

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<b>Concrete Technology</b>		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>CIER 211</b>		
ECTS Credits	4		
SWL (hr/sem)	<b>100</b>		
Module Level		Semester of Delivery	
Administering Department	CIER	College	
Module Leader	Hawraa Saeed Jawad	e-mail	<a href="mailto:hawraa.s.jawad@nahrainuniv.edu.iq">hawraa.s.jawad@nahrainuniv.edu.iq</a>
Module Leader's Acad. Title	Assist Lecture	Module Leader's Qualification	MS.C.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	12/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. This course deals with the basic concept of concrete technology</li> <li>2. This is the basic subject for different types of concrete and cement.</li> <li>3. The ability to know the types of cement and the basic tests of cement</li> <li>4. The ability to know the types of aggregates, the methods of examining each of them, and their specifications</li> <li>5. The ability to produce concrete in all its stages and the defects that may occur during each stage</li> <li>6. The ability to design concrete mixes</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1- knowledge of the raw materials involved in the cement industry and cement production methods</li> <li>2- Knowledge of the most important types of cement and the advantages, disadvantages and uses of each type</li> <li>3- Knowledge of coarse and fine aggregates, their defects, tests and approved specifications for each</li> <li>4- Knowledge of the additives used in the production of concrete and the specifications and advantages of each additive</li> <li>5- Knowledge of concrete production methods, errors that may occur during concrete production, how to avoid them, and new types of concrete</li> <li>6- Knowledge of the properties and specifications of concrete and the ability to choose the appropriate type for each condition</li> <li>7- Knowledge of the methods used in designing the concrete mix and the durability of the concrete</li> <li>8- Knowledge of the properties of fresh and hardened concrete and factor that effect on it.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p style="text-align: center;"><b><u>Portland cement</u></b></p> <p>Definition, Raw materials, Manufacture of Portland cement, Chemical compositions of Portland cement, Prosperities and influence of compounds composition, Hydration of cement, Fineness of cement, Structure of hydrated cement, Volume of products of hydration, Types of cement, Standard Portland cements, Special Portland cement, other cements. [12hr]</p> <p style="text-align: center;"><b><u>Aggregate</u></b></p> <p>General classification, Sampling, Properties of aggregates, Influence of external, characteristics of aggregates on concrete, Bound between aggregate and cement paste, Strength of aggregates, Specific gravity, Bulk density, porosity and absorption of aggregates, Moisture content of aggregates, Bulking of sand, Deleterious substances in aggregate, Alkali-Aggregate Reaction, Alkali-Aggregate carbonates Reaction, Sieve Analysis, Grading Curves, Fineness modulus, Grading Requirements, Practical grading, Oversize and undersize, Gap-Graded Aggregate [10hr]</p> <p style="text-align: center;"><b><u>Properties of Fresh Concrete</u></b></p> <p>Workability, Factors affecting workability, Segregation and Bleeding, Compaction of concrete, mixing of concrete, Concrete mixers, Uniformity of mixing, Hand mixing, Ready-mixed concrete (or pre-mixed concrete), Pumped Concrete, Vibration of</p>

	<p>concrete, Types of vibrators, Hot weather concreting, Quality of Mixing Water. [10hr]</p> <p style="text-align: center;"><b><u>Strength of concrete</u></b></p> <p>Curing of concrete and methods of curing, Methods of curing, Strength, Factors affecting strength, The Bond between Concrete and Reinforcement, Factors Affecting the Bound, Strength of Hardened Cement Past. [12hr]</p> <p style="text-align: center;"><b><u>Elasticity, Shrinkage, and Creep of Concrete</u></b></p> <p>Elastic Modulus, Stiffness, Yield strength, Shrinkage, Creep, Durability, Permeability, and Frost Resistance of Concrete, Sulfate Attack. [6hr]</p> <p style="text-align: center;"><b><u>Concrete Mix design</u></b></p> <p>Selection of materials, Basic data required for mix proportioning, Methods of Concrete Mix design, British Method of Concrete Mix Design (DoE Method), American Concrete Institute Method of Mix Design (ACI- 211.1).[8hr]</p> <p style="text-align: center;"><b><u>ADMIXTURES</u></b></p> <p>Chemical Admixtures for Concrete, Admixture Definition, Types of admixtures. [2hr]</p>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments (lab.) involving some sampling activities that are interesting to the students.</p>

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>100</b>		

<b>Module Evaluation</b> تقييم المادة الدراسية
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		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	2 ,4 and 10	LO #1, #2 and #10
	Assignments	1	5% (5)	14	LO 11- #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	5% (5)	10	LO 15- #10
Summative assessment	Midterm Exam	2	20% (20)	4,8	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	Material Covered
<b>Week 1</b>	Portland cement; Definition, Raw materials, Manufacture of Portland cement, Chemical compositions of Portland cement, Prosperities and influence of compounds composition, Hydration of cement, Fineness of cement
<b>Week 2</b>	Portland cement, Structure of hydrated cement, Volume of products of hydration, Types of cement, Standard Portland cements, Special Portland cement, other cements.
<b>Week 3</b>	Aggregate: General classification, Sampling, Properties of aggregates, Influence of external, characteristics of aggregates on concrete, bond between aggregate and cement paste, Strength of aggregates, Specific gravity, Bulk density, porosity and absorption of aggregates, Moisture content of aggregates, Bulking of sand.
<b>Week 4</b>	Aggregate: Deleterious substances in aggregate, Alkali-Aggregate Reaction, Alkali-Aggregate carbonates Reaction, Sieve Analysis, Grading Curves, Fineness modulus, Grading Requirements, Practical grading, Oversize and undersize, Gap-Graded Aggregate
<b>Week 5</b>	Properties of Fresh Concrete: Workability, Factors affecting workability, Segregation and Bleeding, Compaction of concrete, mixing of concrete, Concrete mixers, Uniformity of mixing, Hand mixing
<b>Week 6</b>	Properties of Fresh Concrete: Ready-mixed concrete (or pre-mixed concrete), Pumped Concrete, Vibration of concrete, Types of vibrators, Hot weather concreting, Quality of Mixing Water.
<b>Week 7</b>	Strength of concrete: Curing of concrete and methods of curing, Methods of curing, Strength, Factors affecting strength,
<b>Week 8</b>	The Bond between Concrete and Reinforcement, Factors Affecting the Bound, Strength of Hardened Cement Past
<b>Week 9</b>	Elasticity, Shrinkage, and Creep of Concrete: Elastic Modulus, Stiffness, Yield strength,
<b>Week 10</b>	Shrinkage, Creep, Durability, Permeability, and Frost Resistance of Concrete, Sulfate Attack
<b>Week 11</b>	Concrete Mix design: Selection of materials, Basic data required for mix proportioning
<b>Week 12</b>	British Method of Concrete Mix Design (DoE Method),
<b>Week 13</b>	Methods of Concrete Mix design, American Concrete Institute Method of Mix Design (ACI– 211.1)

<b>Week 14</b>	Another examples in mix design
<b>Week 15</b>	Admixtures: Chemical Admixtures for Concrete, Admixture Definition, Types of admixtures.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

<b>Delivery Plan (Weekly Lab. Syllabus)</b> المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: cement tests, standard consistency
<b>Week 2</b>	Lab 2: cement tests, setting time and compressive strength
<b>Week 3</b>	Lab 3: Aggregate tests, coarse aggregate
<b>Week 4</b>	Lab 4: Aggregate tests, fine aggregate
<b>Week 5</b>	Lab 5: fresh concrete test, workability
<b>Week 6</b>	Lab 6: hardened concrete test: effect of age and W/C ratio on compressive strength
<b>Week 7</b>	Lab 7: hardened concrete test: effect of shape on compressive strength
<b>Week 8</b>	Lab 8: hardened concrete test: effect of sulphate on compressive strength
<b>Week 9</b>	Lab 9: hardened concrete test: splitting tensile strength
<b>Week 10</b>	Lab 10: hardened concrete test: modulus of rupture

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Properties of concrete by A.M. Neville المواصفة القياسية العراقية	Yes
<b>Recommended Texts</b>		
<b>Websites</b>	<a href="http://www.cement.org/for-concrete-books-learning/concrete-technology">http://www.cement.org/for-concrete-books-learning/concrete-technology</a>	

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.