Course Syllabus for
Smart and Sustainable Industry PhD Program
(years 2024-25/2025-26)

Course title	**Xtended Experiences for Smart and Sustainable Industry**
Scientific Discipline Sector	ING-IND/15
Hours of instruction	20 hours
CFU	2 CFU
Semester	First
Goal	Quickly introduce the researchers to the Augmented, Virtual, and Mixed technologies providing the key concepts and methods, and by a hands-on practical laboratory. A course project will be tailored according to researcher's interest. The goal is to explore and envision new and disruptive research domains, applications and experiences.
Syllabus	• Human computer Interface (HCI) history and evolution(4 h, 0.5 CFU): command line, GUI, NUI, Multimodal, Spatial (VR, AR, MR), in-body. Input devices: Physical, Virtual, Voice, Scanners, Gesture, Gaze, Electromyography, BCI. Output Devices: Output: Display, Haptic, 3D audio, Taste, and Smell. • Next-Gen interfaces (4 h, 0.5 CFU): Milgram continuum, AR vs. VR, trends, AR-enabling Technologies, Virtual-Digital combiner (Spatially Augmented Reality, Spatial see-through display, Head-up displays, Handheld Displays, Video see-through HMD, Optical see-through HMD, retinal), AR tracking, AR UI, AR applications, AR metaverse and AR ethics • Kickstart Unity3D (4 h, 0.5 CFU): Why unity, installation with Unityhub, start a new project Interface Layout, Scene-Game workflow, Playmode \ edit mode, How navigate the scene, Create\move basic geometries+ camera, Use of hierarchy, Project Explorer and asset store, Console, Save\retrieve scenes, Deployment. • Project Development (4 h, 0.5 CFU): Conceptualization, implementation, user experience validation, data collection, analysis and report.
Bibliography	• Virtual and Augmented Reality (VR/AR): Foundations and Methods of Extended Realities (XR) 1st ed. 2022 Edition by Ralf Doerner (Editor), Wolfgang Broll (Editor), Paul Grimm (Editor), Bernhard Jung (Editor) • Augmented Reality: Principles and Practice (Usability) 1st Edition by Dieter Schmalstieg (Author), Tobias Hollerer (Author)
Examination method	Course Project and final presentation