Software Engineering

Course Information

SoftEng http://softeng.polito.it

Version 2.0

What

- What will I learn in this course?

The software ‘factory’

software

Why

I can write a {C, Java, Python, Javascript, PHP, ….} program, what else should I need to know?

Software engineering is about software as a **commercial, industrial product**

Why

Software as an industrial product

- Is large, and requires a **team**, not a single programmer

  -need to share programs and documents

  → configuration management, repository tools

  -need to manage the team

  → project management, team management

Why

Software as an industrial product

- Is made for a **customer**, who has **no notion of computing**

  -need to understand what the customer wants / needs

  → requirement engineering

  -need to define and respect deadlines and contracts

  → project management

  -need to assure a defined level of quality

  → testing

Why

Software as an industrial product

- Is usually a **large and complex** product

  - need to master the complexity, and implement what was promised to the customer

    → software design

    → project management

Why

Software as an industrial product

- Is an asset with a **great financial value** that must last years

    -need to maintain and evolve the product for years

    → software maintenance

    → software design

    → testing

    → configuration management

Why

Software as an industrial product

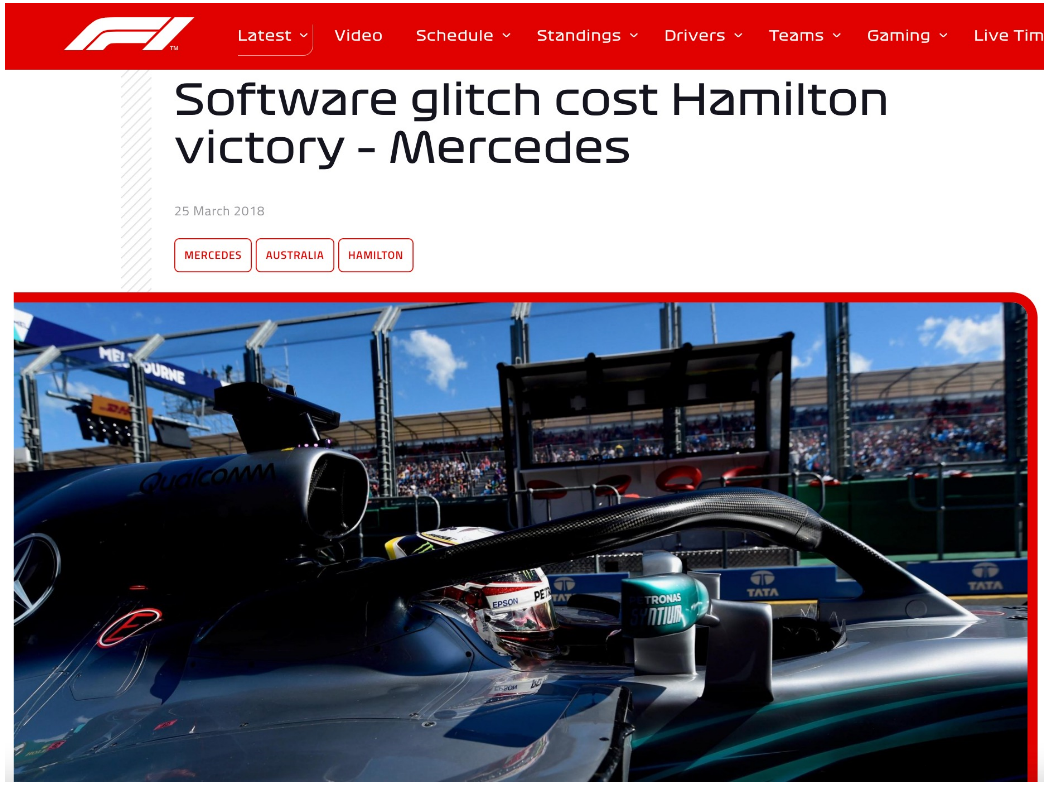
- Is an asset with **critical effect on the customer's business**

    -need to avoid critical defects

    → software testing

    → software quality

Why



Software glitch cost Hamilton victory - Mercedes

25 March 2018

MERCEDES AUSTRALIA HAMILTON

We identified that there was an issue with the software that was telling us at that point that Lewis was safe, and that Vettel would drop out behind us, and then obviously you saw what happened and Vettel dropped out in front after he came in for his pit stop," Shovlin said. "The issue isn't actually with the race strategy software that we use, it was an offline tool that we create these delta time laps with, and we found a bug in that tool that meant that it gave us the wrong number.

Why

- ArianeV rocket launch failure, June 1996
- Due to a system / software defect

Why

Software as an industrial product

- Requires a large number of activities and tools, that must be coordinated and organized effectively

→ software process

Why

- All right, developing software is a f… mess, and that is why i don’t want to do it in my career

Software Is Eating the World

Why

- Software is everywhere!

Why

- Every company should become a software company
  - Amazon vs. Border’s
  - Netflix vs. Blockbuster
  - Apple, Google, Uber, BlaBlaCar vs. Toyota, Volkswagen, GM, ..

Why

- Every person should be computer literate
  - Reading, writing, math, COMPUTING

  - Digital divide
    - Social and work exclusion of citizens who are computer illiterate

- Every engineer should be (way more than) computer literate

Who

- Luca Ardito
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- Tommaso Fulcini
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When (and where)

Day	Time	Room
Monday	17.30 – 19.00	4P
Wednesday	8.30 – 11.30	1P
Friday	14.30 – 17.30	4P

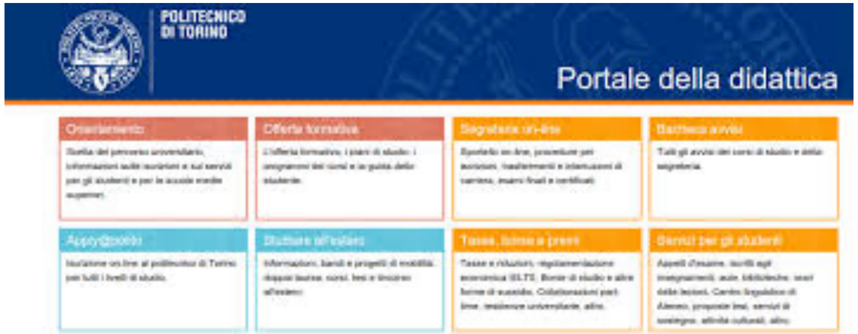
- BYOD (Bring Your Own Device)!
    - Rooms 1P and 4P have plugs!
- All the lectures will be streamed and recorded

How

- Lectures and Exercises
  - In classroom, BYOD
- Participation is important
  - live / in streaming / on demand
- Slack discussions
  - Join right now following this link:
    - https://join.slack.com/t/softwareengin-zu84910/shared_invite/zt-2d6qy65s6-tNH7UORxDzRSPAeBYmf5wA

  ONLY WITH @polito.it email

How



POLITECNICO DI TORINO

Portale della didattica

Orientamento: Scelta del percorso universitario, informazioni sulle iscrizioni e sui servizi per gli studenti e per le scuole medie superiori.

Offerta formativa: L'offerta formativa, i piani di studio, i programmi dei corsi e la guida dello studente.

Segreteria on-line: Sportello on line, procedure per iscrizioni, trasferimenti e interruzioni di carriera, esami finali e certificati.

Bacheca avvisi: Tutti gli avvisi dei corsi di studio e della segreteria.

Apply@polito: Iscrizione on line al politecnico di Torino per tutti i livelli di studio.

Studiare all'estero: Informazioni, bandi e progetti di mobilità: doppie lauree, corsi, tesi e tirocini all'estero.

Tasse, borse e premi: Tasse e riduzioni, regolamentazione economica ISEE, Borse di studio e altre forme di sussidio, Collaborazioni part time, residenze universitarie, altro.

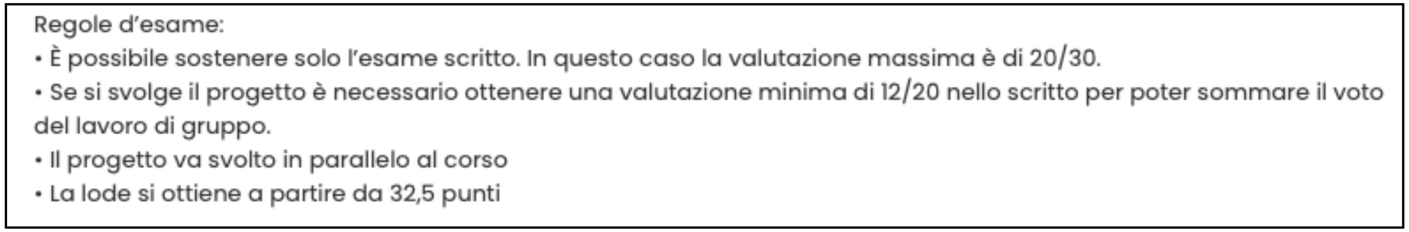
Servizi per gli studenti: Appelli d'esame, iscritti agli insegnamenti, aule, biblioteche, orari delle lezioni, Centro linguistico di Ateneo, proposte tesi, servizi di sostegno, attività culturali, altro.

What will I learn?

- Software Engineering
  - Motivation, issues, problems
- Requirement engineering
  - How to understand what the customer / user needs
- Design
  - How to put together components which deliver what the customer needs
- Verification and Validation
  - How to assure that the product does what it is supposed to do
- Project management
  - How to manage teamwork and deliver the product
- Software process
  - How to organize activities and tools, what process models are available

How to… pass the exam

- Two parts
  - Project work (explained in detail later)
  - Exam
- Exam: 33 points
  - Passed if mark >= 18
- Project: 33 points
  - Passed if mark >= 18



Regole d’esame:

- È possibile sostenere solo l’esame scritto. In questo caso la valutazione massima è di 20/30.
- Se si svolge il progetto è necessario ottenere una valutazione minima di 12/20 nello scritto per poter sommare il voto del lavoro di gruppo.
- Il progetto va svolto in parallelo al corso
- La lode si ottiene a partire da 32,5 punti

- Final Grade
  - (GradeExamIfGT17,5 * 0,6 + GradeProjectIfGT17,5 * 0,4) OR
  - (GradeExamGT29,5 * 0,6 && (noProject || projectLT17,5))

Books and References

- Bruegge Dutoit, Object Oriented Software Engineering
- Ian Sommerville, Software Engineering, Pearson ed.
  - Also, Pfleeger, Pressman, Shach
- Martin Fowler, UML Distilled

And then?

- How does Software development work in practice?
  - Modern teams organize with agile practices
- Quality is a key component in engineering practice, how does it work in Software engineering?
  - Software analytics allow measuring and controlling Sw projects
- Evolution is intrinsic in software, how do you tame it?
  - Advanced debugging methods, log analysis, reverse engineering techniques

Software Engineering 2!

- Professors: Marco Torchiano, Antonio Vetrò
- A practical, project-oriented course to learn how software is crafted in modern teams
- Let’s try in practice
  - Software Scrum
  - Planning poker
  - Technical debt
  - Software smells

Project

Process and product

- Apply a state-of-the-art software engineering process to a (small) project:
  - Use of tools
  - Use of techniques
  - Use of process
  - Work in a team

- Receive an existing project, test and slightly modify it

Constraints

- Project must be developed in parallel with course
- The object to be developed is the same for all the teams
  - Discussion inside the team is essential
  - Copying between teams is forbidden
- Antiplagiarism tools will be applied
- All communications only via defined tools
  - (mostly the Git repository, or Slack)

Steps

1. Teams will be defined by us
   - You cannot choose your teammates (as it happens in real life!)
2. Set up repository
   - You will receive an email (@polito account) for setting up your account and team repository
3. Access objects of development on repository
4. Produce various deliverables

To be produced

- Requirements document
- Design document
- Code
- Test suite – unit level, integration level
- Test suite, API level
- Change Request