

## AD HOC PhD MODULE Announcement

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

PHD PROGRAM IN INFORMATION AND COMMUNICATION TECHNOLOGY FOR HEALTH

PHD PROGRAM IN INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

**Module Title: Design of Extended Reality Software Systems**

### Lecturers:

**Dr. Domenico Amalfitano**

University of Naples Federico II

Department of Electrical Engineering and of Information Technologies (DIETI)

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**CV:** Domenico Amalfitano is assistant professor at the Department of Electrical Engineering and of Information Technologies (DIETI) of the University of Naples Federico II. He received the Ph.D. degree in computer engineering and automation from the University of Naples Federico II, in 2011. His main research interests include software engineering, software testing, software testing automation, reverse engineering, software maintenance, program comprehension, and software development processes improvement. He applied his research activity in the contexts of Mobile Apps, Web Applications, and Automotive Embedded Software.

**Prof. Anna Rita Fasolino**

University of Naples Federico II

Department of Electrical Engineering and of Information Technologies (DIETI)

[fasolino@unina.it](mailto:fasolino@unina.it)

**CV:** Anna Rita Fasolino is Associate Professor at the Department of Electrical Engineering and Information Technology (DIETI) of the University of Naples Federico II, where she teaches Software Engineering and Software Architecture Design. Her research interests in software engineering include Software Testing, Reverse Engineering, Maintenance, Software Processes, and Testing Automation.

**ECTS Credits: 4**

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### Lectures' schedule

Date	Hours	Room	Lecturer
TBD	TBD	TBD	Prof. Anna Rita Fasolino
TBD	TBD	TBD	Dr. Domenico Amalfitano
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### Overview

The goal of this module is to introduce the Extended Reality (XR) Software Systems to the researchers working in ICT and health domains and to present software engineering solutions appositely crafted for specifying the requirements, designing, implementing, and evaluating the quality of such software systems. At the same time, the module will show the new research trends in the field of Extended Reality Software Systems and its novel applications in industry.

To earn the credits, at the end of the course students are requested to provide a good quality presentation about the potential application of Extended Reality in the context of their research field. Alternatively, students can also present a project (or running demo) of an Augmented Reality Software System prototype they develop. Student's presentations will take place in the last lesson. Details about the presentation format will be given during the course. The schedule of the presentations will be defined during the course.

### Content

**Lesson 1 (2 hours) - Introduction to Extended Reality Software Systems:** Module overview, goals and objectives. Introduction to Augmented Reality Software Systems and their applications in industry.

**Lesson 2 (3 hours) - Extended Reality Software Systems Requirements Modelling and Specification:** Introduction to UML as modeling language for Extended Reality Software Systems design. Analysis and modelling of XR Software Systems requirements and specifications in UML.

**Lesson 3 (3 hours) - Extended Reality Software Systems Design:** Software Architectures adopted for designing Augmented Reality Software Systems. UML as modelling language for designing Augmented Reality Software Systems architectures. Architectural patterns and Architectural styles for documenting and designing Extended Reality Software Systems.

**Lesson 4 (3 hours) - Design of Virtual Environments for Extended Reality Software Systems:** Description and comparison of the software technologies enabling the design of Virtual Environments for Extended Reality Software Systems. Hands on creating a virtual environment and adding virtual information to real scenes with Unity 3D and Unreal Engine. Object recognition and tracking with Vuforia SDK.

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**Lesson 5 (2 hours) - Design of Mobile Extended Reality Software Applications:** Introduction to iOS (ARKit) and Android (ARCore) SDK for developing Mobile Extended Reality Software Applications. Design of portable Mobile Extended Reality Software Applications. Deploying Mobile Extended Reality Software Applications on different mobile devices using Unity 3D and Vuforia. Integrating Mobile Extended Reality software applications with native apps.

**Lesson 6 (2 hours) - Design of Extended Reality Software Systems for Head Mounted Devices (HMD):** Design of Extended Reality Software Systems for Head Mounted Devices. Case study: from requirements analysis to design and deploy on the physical device.

**Lesson 7 (2 hours) – Quality Assessment of Extended Reality Software Systems Testing:** Introduction to the methodologies and the techniques for Extended Reality Software Systems testing.

**Lesson 8 (3 hours) - Assessment** - The lesson is dedicated to the final assessment.

### Enrollment

Participants are requested to e-mail to Dr. Domenico Amalfitano one week before the start of the course, reporting the following information: Student name and surname, name of the PhD program and cycle.

Info: **Dr. Domenico Amalfitano** - tel. 081-7683819 – [domenico.amalfitano@unina.it](mailto:domenico.amalfitano@unina.it)