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 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://developer.android.com/courses/fundamentals-training/overview-v2

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=14012