Module Information معلومات المادة الدراسية					
Module Title	**Concrete Technology 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOMU023031				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		**Technical building and Construction**	**College**	**College of Engineering Technologies/ Al MUSTAQBAL**	
Module Leader	Ass. Peof .Dr. Sabah Muhammed Abd		**e-mail**	Sabah. Muhammed@uomus.edu.iq	
Module Leader's Acad. Title		Assist professor	**Module Leader's Qualification**		PHD in Arch. Enginee.
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	1. The student must be to learn the chemical characteristics of the main component of concrete and their effect on the properties of concrete 2. The student must be to learn the physical mechanical and cheical characteristics of the main component of concrete, as well as accomplishing all the related laboratory tests.
Module Learning Outcomes	1. The course is the basis for the use of concrete, with emphasis on requirements and possibilities within the standard for consultants, concrete producers, contractors and owners.

	2. Proportioning of concrete including principles for self-compacting concrete taking into account fresh (rheology, stability) and hardened concrete (strength, durability, economy, sustainable development). 3. This also includes giving the student an understanding of the importance of the constituents (cement, pozzolana/additives, admixtures and aggregates/fines including alkali aggregate reactivity) and composite theory (the Particle Matrix model). 4. Introduction to simple calculations of volumetric relations and pore structure (gel/capillary) in hydration products. The basis for the use of curing technology models (maturity, property development etc) for control and verification of hardening at winter concreting will be learnt. 5. Understanding of mechanisms causing volume change from fresh (plastic settlement, -shrinkage), via early age (temperature, autogenous shrinkage) to hardened concrete (drying shrinkage) is also given. 6. The student shall know the mechanisms for volume change in the different phases (stability, bleeding, temperature change, self-desiccation) as basis to understand cracking problems in fresh/young concrete (choice of constituents and proportions, importance of drying/keeping fresh concrete wet, temperature control etc). 7. Concrete strength; know and understand constituent materials and hydration products importance for strength properties, fracture mechanisms and the strength requirements of the standard for structural concrete. 8. Prediction and control of strength during concrete production therefore is central. 9. Finally transport properties and durability issues are treated (frost, corrosion, ASR) 10. .Knowledge: - Understanding of constituent materials for properties of fresh and hardened concrete properties- Composite models for proportioning (particle/patrix) and transport/durability issues (paste/aggregate)- Basic understanding of hydration as well as important physical and chemical properties of the hydration products- Basic curing technology models (maturity, property development)- 11. Know the different mechanisms causing volume change from fresh (plastic settlement, -shrinkage) via young (temperature, autogeneous shrinkage) to hardened concrete (drying shrinkage).
Indicative Contents	Composition of concrete, function of the paste and aggregate, general properties of ordinary cement, Portland cement, making materials, chemical formulas and processes. [4 hrs.] Manufacture of Portland cement ,Chemical analysis of Portland cement, major and minor compounds of Portland cement. [4 hrs.]

	Properties of Portland cement, Fineness of cement ,Consistency of cement paste, Hydration reactions of cement ,Heat of hydration ,Setting and hardening of cement ,time of setting. [4 hrs.] Soundness of cement, Strength of cement , Influence of the compound composition on properties of cement (strength development). [4 hrs.] Types of cement, Ordinary Portland Cement (TYPE I), Modified Cement (Type II), Rapid-Hardening Portland Cement (Type III), Ultra-High Early Strength Cement, Low Heat Portland Cement (Type IV), Sulfate-Resisting Cement (Type V), White Cement and Pigments, Portland Blast-furnace Cement, Super-Sulfated Cement, Pozzolana, Anti-bacterial cement, Masonry cement, Natural cement, Hydrophobic cement. [8 hrs.] Aggregate, Classification of aggregate, According to the size, According to the source, According to the unit weight, Physical properties of aggregate, Practical shape and texture, Bond of aggregate. [4 hrs.] Specific Gravity, Porosity and Absorption ,Gradation, sieve analysis , max size of aggregate, fineness modulus, Gap- graded aggregate, Oversize and undersize aggregate, All- in aggregate, bulking of sand. [4 hrs.] Soundness of aggregate, Handling and storage aggregate, Deleterious substances organic impurities, Alkali- aggregate reaction , Alkali- carbonate reaction. [4 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on 1. Exams. 2. Student feedback. 3. Preparation of scientific reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,5,6,10	
	Assignments	2	10% (10)	7, 8	
	Report	1	10% (10)	11	
	Class work	4	10% (10)	2,4,8,11	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
Week 1	Definition of concrete, constitutes of concrete , function of the concrete's constitutes
Week 2	Cement raw materials of cement .Manufacture of cement ,
Week 3	Chemical analysis of Portland cement, major and minor compounds of Portland cement
Week 4	Properties of Portland cement, Fineness of cement ,Consistency of cement paste, Hydration reactions of cement ,Heat of hydration ,Setting and hardening of cement ,time of setting
Week 5	Soundness of cement, Strength of cement , Influence of the compound composition on properties of cement (strength development)
Week 6	Calculation of gel and hydration product paste
Week 7	Types of cement, Ordinary Portland Cement (TYPE I), Modified Cement (Type II), Rapid-Hardening Portland Cement (Type III), Ultra-High Early Strength Cement, Low Heat Portland Cement (Type IV), Sulfate-Resisting Cement (Type V),
Week 8	White Cement and Pigments, Portland Blast-furnace Cement, Super-Sulfated Cement, Pozzolana, Anti-bacterial cement, Masonry cement, Natural cement, Hydrophobic cement
Week 9	Aggregate, definition, function, requirements, Classification of aggregate,
Week 10	Physical properties of aggregate, Practical shape and texture, Bond of aggregate,
Week 11	Specific Gravity, Porosity and Absorption ,Gradation, sieve analysis , max size of aggregate, fineness modulus, Gap- graded aggregate, Oversize and undersize aggregate, All- in aggregate, bulking of sand
Week 12	Soundness of aggregate, Handling and storage aggregate, Deleterious substances organic impurities, Alkali- aggregate reaction , Alkali- carbonate reaction .
Week 13	Water in concrete, function of water, requirement of water in concrete, impurities limitation and effect
Week 14	Mixing water, curing water, sea water

Week 15	Preparing for final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Cement tests , consistency of cement paste
Week 2	Initial and final setting times of cement paste
Week 3	Compressive strength of cement mortar
Week 4	Fineness of cement by blain method and by sieving
Week 5	Sampling of coarse and fine aggregate
Week 6	Unit weight and voids of coarse aggregate
Week 7	Unit weight and voids of coarse aggregate
Week 8	Sieve analysis for fine aggregate
Week 9	Sieve analysis for coarse aggregate
Week 10	Specific gravity and absorption for fine aggregate
Week 11	Specific gravity and absorption for coarse aggregate
Week 12	Moisture content in coarse and fine aggregate , bulking of sand
Week 13	Los-angeles abrasion test for coarse aggregate
Week 14	Water test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Properties of concrete, A ,M. NEVILLE 2. تكنولوجيا الخرسانة , د احمد علي العريان	
Recommended Texts	1- تكنولوجيا الخرسانة محمود امام	
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success	**A** - Excellent	امتياز	90 - 100	Outstanding Performance

Group (50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – 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.