

**Module Description, available in: EN**

## Mobile Computing

**General Information****Number of ECTS Credits**

3

**Module code**

TSM\_MobCom

**Valid for academic year**

2020-21

**Last modification**

2019-10-10

**Coordinator of the module**

Thomas Amberg (FHNW, thomas.amberg@fhnw.ch)

**Explanations regarding the language definitions for each location:**

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Lausanne			Lugano	Zurich		
<b>Instruction</b>					X E 100%		
<b>Documentation</b>					X E 100%		
<b>Examination</b>					X E 100%		

**Module Category**

TSM Technical scientific module

**Lessons**

2 lecture periods and 1 tutorial period per week

**Entry level competences****Prerequisites, previous knowledge**

Students have working knowledge in:

- Programming in Java
  - Software development and frameworks
  - Desktop or mobile user interface development
  - Internet protocols, HTTP and sending Web requests
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- Students bring a laptop to class.
  - Students bring an Android phone to class (if possible).

## Brief course description of module objectives and content

This module enables students to develop advanced, native applications for the Android mobile operating system and get a solid understanding of mobile computing concepts. Building on the basics of mobile application development, this course covers a selection of application programming interfaces for on-board sensors and connectivity options for the integration with backend services, IoT platforms and peripheral devices. Lecturers share their experience and best-practices from recent projects involving mobile computing. Students work with both emulators and real devices.

## Aims, content, methods

### Learning objectives and acquired competencies

#### Application Development (50%)

- Students know how to design and implement native applications for mobile devices running Android, the most widely used mobile platform.
- Students have basic knowledge of user-interface design guidelines and techniques relevant for mobile application design.
- Students can describe the integration of their application with a backend Web service.

#### Sensors and Connectivity (50%)

- Students know how to use on-device sensor APIs for motion, position and environment.
- Students have basic knowledge of connectivity options like Near Field Communication (NFC), Bluetooth Low Energy (BLE) and Wi-Fi.
- Students can describe the integration of their application with a peripheral device or IoT platform using request/response or messaging protocols.
- Students have basic knowledge of prototyping a peripheral IoT device with an Arduino-compatible hardware platform, sensors and actuators.

### Contents of module with emphasis on teaching content

#### Application Development

- Development of native mobile applications for Android, including user interfaces
- Specific aspects in mobile application programming such as application lifecycle, data storage, data synchronization with servers and cloud services, security / sandboxing of mobile applications and power management.

#### Sensors and Connectivity

- Development with on-device sensor APIs for motion, position and environment.
- Specific aspects of connecting to peripheral devices with connectivity options like NFC, BLE and Wi-Fi, prototyping an IoT device and integration with IoT platforms.

### Teaching and learning methods

- Ex-cathedra teaching
- Mini-projects
- Exercises
- Self-Study

### Literature

#### Android

- IDE <https://developer.android.com/studio>
- Docs <https://developer.android.com/docs>
- Source Code <https://source.android.com/>

#### Arduino

- IDE <https://www.arduino.cc/en/Main/Software#download>

## Assessment

### Certification requirements

Module uses certification requirements

### Certification requirements for final examinations (conditions for attestation)

Mini-projects count 30% for final examination mark.

### Basic principle for exams

**As a rule, all the standard final exams for modules and also all resit exams are to be in written form**

### Standard final exam for a module and written resit exam

**Kind of exam**

written

**Duration of exam**

120 minutes

**Permissible aids**

*Aids permitted as specified below:*

**Permissible electronic aids**

No electronic aids permitted

**Other permissible aids**

- Closed book examination
- Personal 1-page summary allowed

**Special case: Resit exam as oral exam****Kind of exam**

oral

**Duration of exam**

30 minutes

**Permissible aids**

No aids permitted