Complex exam minor subject	Virtual and augmented reality
Syllabus	History of virtual and extended reality systems. The basics of creating virtual spaces, their geometric properties, the use of graphical tools and methods that can be used to create them. Managing stationary and movable objects and models, changing position and orientation, moving objects, showing rotation and offsets, chaining transformations in virtual spaces. Ways as objects can be attributed with physical properties. Essential features of light phenomena that are important for creating and using virtual spaces (the basic behaviour light, light reflection, refraction, properties of optical lens), the physiology of human vision, light and shadow management in virtual spaces. Interactions related to virtual reality. Audio in virtual reality. Ways of displaying virtual spaces, features of the devices used for display. Possibility of collaboration with virtual reality. Virtual and augmented reality systems in different disciplines (including medicine, engineering, archeology, and history), architecture, and education. Human factors related to the use of virtual and augmented reality systems, possible health problems, ethical issues, the correct way of creating and using virtual reality systems.
Bibliography	Steven M. LaValle, *Virtual Reality*, Cambridge University Press, 2017. Tony Parisi, *Learning Virtual Reality*, O'Reilly Media, 2015. Jason Jerald, *The VR Book: Human-Centered Design for Virtual Reality*, ACM Books, Morgan and Claypool Publishers, 2015. William R. Sherman, Alan B. Craig, *Understanding Virtual Reality: Interface, Application, and Design*, Morgan Kaufmann, 2018.
Compulsory subjects for this minor subject	Virtual reality systems
Recommended subjects for this minor subject	Applications of virtual and augmented reality systems