

**Real time 3D visualization, 5 ECTS**

**UJM semester 2**

### **Learning outcomes**

The first aim of this course is to understand the modern GPU architectures and capabilities. The second is to understand and apply the basic and advanced techniques of real-time 3D rendering in the context of XR. A focus will be placed on the web technologies (WebGL, WebVR and WebXR) that will be used to implement these techniques.

### **Content**

- GPU architecture
- Introduction to WebGL, WebVR and WebXR
- Concept of the third dimension to create realistic 3D animations.
- Lighting and materials
- GPU programming with shaders
- Advanced 3D visualization techniques with **Three.js** (<https://threejs.org/>)

### **Modes of study**

Course and project work, active participation and a 3 days development sprint.

### **Teaching methods**

- Lectures: 15 hours
- Practical work (during the lectures): 26 hours
- 3 days development sprint

### **Study materials**

- The Graphics Codex, V2.15, by Morgan McGuire, 2011-2018
- The Book of Shaders - <https://thebookofshaders.com>
- Real-Time 3D Graphics with WebGL 2, Second Edition, by Farhad Ghayour and Diego Cantor, Packt Publishing, October 2018

### **Evaluation criteria**

(Written exam / written assignments / project work / ...)

1 theoretical examination (1h30, 1/2), 1/2 project (3 days sprint included)

Scale to be defined

### **Prerequisites**

- Basic knowledge of HTML
- Basic knowledge of JavaScript/Typescript