

<b>Module title</b>		<b>Abbreviation</b>
Principles of Interactive Systems		10-HCI-PRIS-212-m01
<b>Module coordinator</b>		<b>Module offered by</b>
holder of the Chair of Computer Science IX		Institute of Computer Science
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
5	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	graduate	--
<b>Contents</b>		
<p>The module teaches requirements, concepts and practical solutions for interactive human-computer systems of extended reality (virtual reality, mixed reality, augmented reality), perceptual computing, computer games and cyber-physical systems. Due to their common characteristics, these systems have recently often been referred to as real-time interactive systems.</p> <p>In the lecture, theoretical models are introduced, requirements of the application domain are derived, and current and novel conceptual and practical solutions are presented. First, conceptual principles for characterizing real-time interactive systems are presented. Then, conceptual models of the mission-critical aspects of time, latencies, processes, and events necessary to describe the behavior of a system are introduced. This is followed by a presentation of the application state, its distribution and coherence requirements, and the consequences of these requirements on decoupling and software quality in general. Then, potential solutions for data redundancy, distribution, synchronization, and interoperability are addressed. Furthermore, concepts underlying virtual reality such as immersion and presence are discussed, as well as various methods for measuring them. Finally, avatars and the concept of embodiment will be discussed. The exercise will provide an insight into practical research work and experiments of the chair as well as a first practical insight into software technologies and frameworks for the creation of interactive real-time systems, e.g. Unity3d and/or Unreal Engine.</p>		
<b>Intended learning outcomes</b>		
<p>After participating in the module courses, students are able to recognize basic application scenarios for Interactive Systems. They remember subject-specific approaches and can apply them to adequate problems. They know theoretical models and they can summarize, compare and explain different approaches and evaluate their performance. They can apply available tools to typically occurring tasks and know their advantages and disadvantages. Furthermore, you can independently familiarize yourself with complex technical systems as well as independently develop problem-solving proposals, communicate these in a team and integrate them in a prototype.</p>		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
V (2) + Ü (2) Module taught in: German and/or English		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>a) written examination (approx. 90 minutes) or  b) oral examination of one candidate each (approx. 30 minutes)  Language of assessment: German and/or English  creditable for bonus</p>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Workload</b>		
150 h		
<b>Teaching cycle</b>		
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Module appears in**

Master's degree (1 major) Human-Computer-Interaction (2021)  
Master's degree (1 major) Computational Mathematics (2022)  
Master's degree (1 major) Mathematics (2022)  
Master's degree (1 major) Media Entertainment (2022)  
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)  
Master's degree (1 major) Artificial Intelligence (2024)  
Master's degree (1 major) Computational Mathematics (2024)  
Master's degree (1 major) Mathematics (2024)