

Virtual Reality, 3HP*Virtual Reality, 3HP*

Course Code/Codes	50DT062
Subject Area	Computer Engineering, Psychology
School/equivalent	School of Science and Technology
Valid from	2021-08-27
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Approved by	Head of school Peter Johansson
Translation to English, date and signature	-

1 Course content

Our imagination has always been a powerful source of alternative realities e.g. imaginary artifacts, characters, stories art and literature. Over time, new technologies such as moving images and Virtual Reality have opened up more ways to create and let others experience new realities.

Mixing real and virtual worlds has always been attractive, but it has only recently become possible due to technological developments. Video games created interest in Virtual Reality, not only in the field of entertainment but also for industrial applications.

The course examines phenomena of human interaction with virtual and augmented reality. We examine different aspects of human perception of virtual reality, depending on factors such as true-to-life rendering and experience. We look at how people act when they take part in virtual environments. We also look at the methods for building effective interaction scenarios and measuring interaction quality with both qualitative and quantitative tools.

The following four units are included in this course:

- Unit 1: Theory of reality-virtuality continuum, technologies and application domains of Mixed Reality.
- Unit 2: Fundamental of human perception and action, factors influencing engagement, immersion, and user experience.
- Unit 3: Qualitative and quantitative evaluation of user experience and performance in mixed reality; building experimental support for design solutions.
- Unit 4: Ethical consideration when designing high-fidelity MR experiences.

2 Outcomes

2.1 The course in relation to the doctoral programme

The course covers the following intended learning outcomes for third-cycle courses and study programmes as described in the Higher Education Ordinance. The doctoral student shall demonstrate:

Knowledge and understanding

- advanced and up-to-date specialised knowledge in a limited area of this field (part of outcome 1)
- familiarity with the methods of the specific field of research in particular (part of outcome 2)

Competence and skills

- the capacity for scholarly analysis and synthesis (part of outcome 3)
- the capacity to review and assess new and complex phenomena, issues and situations autonomously and critically (part of outcome 3)
- the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively (part of outcome 4)
- the ability to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames (part of outcome 4)
- the ability to review and evaluate research and other qualified tasks (part of outcome 4)
- the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general (outcome 6)
- the ability to identify the need for further knowledge (outcome 7)

Judgement and approach

- intellectual autonomy and disciplinary rectitude (part of outcome 9)
- the ability to make assessments of research ethics (part of outcome 9)
- specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used (outcome 10)

The intended learning outcomes are listed in the same order as in the general syllabus for the programme.

2.2 Intended course learning outcomes

Upon completion of the course the student will be familiar with fundamentals of human perception and action, principles of user-centric approach when designing Virtual Reality and Mixed Reality applications, and methodologies for objective and subjective evaluation of user experience.

Applied knowledge and skills

The student will be able to apply the knowledge to design immersive Virtual and Mixed Reality experiences, create VR and MR software using modern programming techniques and software frameworks, critically evaluate user experiences in order to improve it.

Making judgments and attitudes

Completing this course, the student will be able to judge the suitability of a Virtual and Mixed Reality paradigm for a given problem demonstrate responsible approach in designing MR

experiences taking ethical aspects into account, and understand capabilities and limitations of technology.

3 Reading list and other teaching material

Steven LaValle (2020) Virtual Reality. Cambridge University Press.

4 Teaching formats

The course is designed as a distance learning course including classroom events. It comprises a series of online lectures, group discussions, obligatory self-study exercises and seminar presentations on a literature study and a case-based learning task.

5 Examination

The course is assessed through the following examinations which will be graded separately:

Assignments, 1.5 Credits. (Code: A001), U-G
Examinations is done based on written report on obligatory task assignments.

Seminar Presentations, 1.5 Credits. (Code: A002), U-G
Examinations happens via oral presentation at seminars.

For students with documented disabilities, the university can decide on adaption of the examination or other form of examination.

For further information, see the university's local examination regulations (in Swedish)

6 Grades

Examinations on third-cycle courses and study programmes are to be assessed according to a two-grade scale with either of the grades 'fail' or 'pass' (local regulations).

The grade shall be determined by a teacher specifically nominated by the higher education institution (the examiner) (Higher Education Ordinance).

To obtain a passing grade on examinations included in the course, the doctoral student is required to demonstrate that he/she attains the intended course learning outcomes as described in section 2.2. Alternatively, if the course consists of multiple examinations generating credit, the doctoral student is required to demonstrate that he/she attains the outcomes that the examination in question refers to in accordance with section 5.

A student who has failed an examination is entitled to a retake.

If an examination consists of several examination components, and a student fails an examination component, the examiner may, as an alternative to a retake, set a make-up assignment with regard to the examination component in question.

A doctoral student who has failed an examination twice for a specific course or course element is entitled, upon his/her request, to have another examiner appointed to determine the grade.

7 Admission to the course

7.1 Admission requirements

To gain access to the course and complete the examinations included in the course, the applicant must be admitted to a doctoral programme at Örebro University.

7.2 Selection

Selection between applicants who have been admitted to doctoral programmes at Örebro University and who otherwise meet the admission requirements as listed above is made according to the following order of precedence:

- Applicants from the following subject/-s: Computer Science and/or Engineering.

7.3 Other applicants than doctoral students admitted at Örebro University

Other applicants than doctoral students admitted at Örebro University may be given access to the course on the grounds of provisions for and/or agreements regarding contracted courses, joint degrees, national graduate schools or cooperation in other respects with other universities.

Any decisions on what such other applicants may be given access to the course are made separately and on the basis of the provisions and/or agreements that occasion the student to apply for the course.

For participation in the course in other respects, the same provisions shall apply as for doctoral students admitted to Örebro University.

8 Transfer of credits for courses, study programmes and other experience

Provisions on the transfer of credits can be found in the Higher Education Ordinance and on the university's webpage.

9 Other information

None.

Transitional provisions

None.