eXtended Reality (XR) - Principles and Programming

Utvidgad verklighet (XR) - principer och programmering
6 credits

Programme course

TNM116

Valid from: 2025 Spring semester

Determined by	**Main field of study**	
Board of Studies for Computer Science and Media Technology	Information Technology, Computer Science and Engineering, Media Technology and Engineering	
Date determined	**Course level**	**Progressive specialisation**
2024-08-28	Second cycle	A1N
Revised by	**Disciplinary domain**	
	Technology	
Revision date	**Subject group**	
	Computer Technology	
Offered first time	**Offered for the last time**	
Autumn semester 2024		
Department	**Replaced by**	
Institutionen för teknik och naturvetenskap		

Specific information

The course can not be included in degree together with TNM086.

Course offered for

- Master of Science in Computer Science and Engineering
- Master of Science in Information Technology
- Master of Science in Biomedical Engineering
- Master of Science in Media Technology and Engineering
- Master of Science in Computer Science and Software Engineering
- Master of Science in Applied Physics and Electrical Engineering
- Master of Science in Applied Physics and Electrical Engineering - International
- Master's Programme in Computer Science

Entry requirements

3D computer graphics, linear algebra, C++ programming

Prerequisites

3D Computer Graphics, Linear Algebra, Programminig in C++

Intended learning outcomes

The aim of the course is for the student to gain insights in XR, VR, AR and other related principles, how they are used and how they can be implemented and utillized. They should also learn to analyze needs and challenges and learn how to apply theories and principles to realize effective immersive user interfaces and interaction.

After finishing this course the student should be able to

- present the principles of XR with respect to
    - human factors such as perception, social aspects and gender
    - visual and multisensory display systems, tracking and other interaction equipment
    - egocentric interaction and haptics
    - audio and audio interaction
- implement interactive, immersive applications

Course content

The course covers a wide range of aspects associated with eXtended Reality (XR), a collective term for immersive applications with virtual content, such as virtual reality (VR), augmented reality (AR), mixed reality (MR) and augmented virtuality. We cover display systems and their principles, from desktop to large-scale VR theaters and domes, principles for effective implementation, methods for interaction and how sound and touch are used to create a convincing and useful immersive environment for a range of different applications.

Teaching and working methods

The course is given at Campus Norrköping, but can to an extent be taken remotely, if necessary. Attendance is required for laboration with VR equipment and examination with VR equipment.

Theories are covered through lectures supplemented with scientific publications for further in-depth studies. Substantial laboratory work is also included, where theory is converted into practice. Students taking the course are given access to the VR laboratory and its equipment.

Examination

MUN1	Oral examination	2 credits	U, 3, 4, 5
LAB1	Laborations	4 credits	U, G

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.