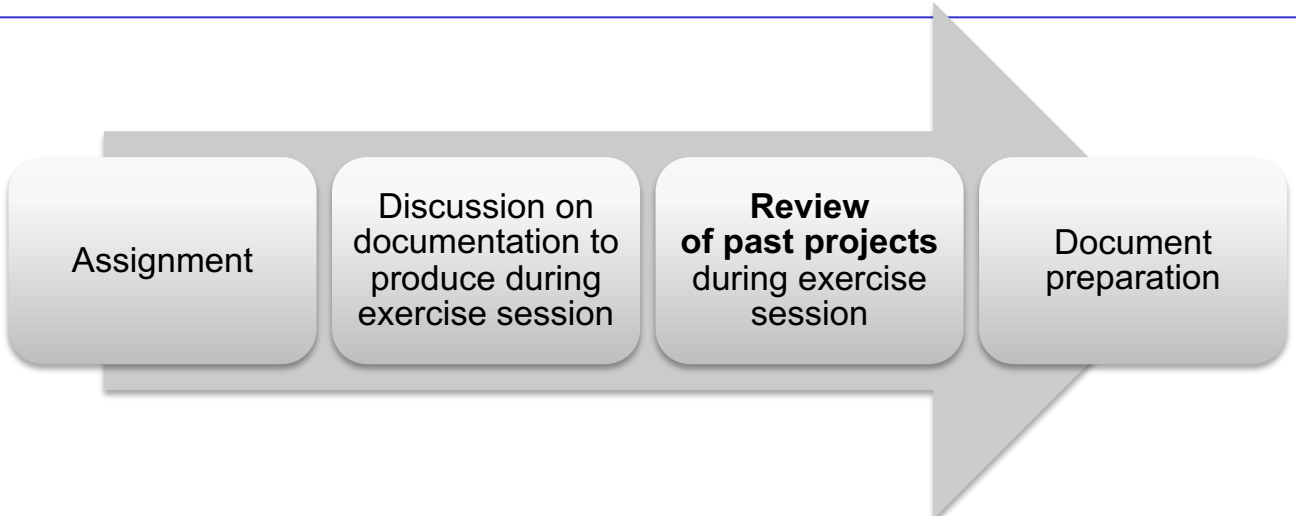
Written Exam (WE1 + WE2)

- WE1: Three exercises focusing on all aspects presented in the course
  - Previous exams are available on the course website
- WE2: Specific exercises to assess your ability to develop the documentation of a complex project (more on this in the next slides)
- During the exam you can use your notes and books
  - The purpose of the course is not to acquire and apply “predefined recipes”, but to get the background needed for building your own approach to the solution!

R&DD Project

- Objective: to help students apply the approaches and principles we teach in class
- Those who choose to do the project will autonomously form groups of at most three persons
  - The project can be done also by "groups of 1"
- Each person in the group can have a specific role (to be declared at the exam)
  - But all have to do some part of each of the assignments (see later)
- Some exercise sessions are dedicated to introducing and discussing the project development

R&DD Project



- We will provide you with an (anonymized) past project, you will look into it offline, and then we will **discuss** its flaws during an exercise session
- You will also be asked to fill out a short questionnaire (before the session) in which you will explain what errors you found.
- Answering the questionnaire with reasonable answers is worth 1 point (of the 16 allocated to the R&DD)
  - Hence, 2 points can be earned through questionnaires (one for requirements, one for design)

R&DD Project

- If you need to improve/update your documents after the submission deadline, you can do so, making sure that you document what changes you applied
- All projects will be reviewed during the final presentations during the exam session
- In summary, the project score is organized as follows:
  - maximum 1 point for each questionnaire
  - maximum 14 points for your work (documents and final presentation)

R&DD Project

- Project assignment: 9/10
- Group registration: 16/10

- RASD submission deadline: 23/12
- Design Document submission deadline: 10/1/2021
- Final project presentations (to be scheduled)

- **You can submit before the deadlines, if you want/need!**

R&DD Project evaluation

- We will assess
  - Quality of the produced artifacts
  - Ability to justify design decisions
  - Ability to explain rationales
  - Ability to coordinate with the other group members
  - Ability to meet the deadlines
  - Presentation

Written Exam – project-oriented (WE2)

- Longer exercise in which you will be given a system description, and you will have to identify requirements and define architecture
- Even students who take WE2 instead of R&DD can fill out the questionnaires (1 for RASD, 1 for DD) commenting about past projects
- In summary, the score of this part is organized as follows (similarly to R&DD):
  - maximum 1 point for each questionnaire
  - maximum 14 points for the actual written exam

Implementation and Testing Project (I&T)

- This is allowed only for groups of two or three persons who have taken the R&DD Project
  - These should be the same groups as for R&DD!
- It is optional and replaces WE1
- The focus will be the same of the R&DD project, the goals are to:
  - Achieve a running prototype implementation offering some of the functionality of the project
  - Test your prototype possibly using some of the automation tools that will be presented in class
  - Evaluate through acceptance testing the prototype implemented by another group
- You can choose to continue with the project right after completing R&DD

I&T Project phases

- Deadline for submitting your I&T deliverable 7/2/2021
- Deadline for submitting your acceptance testing deliverable 14/2/2021
- Final presentation (to be scheduled)

- Evaluation criteria similar to those applied to the R&DD project

- **You can submit before the deadlines, if you want/need!**

Research Project (RP)

- To be agreed with your instructors: we will schedule a dedicated meeting for this around mid-October
- RPs will be assigned in this spring session
- They must be completed by September at the latest

- (speaking of research, but unrelated to RP, there are M.Sc. theses available, if you are interested)