

Module (Course Syllabus) Catalogue 2021-2022

College/ Institute	Erbil Technical Engineering College	
Department	Highway Engineering Techniques	
Module Name	Concrete Technology	
Module Code	COT404	
Degree	Technical Diploma <input type="checkbox"/> Bachelor <input checked="" type="checkbox"/> High Diploma <input type="checkbox"/> Master <input type="checkbox"/> PhD <input type="checkbox"/>	
Semester	2 nd	
Qualification		
Scientific Title	Lecturer	
ECTS (Credits)	7	
Module type	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weekly hours	4	
Weekly hours (Theory)	(2) hr Class	(84) Total hrs Workload
Weekly hours (Practical)	(3) hr Class	(108) Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Rawaz Mohammed Saleem Kurda	
E-Mail & Mobile NO.	Rawaz.Kurda@epu.edu.iq	
Lecturer (Practical)	Rawaz Mohammed Saleem Kurda	
E-Mail & Mobile NO.	Rawaz.Kurda@epu.edu.iq	
Websites	https://academicstaff.epu.edu.iq/faculty/rawaz.kurda	

Course Book

Course Description	<p>Approach to study of concrete</p> <p>The order of our lectures is as follow:</p> <p>Concrete ingredients: cement, aggregate, and mixing water. Then concrete in its fresh state following by the strength of concrete because it is one of the most important properties of concrete and it is always prominent in the specifications. Having established how we make concrete and what we fundamentally require, we turn to some techniques: mixing and handling, use of admixtures to modify the properties at this stage, and methods of dealing with temperature problems. In the following lectures, we study other properties of concrete and finally mix design.</p> <p><u>Concrete as a structural material</u></p> <p>These days, there are two commonly used structural materials: concrete and steel. They sometimes complement one another, and sometimes compete with one another, so that many structures of a similar type and function can be built in either of these materials.</p> <p>In actual practice, the man on the job needs to know more about concrete than about steel. Why?</p> <ul style="list-style-type: none">• Steel is manufactured under carefully controlled conditions, always in a highly developed plant; the properties of every type of steel are determined in a laboratory and described in a manufacturer's certificate. Thus, the designer of a steel structure needs only specify the steel matching a relevant standard, and the constructor needs only ensure that correct steel is used.• On a concrete building site, the situation is totally different. It is true that the quality of cement is guaranteed by the manufacturer in a manner similar to that of steel. However, cement is not the building material; in fact concrete is.• It is possible to obtain concrete of specified quality from a ready-mix supplier but even in this case, it is only the raw material that is bought. Transporting, placing and, above all, compacting greatly influence the final product.• Moreover, unlike the case of steel, the choice of mixes is virtually infinite and therefore the selection cannot be made without a well knowledge of the properties and behavior of concrete.
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	<ul style="list-style-type: none"> • It is thus the competence of the designer that determines the potential qualities of concrete, and the competence of the contractor and the supplier that controls the actual quality of concrete in the finished structure. 				
Course objectives	<ul style="list-style-type: none"> ❖ Understanding concrete and its properties; ❖ Concrete behavior under load, temperature, and humidity changes; ❖ Identifying materials used in concrete and their properties; ❖ Concrete types; ❖ Concrete mix design; ❖ Significant tests of fresh and hardened concrete; ❖ Significant tests of cement; ❖ Significant tests of aggregate; ❖ Concrete properties in its fresh state; ❖ Concrete properties in its hardened state. 				
Student's obligation	<p>All students are required to fulfil the following requirements:</p> <ul style="list-style-type: none"> ➤ Attendance ➤ Participation in class activities ➤ Doing homework ➤ Participation in quiz ➤ Conducting projects ➤ Presenting seminars ➤ Participation in Lab tests ➤ Reporting for each test ➤ Participation in theory part exams ➤ Participation in practical part exams ➤ Site visits (if applicable) 				
Required Learning Materials	lecture halls with data show equipment for lecture presentations, white board, overhead projector, posters				
Evaluation	Task		Weight (Marks)	Due Week	Relevant Learning Outcome
	Assignments	Paper Review	0	0	
		Homework	14	2	
		Class Activity	2	3	
		Report	0	0	
		Seminar	5	1	
		Essay	0	0	
		Project	5	1	
Quiz		4	3		

	Lab.	14	0	
	Midterm Exam	6+10	2	
	Final Exam	15+25	2	
	Total	100	16	
Specific learning outcome:	<ol style="list-style-type: none"> 1. Students will be able to: 2. Be familiar with necessary items available at construction sites 3. Work at construction and material laboratories 4. Recognize common problems during transporting, handling and placing of concrete 5. Check concrete properties during its fresh and hardened state 6. Deal with fresh concrete problems 7. Strengthen themselves for the upcoming subjects in 3rd and 4th year 			
Course References:	<ul style="list-style-type: none"> ➤ Concrete technology by A.M. Neville & J.J. Brooks ➤ Advanced concrete technology by ZONGJIN LI ➤ Advanced concrete technology by John Newman 			
Course topics (Theory)	Week	Learning Outcome		
Introduction to concrete	1	Upon the completion of this class, students should be able to understand the definition, advantages, disadvantages, classifications and properties of concrete		
Cement	2 3	Upon the completion of this class, students should be able to understand <ul style="list-style-type: none"> • The process of cement manufacturing • The characteristics of cement types based on the ASTM • Most of the required cement tests • Application of various cement types indicated 		
Aggregate	4	Upon the completion of this class, students should be able to understand <ul style="list-style-type: none"> • Sources, types and classifications of aggregate • Relevant tests of aggregate • Effect of aggregates' properties on the performance of concrete • MC, SG, UW and fineness modulus 		
Water	5	Upon the completion of this class, students should be able to understand <ul style="list-style-type: none"> • The role of water in concrete mix discussed • The effect of impurities in water explained in concrete mix 		

		<ul style="list-style-type: none"> The properties of mixing water and curing water
Admixtures	6	<ul style="list-style-type: none"> The importance and classifications of admixtures Various applications of admixture types
Fresh concrete	7	Upon the completion of this class, students should be able to understand various properties of concrete when it is fresh
Hardened concrete	8 9	Upon the completion of this class, students should be able to understand <ul style="list-style-type: none"> Various properties of concrete when it is hardened Main causes of concrete durability
Mixing, handling, transporting, placing, compacting and finishing of concrete	10	<ul style="list-style-type: none"> The way civil and construction engineers should deal with mixing, handling, transporting, placing, compacting and finishing of concrete will be shown New technologies used in the mentioned procedures are explained
Hot and cold weather concreting	11	<ul style="list-style-type: none"> The way civil and construction engineers should deal with concreting in hot and cold weather Different ways of concrete curing
Mix design	12	<ul style="list-style-type: none"> Basics of concrete mix design Important concrete properties illustrated to be considered during mix design Useful tables and figures of ACI and BS shared to calculate concrete ingredients Examples developed to show the mix design calculation procedure according to American and British methods
Practical Topics	Week	Learning Outcome
Slump test + flow table test	1	Two tests conducted to calculate concrete workability
Compacting factor + vebe test	2	Two tests conducted to calculate concrete workability
Compressive strength of concrete	3	Compressive strength of concrete determined

Split test of concrete	4	Indirect tensile strength of concrete determined using concrete cylinders
Flexural test of concrete	5	Modulus of rupture of concrete determined using concrete prism
Specific gravity of cement	6	Specific gravity of cement found using kerosene
Standard consistency of cement	7	The importance of Standard consistency explained in cement tests Standard consistency of cement determined
Setting time of cement	8	Setting time of cement determined
Soundness of cement	9	Soundness of cement determined
Compressive Strength of cement	10	Compressive Strength of cement determined using (5*5*5) cubes
Sieve analysis of aggregate	11	Sieve analysis conducted for aggregate
Hammer test + UPV ultrasonic	12	Compressive strength of concrete determined using hammer test and UPV test

Questions Example Design

Solving Problems

Such as solve, derive, find, determine, etc.

Explanations and graphing

Such as explain, why, show that, prove that ..., etc.

Number of Questions: 3-6

Number of Assignments: 2-4

Recommendations for Students at Exams

- Read the questions carefully and at least twice.
- Think about the answers and don't hurry.

Answer the questions with the easiest first

At the end, review the answers.

Extra notes:

For the above time schedule, 12 weeks of teaching is considered, hence, the completion of the program is dependent on the available number of weeks. However, some changes might happen to optimize the available time.

External Evaluator

Checked and found satisfactory for the purpose of its use.

Dr. Khaleel Hasan Younis