Lab on app development for tablets and smartphones

Summary
This course introduces mobile application programming and system-level power management for Android OS. The students learn to develop low-power Apps on mobile platforms (in tablets, smartphones and smartwatches). Students receive a tablet and a smartwatch, and can use their smartphones if desired.

Content
• Introduction to system-level architectures of tablets, smartphones and smartwatches.
• Basics of Java programming.
• Introduction to Android and Android Architecture overview
• Setup of Android Development environment.
• Android Application Fundamentals and Android components (Activities, Services, etc.).
• Apps User Interface and main Building Blocks.
• Hardware resources, local data storage and cloud storage.
• Interacting with other IoT devices (e-health monitors).
• Efficient battery use and low-power management.
• Deployment to Market and “monetization”.

Keywords
Embedded systems, IoT, mobile platforms, smartphones, smartwatches, Android, system-level design, advanced programming, App.

Learning Prerequisites
Recommended courses
- Lab on Digital Systems Design (EE-390(a)).

Learning Outcomes
• Analyze requirements of Apps to be designed.
• Assess / Evaluate complexity of a certain App design.
• Choose the right set of technologies to include an App design.
• Optimize o optimize an App design to improve performance and reduce power consumption.
• Implement the required services and modules to design Android Apps.
• Test the final App design.
• Discuss the possible bugs and defects found in the App.
• Select appropriately techniques to correct those bugs.

Transversal skills
• Assess progress against the plan, and adapt the plan as appropriate.
• Plan and carry out activities in a way which makes optimal use of available time and other resources.
• Access and evaluate appropriate sources of information.
• Assess one's own level of skill acquisition, and plan their on-going learning goals.
• Evaluate one's own performance in the team, receive and respond appropriately to feedback.
• Continue to work through difficulties or initial failure to find optimal solutions.
• Use both general and domain specific IT resources and tools

Teaching methods
The course will include a combination of lectures and practical exercises in the laboratory to understand the baseline technologies and design aspects required in the development of Apps in Android-based. Then, in the last part of the course, it will be developed a project on a topic defined by the students team or the teacher to evaluate the learned technologies in real-life setups.

Expected student activities
Individual exercises in Android-based platforms, interact in the course, develop a complete project in the laboratory working in a team.

Assessment methods
The evaluation will be based on a mid-term and a 2- or 3-person project done in the last part of the semester.

Resources
Bibliography
List of references provided in class, cf. on the Moodle page of the course. Support material: lecture slides, lab handouts, code snippets, example applications, solutions to the labs will be available through the Moodle page.

Websites
• https://developers.google.com/training/courses/android-fundamentals

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=15420