

# DevOps

## Innopolis University

Fall 2021

by  
Dr. Paolo Ciancarini

# Welcome!

# Dr. Paolo Ciancarini

- Professor
  - University of Bologna (since 1992)
  - Dept.of Computer Science
- Research
  - Advanced software engineering methods, techniques and tools
- Teaching (BS, MS, PhD)
  - Software Engineering
  - Distributed software systems
  - Advanced agile design, Autonomous systems, Multiagent systems
- Contact info
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# Course description

# Course card

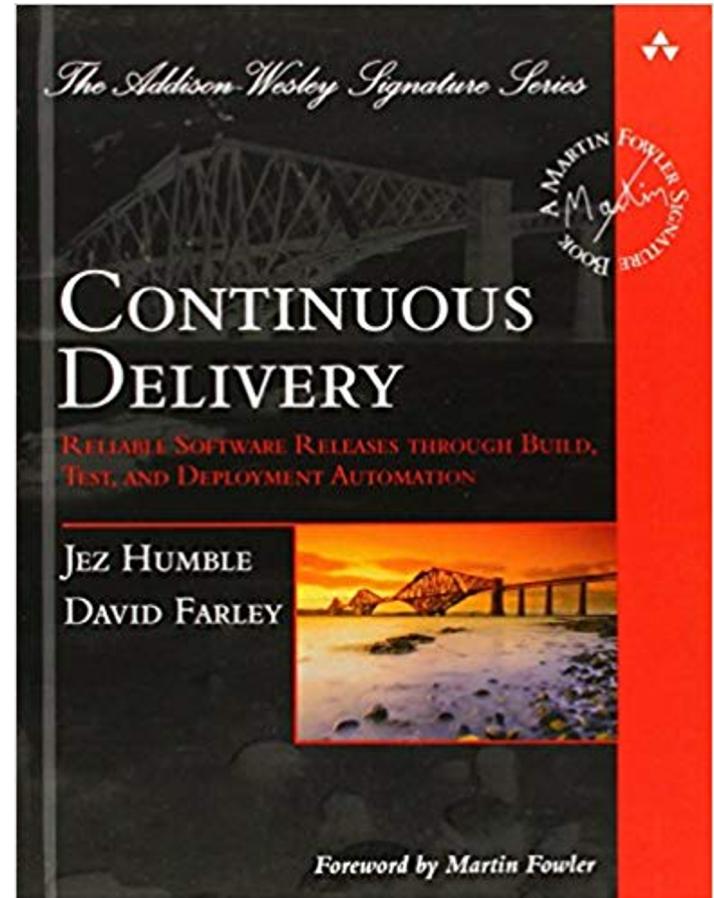
| Property    | Details   |
|-------------|---|
| Title       | DevOps  |
| Course type | Core  |
| Faculty     | Computer Science and Engineering  |
| Major       | Computer science  |
| Term        | 3th (S6) and 4th (S8) year bachelor   |
| ECTS        | 5 (Note: 1 ECTS requires between <b>25-30hs</b> of both in-class and out-of class work) |
| Starting    | 23/8/2021   |
| Ending      | 30/9/2021 (tentative)   |
| Instructors | Dr. Paolo Ciancarini, Dmitriy Creed (PoP), Kiril Saltanov (TA)                          |
| Weekly load | <b>25 hours/week</b> (150hs/6 weeks) in “average” for an “average” student              |

# Objectives

- Software engineering
  - Recall on sw processes
  - Introduction to DevOps
  - Deployment pipeline
  - Configuration Management
  - Build Management
  - Test Management
  - Deploy/Release Management
  - Metrics
- Organisation/People
  - Project management
  - Collaborative work
  - DevOps culture
- R&D
  - Project development
  - Reporting
  - Reviewing

# Bibliography: main reference

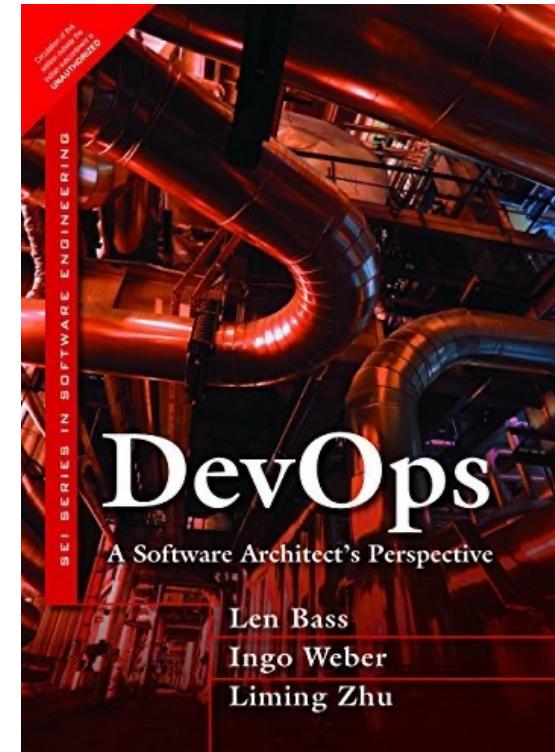
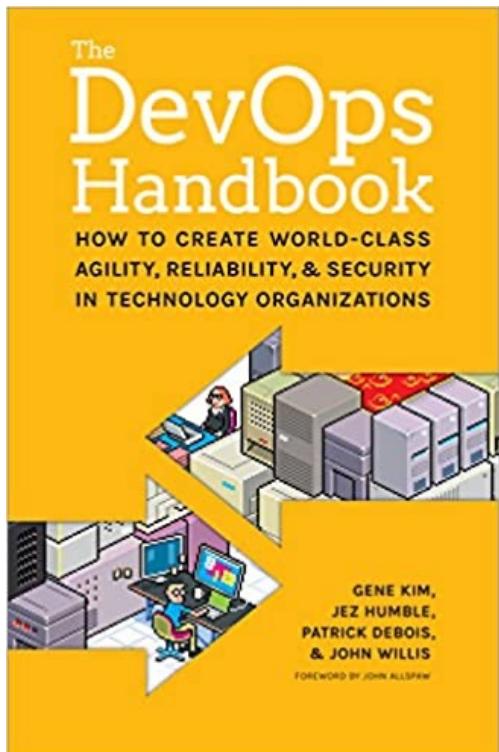
- Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation (Addison-Wesley Professional); 2010, by Jez Humble and David Farley.



# Bibliography: complementary relevant references

- [DevOps: A Software Architect's Perspective](#), SEI, Addison-Wesley Professional; 1 edition (May 28, 2015), by Len Bass, Ingo Weber, and Liming Zhu.
- [Deployment and Operations for Software Engineers](#) (Paperback, April 29, 2019), by Len Bass and John Klein.
- [Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale](#), O'Reilly Media; 1 edition (June 24, 2016).
- [DevOps for Developers](#), Apress; 1 edition (September 12, 2012).
- [The DevOps Handbook](#), IT Revolution Press; (October 15, 2016).
- [DevOps Defined](#), O'Reilly Media, Inc.; (December 15, 2017).
- [Continuous Integration](#), Addison-Wesley Professional; (June 29, 2007).

# Two more books



# Activities

- Lecture
- Readings
- Project lab (individual)
  - Analysis, Design, and Implementation
  - Report writing
- Assessment



# Schedule

Tuesday (24.08) 106 room 9:30-11:00 and 11:10-12:40

Wednesday (25.08) 106 room 9:30-11:00 and 11:10-12:40

Thursday (26.08) 106 room 9:30-11:00 and 11:10-12:40

Saturday (28.08) 106 room 9:30-11:00 and 11:10-12:40

September 7, Tue morning - two lectures

September 8 Wed morning - two lectures

September 9 Thu morning - two lectures

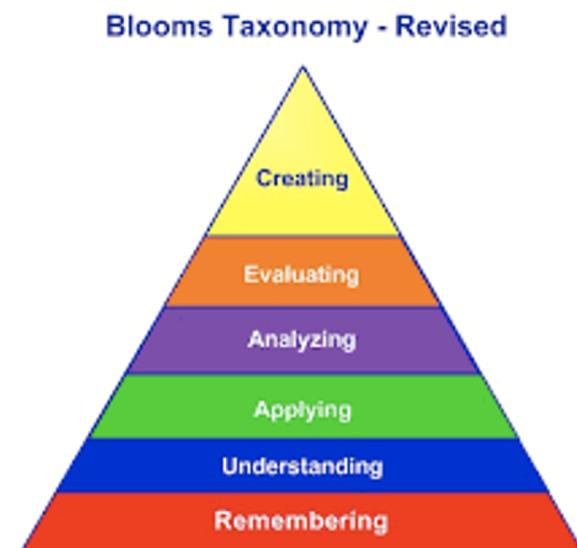
September 11 Sat morning - one lecture

Also available on [Moodle](#)

# (Expected) Learning outcomes

- Design and implement a Deployment Pipeline for a particular software development project (**LO1**)
- Classify sw development tools based on certain quality attributes (**LO2**)
- Use and integrate existing tools (**LO3**)
- Write a report of scientific and technical quality (**LO4**)
- Plan, coordinate, and report activities in a multi-participant project (**LO5**)

| Learning outcome | Bloom's level [1] |
|------------------|-------------------|
| LO1              | Apply (L3)        |
| LO2              | Evaluate (L5)     |
| LO3              | Apply (L3)        |
| LO4              | Create (L6)       |
| LO5              | Apply (L3)        |



# Mapping Activity - Learning outcome

| Activity                                    | Learning Outcome        |
|---|-------------------------|
| Summary recall on sw processes (Lecture)    | LO4                     |
| Introduction to DevOps (Lectures)           | LO1,LO3                 |
| DevOps culture and background (Lecture)     | LO2,LO4                 |
| Deployment pipeline (Lecture)               | LO1, LO2, LO3           |
| Configuration Management (Lecture)          | LO1, LO3                |
| Build Management (Lecture)                  | LO1, LO3                |
| Test & Deploy/Release Management (Lectures) | LO1, LO3                |
| Metrics (Lectures)                          | LO1, LO3                |
| Lab sessions                                | LO1, LO2, LO3, LO4, LO5 |
| Report writing                              | LO4, LO5                |

**LO1:** Design and implement a Deployment Pipeline for a particular software development project.

**LO2:** Classify tools based on certain quality attributes.

**LO3:** Use and integrate existing tools.

**LO4:** Write a report of scientific and technical quality.

**LO5:** Plan, coordinate, and report activities in a DevOps project.

# Tools

- [Moodle@IU](#)
  - Material
    - Slides
    - Docs
- Telegram group
- Submissions (to be defined)

# Grading: overall view

- Attending class: **10%**
- Project deliverables: **70 %**
  - 1x group submission **[individual grade]**
- In-class assessment: **20%**
  - 1x **[individual grade]**

# Grading: Project deliverables (70%)

- One single packaged submission (.zip file) consisting of:
  - Artefacts
    - Selected Product (source files)
    - Test Cases
    - Scripts, configuration files, ... to setup the Deployment Pipeline
    - ***Readme.txt***: detailed step-by-step instructions on how to make use of the provided files to setup the Deployment Pipeline
    - ***Scenarios.txt*** file that contains enough test cases that allow to demonstrate the correct functioning of the Deployment Pipeline.
  - Report
    - .pdf file adhering to the **IEEE Manuscript Templates for Conference Proceedings**
    - between 3000 and 4000 words (6 pages long, max.)

# Grading: Project deliverables (70%) - cnt'd

- Important remarks
  - Submission
    - Made through Moodle.
      - In case of size limit problem, then use a file transfer web service (e.g. Google Drive, Dropbox, etc), and add the info into the ***Readme.txt***
  - Correctness
    - Explanations should be precise enough to:
      - create the Deployment Pipeline in a given state (***Readme.txt***)
      - reproduce the state required to run the provided test cases ((***Scenarios.txt***)

# Grading: In-class assessment (30%)

- Made using Multiple Choice Questions (MCQs) approach
- Questions based on textbook *Continuous Delivery*, by Humble and Fairley.
  - Complement the theoretical material presented during the session.
- Aim of the questions: to assess whether the student has
  - read the given material
  - understood the main takeaways of the given material.
- Grade (30%)
  - Individual grade

# Grading: summary

- Project deliverables:
  - 70 %
  - individual grade
  - **1 submission required**
  
- In-class assessment:
  - 30%
  - individual grade
  - **NO submission required**

That's all about the  
course introduction.

# References

1. Anderson, L., Krathwohl, D., Bloom, B.: A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives. Longman (2001).

# Questions?

# Student

- What is your pre-state?
  - Acquired knowledge
    - Conceptual
    - Technical
- Useful as reference
  - For the teacher
  - For yourself
    - To find out what you have learnt after having followed the course



# Bloom's levels

- No knowledge at all (**L0**)
- Remember (**L1**): capable to explain very partially it
- Understand (**L2**): capable to explain clearly it and illustrate
- Apply (**L3**): capable to execute a task that implies to understand the knowledge
- Analyse (**L4**): capable to understand all the sub-knowledge parts and their relations that constitute the knowledge.
- Evaluate (**L5**): capable to define appropriate criteria and associated evaluation metrics in order to decide on the relative value of the knowledge.
- Create (**L6**): capable to synthesize a new version of the knowledge in order to improve it with respect to the evaluation of some evaluation criteria.

# Bloom's levels example: “an apple”

L0 = never encountered this notion in my life.

L1 (Remember) = an apple is something round and green.

L2 (Understand) = an apple is the fleshy usually rounded red, yellow, or green edible pome fruit of a usually cultivated tree.

L3 (Apply) = I can provide a list of fruits = apple, orange, tomato, ...

L4 (Analyse) = an apple has a shape, a skin, a flesh, a pollination process and nutrition properties.

L5 (Evaluate) = the shape of an apple is measured using a diameter, the skin has a color mainly belonging to the colors [red, yellow, green, pink] or bi- or tri-coloured from those colors, the flesh has a color mainly belonging to the colors [pale yellowish-white, pink, yellow]. The nutrients of an apple are the energy measured in kcal and the following categories measured in g: carbohydrates, fat, protein, vitamins, minerals and water. The nutrition values can be qualified according to the daily needs of a human being.

L6 (Create) = I can create a new variety of apple with more intense red color by supplying less water to the plant than it requires for maximum transpiration and growth, thereby inducing a low level of water stress. The vegetative growth of the tree is reduced, allowing more light to penetrate the canopy and color the fruit.

# Initial knowledge assessment

- Fill out the survey.
  - Use Bloom's levels to express "your knowledge" to the given statement.
  - To be honest
    - Get an overall view
    - No judgment
    - No grading
- Do it -> <https://forms.gle/yutpCCfWxAfj4UcW9>

# Review your Scrum knowledge

- <https://www.scrum.org/open-assessments>