

## Module (Course Syllabus) Catalogue 2023-2024

College/ Institute	Erbil Technical Engineering College	
Department	Highway Engineering Techniques	
Module Name	Sustainable Concrete Technology	
Module Code		
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input checked="" type="checkbox"/> PhD <input type="checkbox"/>
Semester	2 <sup>nd</sup>	
Qualification		
Scientific Title	Lecturer	
ECTS (Credits)		
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours	4	
Weekly hours (Theory)	(4) hr Class	(84) Total hrs Workload
Weekly hours (Practical)	(0) hr Class	(0) Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Rawaz Mohammed Saleem Kurda	
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Lecturer (Practical)	Rawaz Mohammed Saleem Kurda	
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# Course Book

<p><b>Course Description</b></p>	<p><b>Approach to study of concrete</b></p> <p>The growing concern over global warming and significant ecological changes requires sustainable development in all fields of science and technology. Concrete not only consumes huge amount of energy and natural sources, but also emits large amount of CO<sub>2</sub>, mainly due to the production of cement. It is evident that such large amount of concrete production has put significant impact on the energy, resource, environment, and ecology of the society. Hence, how to develop the concrete technology in a sustainable way has become a significant issue.</p> <p>These are sustainable strengthening for deteriorated concrete structure, sustainable reinforcement of new concrete structure, sustainable concrete using recycled aggregate and supplementary cementing materials and finally application of each technique to precast concrete.</p>
<p><b>Course objectives</b></p>	<ul style="list-style-type: none"> <li>❖ Understanding concrete and its properties;</li> <li>❖ Concrete behavior under load, temperature, and humidity changes;</li> <li>❖ Identifying materials used in concrete and their properties;</li> <li>❖ Concrete types;</li> <li>❖ Concrete mix design;</li> <li>❖ Significant tests of fresh and hardened concrete;</li> <li>❖ Significant tests of cement;</li> <li>❖ Significant tests of aggregate;</li> <li>❖ Concrete properties in its fresh state;</li> <li>❖ Concrete properties in its hardened state.</li> </ul>
<p><b>Student's obligation</b></p>	<p>All students are required to fulfil the following requirements:</p> <ul style="list-style-type: none"> <li>➤ Attendance</li> <li>➤ Participation in class activities</li> <li>➤ Doing homework</li> <li>➤ Participation in quiz</li> <li>➤ Conducting projects</li> <li>➤ Presenting seminars</li> <li>➤ Participation in theory part exams</li> <li>➤ Participation in practical part exams</li> <li>➤ Site visits (if applicable)</li> <li>➤ Review paper</li> </ul>
<p><b>Required Learning Materials</b></p>	<p>lecture halls with data show equipment for lecture presentations, white board, overhead projector, posters</p>

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	
		Review pape	5	1	
	Quiz		4	3	
	Lab.				
Midterm Exam		6+10	2		
Final Exam		15+25	2		
Total		100	16		
Specific learning outcome:	<ol style="list-style-type: none"> <li>1. Students will be able to:</li> <li>2. Be familiar with necessary items available at construction sites</li> <li>3. Work at construction and material laboratories</li> <li>4. Recognize common problems during transporting, handling and placing of concrete</li> <li>5. Check concrete properties during its fresh and hardened state for sustainable concrete mixes</li> </ol>				
Course References:	de Brito, J., & Kurda, R. (2021). The past and future of sustainable concrete: A critical review and new strategies on cement-based materials. <i>Journal of Cleaner Production</i> , 281, 123558.				
Course topics (Theory)		Week	Learning Outcome		
Introduction to concrete					
Cement			•		
Aggregate			•		
Water			•		
Admixtures			•		
Fresh concrete					
Hardened concrete			•		

Mixing, handling, transporting, placing, compacting and finishing of concrete		•
Hot and cold weather concreting		•
Mix design		•
<b>Reduce the total amount of binder</b>		
<b>Reduce the EI and resources use of binders</b>		
<b>Reduce the EI and resources use of aggregates</b>		
<b>Increase the durability of reinforced concrete</b>		
<b>CO<sub>2</sub> mineralization and utilization (carbon capture and storage)</b>		
<b>Thermal conductivity improvement and energy saving</b>		
<b>Material manufacturing</b>		

فۆرمى ھەئسەنگاندنى نمرە بۇ بابەتە سەرھەكیە كان (پسپۆرییە كان) (به Review article)

<b>Study Level</b>	(.....)	<b>Subject</b>	(.....)
<b>Code</b>	(.....)	<b>ECTS</b>	(.....)
<b>Weekly hours</b>	(.....)	<b>Lecturer</b>	(.....)
<b>Subject Type</b>	<b>Core</b>	<b>Language</b>	<b>English</b>
<b>Semester</b>	<b>First</b>	<b>Type</b>	<b>Theoretical</b>

Name	Review Article	Attendance	Seminar	Quiz	Midterm	Final Exam	Total
	10 %	5 %	5 %	10 %	20 %	50 %	100 %
	50 %						

**Signature:**

**Lecturer's name:**

**Date:**

## 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. Hawreen Ahmed