FACULTY OF
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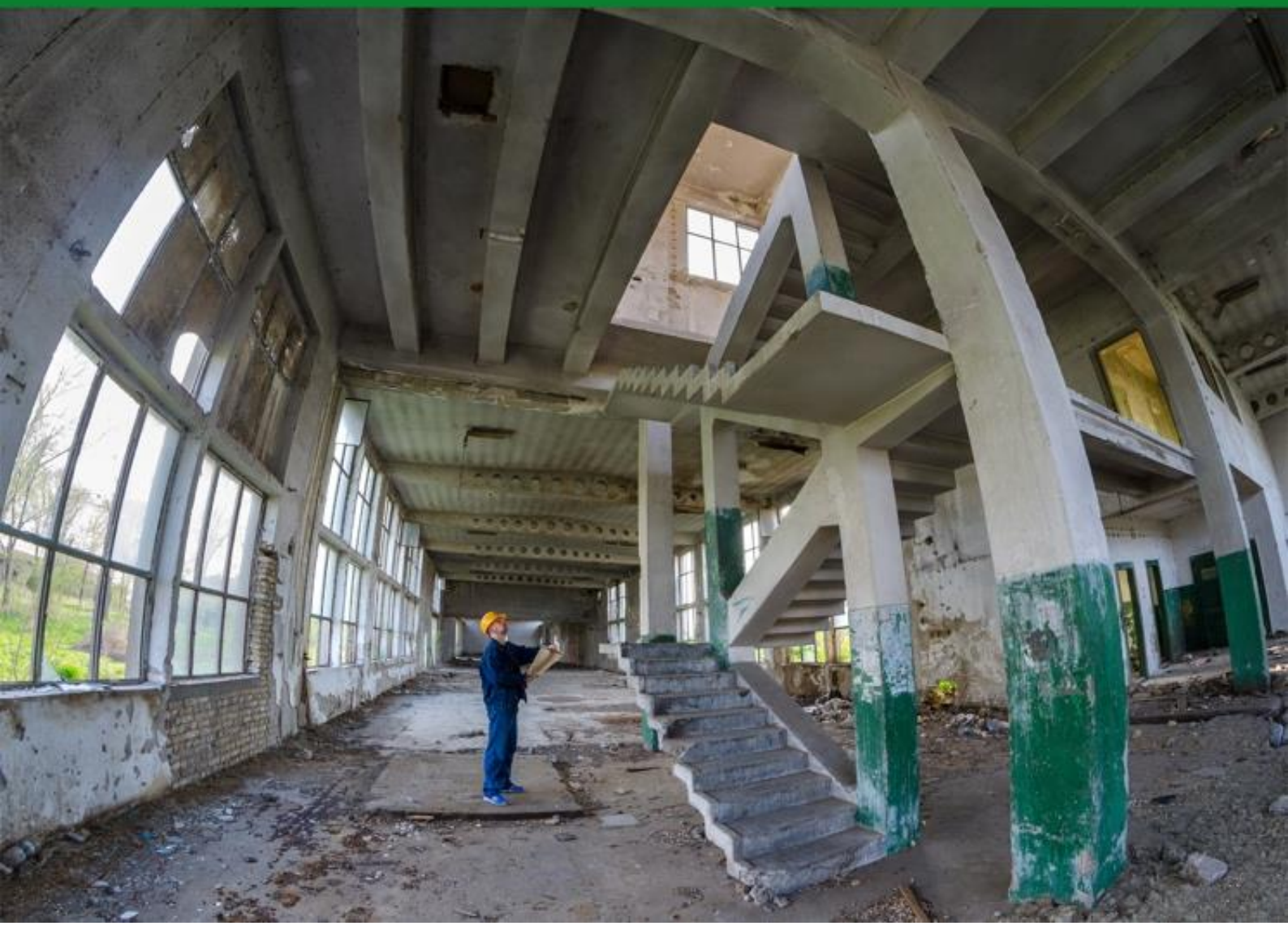
CPD



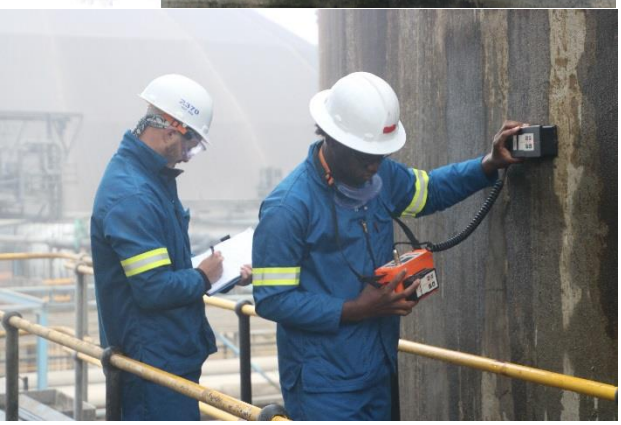
RILEM PhD Course

Repair and Rehabilitation of Concrete Structures

12 – 16 November 2018

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Introduction



The purpose of the course is to provide participants with a fundamental and practical understanding on condition assessment of concrete structures and concrete repair and service life extension methods.

A large number of concrete structures are deteriorating, often prematurely, and need remedial measures to reinstate their safety and/or serviceability. Consequently, the need for repair and protection has grown considerably in recent years. While costs associated with repair of deteriorating concrete structures can be substantial, costs resulting from poorly designed or executed repairs may be even higher. The technical and economical success of repair projects depends on a range of factors, including a proper condition assessment of the structure, design and execution of remedial measures, and design and implementation of maintenance strategies.

For reinforced concrete structures, the main durability problem is corrosion of the reinforcement, resulting from the ingress of chloride ions or carbon dioxide and the subsequent depassivation of the steel. Other causes for concrete deterioration and damage include construction defects, structural loading, chemical attack (ASR, sulphate attack, acid attack) and fire damage. At the beginning of any repair project, a systematic condition assessment of the structure needs to be carried out to identify the cause(s) of deterioration and the extent of damage. The course informs about concrete deterioration mechanisms, on-site evaluation techniques, the principles of diagnostic testing (strategies, test methods and interpretation of results), and concrete repair strategies.

Repair methods need to be designed with consideration for the anticipated or desired remaining service life of the structure. A distinction must be made between repairs intended to stop deterioration fully and those merely aimed at slowing down deterioration processes for a limited period of time. During the course relevant repair methods for damaged concrete structures are discussed, focussing on design methods, application principles and limitations. The scope of relevant repair methods includes the application of penetrating corrosion inhibitors and surface coatings, temporary electrochemical techniques, cathodic protection systems, bonded overlays (patch repairs), and crack injection.

In cooperation with the International Conference on Concrete Repair, Rehabilitation and Retrofitting

ICCRRR2018

Course Topics

1. **(Introduction to:) Concrete deterioration processes and damage to concrete structures**
    - Reinforcement corrosion
    - Chemical and physical attack
    - Structural damage
    - Fire damage
    - Cracking
    - Construction defects
    - Case studies
2. **(Introduction to:) Condition assessment of concrete structures**
    - Planning and strategies for condition assessments
    - On-site diagnostic testing and visual assessment methods
    - Non-destructive testing methods and interpretation of results
    - Laboratory-based testing of samples
    - Prediction of residual service life
    - Case studies
3. **(Main focus:) Repair and rehabilitation of concrete structures**
    - Philosophies and strategies for concrete repair and rehabilitation
    - Repair methods, materials and systems
    - Repair principles for reinforcement corrosion damaged structures
    - Concrete surface protection and coatings
    - Bonded concrete overlays and patch repair
    - Principles, methods and materials for concrete crack repair
    - Repair guidelines according to the Eurocode
    - Service life extension methods
    - The repair contractor's perspective
    - The material supplier's perspective
    - The discipline of forensic engineering: phylosophy and added value
    - Case studies

Delivery modes

The course will be presented through formal lectures, laboratory demonstrations and hands-on exercises, as well as site visits. Lectures will be presented by international leaders in the respective field, supported by repair material suppliers, practicing engineers and repair contractors.

Presenters

Prof. Hans Beushausen is a researcher, lecturer and consultant in the fields of structural engineering, construction material technology, structural condition assessment, and concrete repair technology at the University of Cape Town. He is a member of the Concrete Materials & Structural Integrity Research Unit (CoMSIRU) at UCT, which focuses on infrastructure performance and renewal research.

Prof. Pilate Moyo (PrEng) is Professor of Structural Engineering and Director of the Concrete Materials and Structural Integrity Research Unit (CoMSIRU) in the Department of Civil Engineering at the University of Cape Town. His research and consultancy is on structural health monitoring, condition assessment, structural dynamics, vibration testing, and structural strengthening strategies for civil structures.

Emeritus Prof. Mark Alexander is a Senior Research Scholar in the University of Cape Town. He is a Fellow of RILEM and he co-authored “Aggregates in Concrete” (2005), “Alkali-Aggregate Reaction and Structural Damage to Concrete” (2011), and “Durability of concrete – design and construction” (2017) (CRC Press) and was Editor of “Marine concrete structures. Design, durability and performance” (Woodhead Publishers (2016)). He is involved in CoMSIRU at UCT, which focuses on infrastructure performance and renewal research.

Prof. Rob Polder has been a materials scientist at TNO, The Netherlands, from 1984 until 2017 and a part-time professor at Delft University of Technology from 2009 until 2017. After retirement he is a private consultant. From a background in chemistry he has worked on durability of concrete and corrosion of reinforcement, combining research and consultancy. He has been active in national and international research committees and projects including RILEM and EU projects and holds the chair of the Dutch Knowledge Centre for Cathodic Protection of concrete structures. He has authored over 200 publications. His main focus is corrosion of steel reinforcement in concrete, including chloride penetration modelling, critical chloride threshold, methods for corrosion detection; prevention by mineral additions, electrochemical methods and surface treatments, monitoring, repair and protection methods, including cathodic protection of steel in concrete.

Prof. Vernon Collis is a consulting engineer and architect specializing in integrated and adaptive sustainable systems design and construction in the building and civil engineering industries. His design methodology allows room for reflection by client and team and space for transdisciplinary design to happen, unlike conventional practice which is based on substitutional rather than transformative sustainable design. Collis has designed and built 500+ projects in the mining, commercial, educational, infrastructural and housing sectors. He is an adjunct associate professor at the University of Cape Town and is presently researching sustainable construction materials with the university's Concrete Materials and Structural Integrity Research Unit.

Dr. Philemon Arito is a Postdoctoral Research Fellow at The Department of Civil Engineering, University of Cape Town (UCT). His research interests are in the fields of construction material technology, corrosion of steel in concrete, patch repair mortars and bonded overlays. He is a member of the Concrete Materials and Structural Integrity Research Unit (CoMSIRU) at UCT.

Mike Grantham has worked in the UK in the field of non-destructive testing and concrete repair for many years. He is a former Associate Director of STATS Ltd (now RSK Stats Ltd), a former Director of Technotrade Ltd, specialising in construction materials testing, and is currently the Director of Concrete Solutions (GR Technologie Ltd.) and organiser of the Concrete Solutions series of International Conferences on Concrete Repair. He is a member of Council of both the Concrete Society and the Institute of Concrete Technology, UK. He is also a Visiting Professor at Leeds University and a Consultant to Sandberg LLP. He is co-author of several books on concrete inspection and repair and Editor-in-Chief of the Concrete Solutions conference Proceedings, currently published by Taylor and Francis.

Course Overview

Name	Repair and Rehabilitation of Concrete Structures	
Duration	12 – 16 November 2018	
Venue	The University of Cape Town	
CPD	5 CPD points; ECSA Validation	
Participants	Suitable for consulting engineers, students and academics	
Fees	Standard delegate: R11600	RILEM PhD student: R5800

Registration

Registration and Cancellation

- **You can register for this course in one of the following ways:**
  1. register online or
  2. download the registration form and email it to ebe-cpd@uct.ac.za
- Registration covers attendance of all sessions of the course and course material.
- Registrations close one week before the start of the course. Confirmation of acceptance will be sent on receipt of a registration form.
- Cancellations must be received one week before the start of a course, or the full course fee will be charged.
- **For more information on application and registration procedures, please visit our website:** www.cpd.uct.ac.za/cpd/applications

Certificates and CPD Points

A certificate of attendance will be awarded to CPD participants for each course. Participants need to attend 80% of the lectures to qualify for an attendance certificate.
According to guidelines set out by the Engineering Council of South Africa, attendance of this course will earn participants 5 points towards Category 1 (Developmental Activities).
Please note: If you are interested in attending this course for credit purposes, you will need to register for the Masters Programme or as an occasional student. If you attend the course as a CPD participant, credit cannot be claimed in retrospect.
CPD participants can also request a formal university transcript, which will show this course as part of a Professional Development Career.

Contact details

For more information or details on CPD courses, visit our website or contact us.

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