

Module: Mobile Human-Computer Interfaces

Level	Master	Short Name	MoHCI
Responsible Lecturers	Matthies, Denys, Prof. Dr.		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Applied Information Technology, Master		
Compulsory/elective	Compulsory elective	ECTS Credit Points	5
Semester of Studies	2	Semester Hours per Week	4
Length (semesters)	1	Workload (hours)	150
Frequency	WiSe	Presence Hours	60
Teaching Language	German/English	Self-Study Hours	90

The following section is filled only if there is **exactly one** module-concluding exam.

Exam Type	Project Work	Exam Language	German/English
Exam Length (minutes)		Exam Grading System	One-third Grades
Learning Outcomes	<p>After successfully completing the course, participants acquired theoretical and practical knowledge on the design, implementation, and evaluation of mobile applications. Course participants learned that a “good” mobile application is more than user interface eye candy. In particular, students will:</p> <ul style="list-style-type: none"> • know a variety of application scenarios for mobile applications • can apply different technologies to develop mobile applications • are capable of appropriately evaluating mobile applications, such as by applying basic usability & UX evaluation techniques • know gestalt laws, typography rules, and UI guidelines for mobile applications • understand the design process and HCD life-cycle • be able to apply low-fidelity prototyping while taking into account user-centered design strategies • have improved analytical, teamwork, and presentation skills 		
Participation Prerequisites			

The previous section is filled only if there is **exactly one** module-concluding exam.

Consideration of Gender and Diversity Issues	<ul style="list-style-type: none"> ✓ Use of gender-neutral language (THL standard) ✓ Target group specific adjustment of didactic methods ✓ Making subject diversity visible (female researchers, cultures etc.)
Applicability	The module can be used within the Master of Computer Science/Software Engineering for Distributed Systems
Remarks	

Module Course: Mobile Human-Computer Interfaces (Lecture)

(of Module: Mobile Human-Computer Interfaces)

Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	2
Participation Limit		Semester Hours per Week	2
Group Size		Workload (hours)	60
Teaching Language	English	Presence Hours	30
Study Achievements ("Studienleistung", SL)		Self-Study Hours	30
SL Length (minutes)		SL Grading System	

The following section is filled only if there is a course-specific exam.

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	<p>The course features in-person lectures and online lectures. The following contents are taught in-person:</p> <ul style="list-style-type: none"> • Introduction to mobile applications, discussing different device categories and their properties. It gives an overview of various development platforms for mobile apps and outlines common application scenarios where mobile apps are utilized. • Basics in sketching a mobile UI: focuses on the use of layers and shapes, visual design principles, and grid systems to create structured and aesthetic interfaces. • Conceptualization of Design Principles: covers the key elements such as design patterns, wireframes, and layout. It also addresses grids, iconography, color theory, and Gestalt laws, providing a comprehensive fundamentals for designing mobile UIs. • Typography: explains the fundamentals, including different font types, and the concepts of kerning, tracking, and leading. It also discusses how line length and spacing impact readability and overall text design. • Low fidelity Prototyping: discusses paper prototyping and wireframing, which are used to quickly visualize and test design concepts before moving to more detailed development stages. • User-centered Design fundamentals: covers the mockup of mood boards and personas to guide design decisions. It emphasizes user, human, or humanity-centered design
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approaches and explores the principles of design thinking to ensure solutions are tailored to user needs.

- **Usability heuristics & User Experience guidelines:** focusing on general best practices for designing intuitive, consistent, and predictable user interfaces. These principles help ensure a smooth and user-friendly experience across mobile and other platforms and digital products.
- **Evaluation:** detailing the study design and methods for data acquisition. It discusses the use of both new and established questionnaires to quantify usability and user experience, and explains data analysis techniques, including statistical analysis and machine learning/pattern recognition methods.

The course is complemented through online lectures comprising of:

- **Android:** covers an introduction to Android Studio, Android UI Guidelines, integrating APIs, managing local data with SQLite, and applying Material UI principles to enhance app design and functionality.
- **iOS:** focuses on using Xcode and Swift, with an emphasis on Swift UI for designing intuitive interfaces. Further the broader iOS ecosystem and the integration of Firebase is explored for backend functionalities.
- **Unity:** starting with an introduction to the platform while highlighting media enrichment capabilities, such as sound, videos, and animations. Further input controls, including buttons and gestures as well Unity's augmented reality capabilities are covered.
- **Flutter:** introduction to the cross-platform framework and its basic features. It is explained how Flutter integrates with Firebase for authentication and database access. The use of widgets and animations to enhance app functionality is demonstrated.
- **React Native:** and its JSX syntax is introduced guiding users on how to get started with developing cross-platform apps. It also covers integration with Firebase and its APIs for functionalities like authentication and data management.

Literature

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- Hart, S. G. & Staveland, L. E. (1988) Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. In P. A. Hancock and N. Meshkati (Eds.) Human Mental Workload. Amsterdam: North Holland Press.
- Jackson, W. (2014). Pro Android UI. Apress.

- Love, S. (2005). Understanding mobile human-computer interaction. Elsevier.
- Lukosek, G. (2016). Learning C# by Developing Games with Unity 5. x. Packt Publishing Ltd.
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- Mostefaoui, G., Tariq, F (2018) Mobile Apps Engineering: Design, Development, Security, and Testing, Chapman and Hall.
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- Schrepp, M., Hinderks, A., & Thomaschewski, J. (2017). Construction of a Benchmark for the User Experience Questionnaire (UEQ). *Int. J. Interact. Multim. Artif. Intell.*, 4(4), 40-44.
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- Windmill, E. (2020). Flutter in action. Simon and Schuster.

Remarks	
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Module Course: Mobile Human-Computer Interfaces (Practical Training)

(of Module: Mobile Human-Computer Interfaces)

Course Type	Practical Training	Form of Learning	Presence
Mandatory Attendance	yes	ECTS Credit Points	3
Participation Limit		Semester Hours per Week	2
Group Size	12	Workload (hours)	90
Teaching Language	German/English	Presence Hours	30
Study Achievements ("Studienleistung", SL)	Practical Training	Self-Study Hours	60
SL Length (minutes)		SL Grading System	Pass

The following section is filled only if there is a course-specific exam.

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	The practical course serves to apply the teaching content presented in the lecture and to deepen a specific current topic centering around designing usable mobile applications.
Literature	See lecture
Remarks	