

## Doctoral course

### Corrosion, Anti-Corrosion of Reinforced Concrete

**Date and location:** 21-22 August (2 days), [INSA Toulouse](https://www.insa-toulouse.fr), France

#### Overview of the course

Worldwide, many reinforced concrete structures are experiencing premature corrosion and are not able to meet the intended design life of 100+ years. About 50% of structures experience a major repair within 10 years after construction – leading to the spending more than ~4 % of global GDP to address corrosion-related issues. There is a dire need to educate engineers/professionals on how to assess and control corrosion in concrete structures. If we do not take adequate measures now, the future generation will face the expensive challenge of repairing a large number of structures. This course is designed to help doctoral students, young engineers and faculty to learn the basics of corrosion in concrete structures and ways to prevent and protect the embedded steel from corrosion (in both existing and new structures). During this course, sufficient reading materials and hands-on training will be provided to enable learning in this area and adapt good corrosion prevention/control practices. The lectures will cover topics with a blend of scientific principles, and research- and practice-oriented viewpoints.

#### Objectives

The aim is to deepen participants' knowledge in:

- the electrochemical corrosion of steel in concrete
- the applications of electrochemical techniques in detecting corrosion of steel in concrete
- durability and service life of reinforced concrete structures with low carbon binders
- extension of service life using corrosion prevention and protection strategies.

#### Target audience

The courses are aimed at doctoral/post-doctoral students, as well as practitioners, architects, etc. in the field of construction materials and civil engineering.

#### Prerequisites

Basic knowledge in civil engineering and electrochemistry.

#### Detailed content

##### Day 1

- *Basics of corrosion, corrosion of steel in concrete, corrosion mechanisms*
- *Electrochemical measurement techniques*
- *Lab workshop (potential mapping, linear polarisation resistance, galvanic corrosion current)*

##### Day 2

- *Durability concerns/opportunities related to modern binders/modern construction techniques (digital fabrication)*
- *Corrosion prevention and protection in reinforced concrete systems*
- *Lab workshop (Electrochemical Impedance Spectroscopy and demonstration of working of Cathodic Protection)*
- *Questions & discussion (opportunity for participants to present their challenges)*

## Speakers



**Ueli Angst** obtained his degrees in civil engineering from ETH Zurich in Switzerland (MSc, 2005) and from the Norwegian University of Science and Technology, NTNU (PhD, 2011). He gathered 7 years, some of it part-time, of practical experience as corrosion consultant. In 2017, inspired by having seen the relevant questions in engineering practice, Ueli Angst established his research group “Durability of Engineering Materials” at ETH Zurich. The mission is to develop new and fundamental understanding about corrosion mechanisms to enable better assessments and predictions of the performance of engineered materials and structures across disciplines. His research group uses experimental and computational methods covering corrosion science, electrochemistry, materials science, porous media, reactive mass transport, and civil engineering. Ueli Angst received several awards for his work, including the Robert L’Hermite medal awarded by RILEM in 2017, and he is active in various international committees. His research related to inspection and monitoring led to a SpinOff ([www.duramon.ch](http://www.duramon.ch)), founded in 2021.



**Deepak Kamde** is a Chaire de Professeur Junior at LMDC, INSA Toulouse. Earlier to this, he worked as a UKRI Research Fellow at the University of Leeds and a Postdoctoral Research Fellow at the Indian Institute of Technology Madras (IITM). He earned PhD in Civil Engg. from the IITM. He has received several awards such as the Marie Curie fellowship, UKRI fellowship, NACE India Best PhD Thesis Award, and NACE academic scholarships. His research interests include corrosion of rebars in concrete, durability, service life estimation, and electrochemical repair of concrete structures. He is an active member of RILEM Technical Committees 296-ECS and 314-OCM.



**Gabriel Samson** is an assistant professor at LMDC, INSA Toulouse. His research mainly deals low-carbon concretes (formulation, characterization, durability) such as alkali-activated materials, super sulphated cement concrete, low clinker concrete and corrosion in concrete (numerical modelling, probe development and experimental measurements). He is an active member of RILEM Technical Committees 296-ECS and 283-CAM.

**A certificate of attendance will be issued at the end of the course**

## Contacts

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**Fees and registration to the course:** <https://rilem-week2024.sciencesconf.org/resource/page/id/19>

**More details about the conference:** <https://rilem-week2024.sciencesconf.org/>