

The Islamic University of Gaza
Faculty of Engineering – Civil Engineering Department
Concrete Technology (ECIV 3301)
First Semester 2025/2026
Course Outline

Course Description: Historical development of cement and concrete. Portland cement; manufacturing, composition, hydration, properties and testing. Mineral aggregates; properties and testing. Mineral admixtures, chemical admixtures, water as a building material, fresh concrete, proportioning concrete mixes, concrete construction practices, curing, response of concrete to stress, testing of hardened concrete, quality control, durability, special types of concrete.

Instructor: Prof. Mamoun Alqedra, **Office:** Room B250

Prerequisites ECIV 2204, Engineering Geology

Text Book: Properties of Concrete, by A. M. Neville and J. J. Brooks, 5th edition, Prentice Hall, Oct 1, 2012 - Technology & Engineering, 2012.

References:

- 1 Neville, A. M. and Brooks J. J , "Concrete Technology", Prentice Hall, second edition, 2010.
- 2 Properties of Concrete, by A. M. Neville and J. J. Brooks, 5th edition, Prentice Hall, Oct 1, 2012 - Technology & Engineering, 2012.
- 3 Concrete Technology, by Sidney Mindess, S., Young, J. F., and Darwin, D., Prentice-Hall, Inc. Englewood cliffs, New Jersey , second Edition, 2003.

Course Aims: the main aim is to familiarize students with physical properties and mechanical behavior of various construction materials with main emphasis being placed on concrete. This includes detailed discussions of concrete constituents: cement, aggregates, water and admixtures. Relevant aspects related to fresh and hardened concrete, i.e. mixing, handling, casting, curing, standards, testing, strength, deformation, durability and quality control are also discussed. Other construction materials discussed in the course include structural steel, timber, Metals and plastics. Special topics and new developments related to the materials used in the construction industry may be reviewed.

Course intended Learning Outcomes (ILOs):

- 1- To understand and apply the properties of the constituent materials of concrete in concrete industry.
- 2- To understand and apply fresh concrete properties in producing concrete.
- 3- To understand and apply the properties of hardened concrete including strength and durability.
- 4- To design concrete mixes and apply statistical quality control techniques to concrete quality.
- 5- To know the concepts of the concrete constituents, fresh and hardened concrete laboratory tests (full description is included in Materials Lab. ECIV 3141).

Course Outline:

- 1- Introduction: constituents, advantages, limitations and applications, types.
- 2- Cement: raw materials, manufacture, composition and types, special cements, hydration, tests of cement, paste and mortar.
- 3- Aggregates: classification, physical properties, mechanical properties, Deleterious Substances, grading requirements.
- 4- Mixing water: mixing and curing requirements, tests.
- 5- Admixtures: definition, classification and types of admixtures.
- 6- Fresh concrete: properties, workability, segregation, bleeding and tests.
- 7- Mix design: influencing factors, various methods of mix proportioning and design of normal strength concrete including prescriptive, standard and designed mixes.
- 8- Hardened Concrete: physical, chemical and engineering properties, tensile and compressive strengths, other strengths, deformation, elasticity, shrinkage, creep destructive tests and non-destructive tests.
- 9- Assessment of concrete results: variation in strengths and compliance requirements.
- 10- Durability of concrete: permeability of concrete, chemical and physical attacks, cracking in concrete, repair and maintenance.

Course Conduct:

Midterm Exam:	25 marks
Course work:	15 marks
Final Exam:	60 marks