Jordan University of Science and Technology

Faculty of Engineering

Civil Engineering Department

CE721 Advanced Concrete Technology
First Semester 2024-2025

Course Catalog
3 Credit Hours. Hydration of Portland cement and gel formation, cement paste microstructure and related properties. Strength development and relations between pore structure and strength of pastes and concretes. Elasticity. Curing at elevated temperatures, concreting in cold and hot weathers, maturity concept and accelerated curing. Shrinkage, creep and related deformation and cracks. Permeability and durability. Concrete under elevated temperatures.
Teaching Method: On Campus

Text Book	
Title	Properties of Concrete
Author(s)	Neville, A. M.
Edition	4th Edition
Short Name	1
Other Information	Longman Group Limited, London, 1995.

Course References

Short name	Book name	Author(s)	Edition	Other Information
2	Concrete Technology	Neville, A. M., and Brooks, J. J.	3rd Edition	Longman Group Limited, London
3	Advanced Concrete Technology	Seng, B.	1st Edition	Parts 1-3, Elsevier, Amsterdam, 2003.

Instructor	
Name	**Prof. Rami Haddad**
Office Location	C2L2

Office Hours	Sun : 10:00 - 11:00 Mon : 11:30 - 13:30 Wed : 11:30 - 13:30 Thu : 10:00 - 12:00
Email	rhaddad@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 10:00 - 11:30 Room: C3016

Tentative List of Topics Covered

Weeks	Topic	References
Week 1	HAYDRATION OF PORTAND CEMENT, Chemistry, Chemistry of Hydration	From **1**, From **2**
Weeks 2, 3	HAYDRATION OF PORTAND CEMENT: Products and Microstructure: SEM Images, and MIP Analysis, Properties of Hydrated Cement Paste	From **1**
Weeks 4, 5	STRENGTH OF HARDENED CONCRETE: Effect of Porosity and Pore Size Distribution on Strength, Factors Affecting Strength, Aggregate-Cement Paste Interface	From **1**
Week 6	Elasticity of Concrete, curing at Elevated Temperatures, concreting in Cold and Hot weathers	From **2**
Week 7	The Maturity Concept, Accelerated Curing Test	From **1**
Week 8	Shrinkage	From **2**
Week 9	Creep	From **2**
Week 10	DURABILITY OF CONCRETE: Permeability	From **3**
Weeks 11, 12, 13, 14, 15	DURABILITY OF CONCRETE: Chemical, physical, and electrochmeical attacks	From **1**
Week 16	CONCRETE UNDER ELEVATED TEMPERATURES	From **1**

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Be able to recognize the mechanism of cement hydration and relate to concrete properties; recognize the impact of at elevated temperatures on concrete strength and durability, and recognize proper methods/measures of concreting in cold and hot weathers.	20%	
Be able to compute prorosity, analyze the pore-size distribution of cementitious composites, and project structural. volume stability, and durability.	10%	

To be able to describe failure mechanism of concrete under different types of loading leading to the computation of strengths using theoretical and empirical formulae and recognize and compute maturity, then relate to concrete's strength.	15%	
Be able to describe creep and shrinkage mechanism, their affecting factors, and the priciple of stress relaxation, and compute creep and shrinkage in terms of controlling factors.	20%	
Be able to relate concrete microstructure to its permeability, describe the different chemical, physical, and electro-chemical attacks on concrete and estimate their impact on concrete life.	25%	
Be able describe behavior of concrete upon exposture to elevated temperatures and estimate the extent of resulting deterioration.	10%	

Relationship to Program Student Outcomes (Out of 100%)											
PI-1a	PI-2a	PI-2b	PI-2c	PI-2d	PI-3a	PI-4a	PI-4b	PI-5a	PI-6a	PI-6b	PI-7a

Policy	
Homeworks	A total of 5-6 homework shall be assigned to the students with 1-2 weeks given to submit. The university ethics rule regarding ishall be respected by students. Any attempt of cheating shall be treated swiftly .

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