

1.	Title of the course	Health Monitoring of Civil Engineering Structures
2.	Course number	CE528L
3.	Status of the course	Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	PG
6.	New course/modification to	Modification To Title and content of CE5029: Non-destructive Testing and Health Monitoring of Civil Structures
7.	To be offered by	Department of Civil and Environmental Engineering
8.	To take effect from	July 2022
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective(s): To introduce various deterioration/damage mechanisms responsible for the reduction of the service life of civil engineering structures. To discuss the condition assessment of structures through non-destructive techniques (NDT), physical principles involved in the techniques, and repair/retrofitting methods used for extending the life of civil engineering structures.	
12.	Course Content: Deterioration mechanisms: structure-environment interaction, steel corrosion, alkali-aggregate reaction, freeze-thaw attack, sulphate attack, biofouling/acid attack, fire, abrasion, shrinkage, creep, basis of test methods, quantification and mitigation strategies; Non-destructive evaluation (NDE): principles and processes, general methods of non-destructive techniques (NDT) of civil engineering structures, surface hardness methods, penetration resistance-based methods, stress-wave propagation-based methods, electrochemical methods, electromagnetic methods, thermography; Structural Health Monitoring (SHM): principles, vibration-based techniques and sensors; Repair materials: properties and performance requirements, repair methods, protective treatment, structural strengthening.	
13.	Textbook(s): 1. Maierhofer C, Reinhardt H and Dobmann G, <i>Non-destructive Evaluation of Reinforced Concrete Structures: Volume 1: Deterioration Processes and Standard Test Methods</i> , 1st Edition, Woodhead Publishing (2010). 2. Mehta P K and Monteiro P J M, <i>Concrete: Microstructure, Properties and Materials</i> , 4th Edition, McGraw-Hill Education (2014).	
14.	Reference(s): 1. Emmons P H, <i>Concrete Repair and Maintenance Illustrated</i> , 1st Edition, R.S. Means Company Inc. (2002). 2. Hellier C, <i>Handbook of Non-destructive Evaluation</i> , 3rd Edition, Mc-Graw Hill Education (2020).	