DURABILITY AND SUSTAINABILITY OF REINFORCED CONCRETE STRUCTURES

Flora Faleschini, Klajdi Toska

Program:

Module 1: Sustainability concepts applied to structural engineering.
Environmental, economic and social impacts.
Key performance indicators for environmental impact assessment.
Environmental life cycle assessment of reinforced concrete structures.
Case-study.

Module 2: Concrete as a structural material: physical and mechanical properties.
Basic concrete components, binders, supplementary cementing materials, chemical admixtures, fibers.
SCM efficiency factor.
Non-cement concretes: geopolymer-based concrete.
European and Italian normative about the re-use of recycled and manufactured aggregates in concrete. Market barriers and future perspectives.
Hydration, heat transport, moisture transport.
Mechanical properties.

Module 3: Damage and degradation in concrete.
From visual inspection to identification of degradation mechanisms: carbonation, chlorides-induced corrosion, volume stability, ASR, acid attack, freezing-thawing, errors during casting, inappropriate design.
Durability and service life models. Probabilistic models applied to durability design and service life assessment.
Case-studies.

Module 4: Damage of concrete subject to high temperatures and fire.
Solutions for retrofit of damaged RC structures due to thermal actions.

Applications, practical exercises, Q&A and quizzes during the course.

References:

Slides of the course.

Examination and grading:

Homeworks and oral presentation to the class. Grades: EXCELLENT, VERY GOOD, GOOD, PASS, FAIL.

Course details:

In person (online attendance is allowed). The course will take place in July 2023.