

Programming Ubiquitous Things
2025/26 - Spring 2025 - UiO

Introduction to the Course

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https://www.uio.no/studier/emner/matnat/ifi/IN5600/v24/index.html

Questions: feel free to interrupt at any moment

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Goals



- Course content:
  - it will provide a solid base for understanding the **challenges** and **problems** underlying the **design** and **development** of support **software** (middleware and operating system) for applications in environments with **mobile and ubiquitous entities** (people, hardware, software)
  - it will teach **how to specify, design, program, analyze and implement** such systems and applications

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Learning Outcome



- Understand:
  - the basic principles and concepts of ubiquitous computing systems and their relation to other models
  - the challenges of developing ubiquitous based applications and middleware, and the possible solutions to deal with them
- Be capable to:
  - decide which is the best approach for a particular problem regarding the design and development of a ubiquitous computing system
  - design and implement an application using ubiquitous computing while taking into account some of the issues mentioned
  - measure and analyze the performance of a ubiquitous computing application

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Professors

- Paulo Ferreira (lectures)
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- Lyla Naghipour Vijouyeh (labs)
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  - lylan@ifi.uio.no
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Program

- Introduction to Course
- Introduction to Android
- Introduction to Mobile and Ubiquitous Computing
- Fundamentals challenges and problems of Mobile and Ubiquitous Computing
- Context-Awareness
- Location
- Adaptability
- Resource and usage (cyber-foraging)
- Replication, consistency, synchronization
- Battery Usage
- Security

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Schedule

- Lectures:
  - Theoretical classes
  - Thursday, 10h15-12h
  - Slides + Talks
  - The first class is mandatory (23 January 2024)
- Group Sessions:
  - Lab. Classes (starts 28 January 2024)
  - Tuesday, 14h15-16h
  - Individual exercises + individual project + group project

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Bibliography - Main

- **Slides**
- **Distributed Context-Aware Systems**. Paulo Ferreira, Pedro Alves. Springer - ISBN:978-3-319-04881-9. 2014. https://www.springer.com/gp/book/9783319048819
- **Location Systems: An Introduction to the Technology Behind Location Awareness.** Anthony LaMarca, Eyal de Lara. Synthesis Lectures on Mobile and Pervasive Computing Jan 2008, Vol. 3, No. 1, Pages 1-122. https://link.springer.com/book/10.1007/978-3-031-02478-8
- **Cyber Foraging: Bridging Mobile and Cloud Computing**. Jason Flinn. Synthesis Lectures on Mobile and Pervasive Computing Sep 2012, Vol. 7, No. 2, Pages 1-103. https://link.springer.com/book/10.1007/978-3-031-02481-8
- **Replicated Data Management for Mobile Computing**. Douglas B. Terry. Synthesis Lectures on Mobile and Pervasive Computing Jan 2008, Vol. 3, No. 1, Pages 1-94. https://link.springer.com/book/10.1007/978-3-031-02477-1

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Bibliography - Secondary



- Selected articles. ACM, IEEE, Elsevier
- http://developer.android.com/develop/index.html

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Evaluation



- Presentations of articles: mandatory (min = 20 min; max = 25 min)
- Moderation of articles: for each presentation there is a moderator
- Mandatory individual project to be done by each student (show it works)
- Group project assignment (2 students if IN5600; if IN9600 just 1):
  - 50% in the final evaluation (show it works; write report; exam)
- Oral exam (see questions in the web site):
  - 50% in the final evaluation
  - the participants in the group are heard in the project simultaneously and examined in the theoretical material; final grades are given individually
- The evaluation components parts must be done successfully in the same semester
- No examination support material is allowed for the oral exam
- The oral exam is in English

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Presentation and Moderation

- I will share some slides with you regarding the mandatory presentation
- Students should tell me (paulofe@ifi.uio.no) in case they do not do the mandatory presentation the week before
- For the mandatory moderation (like in a conference):
  - students should always come to the class (whether there is a presentation or not)
  - students will do the following:
    - keep the order in the room saying who is allowed to ask a question
    - ask a few questions regarding the paper that has been presented
- Each student does:
  - Mandatory individual project
  - Group project (2 students if IN5600; if IN9600 just 1)
  - Mandatory presentation and mandatory moderation of an article (groups of 1)
  - Oral exam (individual grading)

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Projects and Detailed Plan

- Individual project specification delivered to students:
  - 18 February in the lab class
  - delivered and seen by the professor in the lab class on 25 February
- Group project specification:
  - delivered to students on 25 February in the lab class
  - group project delivered by students (in devilry - https://devilry.ifi.uio.no) on 2 May (Friday) at 23h59
- See detailed plan here

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