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| | Ministry of Higher Education and Scientific Research - Iraq<br><br>University of Warith Al-Anbiyaa<br>College of Engineering<br>Civil Engineering Department | |

# MODULE DESCRIPTION FORM

## Module Information

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| **Module Title** | CONCRETE TECHNOLOGY II | **Module Delivery** | |
| **Module Type** | CORE | | ☒ **Theory**<br>☒ **Lecture**<br>☒ **Lab** |
| **Module Code** | CIV044 | | |
| **ECTS Credits** | 7 | | |
| **SWL (hr/sem)** | 175 | | |

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| **Module Level** | 2 | **Semester of Delivery** | 2 |
| **Administering Department** | Civil engineering | **College** | Engineering |
| **Module Leader** | Abdulrasool Thamer Abdulrasool | **e-mail** | abdulrasool.th@uowa.edu.iq |
| **Module Leader's Acad. Title** | Assistant Lecturer | **Module Leader's Qualification** | Ms.C |
| **Module Tutor** | | **e-mail** | |
| **Peer Reviewer Name** | | **e-mail** | |
| **Scientific Committee Approval Date** | 20/10/2024 | **Version Number** | 1.0 |

## Relation with other Modules

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| **Prerequisite module** | CONCRETE TECHNOLOGY I | **Semester** | 1 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents | |
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| **Module Objectives** | 1. The course aims to introduce students to the ability to deal with concrete as a construction material.<br>2. Graduates of the department should have a comprehensive knowledge of concrete and the raw materials that make it up.<br>3. Graduate engineers who have the ability to design concrete mixes.<br>4. Gradate engineers who have sufficient knowledge to make all the tests of fresh and hardened concrete.<br>5. Students should know about all the Iraqi and international standards, and evaluate the results of laboratory tests. |
| **Module Learning Outcomes** | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>1. The student will be familiar with the most important methods used in the cement industry.<br>2. The student will be familiar with the factors that affect the properties of the different types of cement and all the details of cement.<br>3. The student will be familiar with the types of aggregates involved in the production of concrete and its properties.<br>4. The student will be familiar with the methods of concrete mix design.<br>5. The student will know the properties of concrete in fresh and hardened states.<br>6. The student will be familiar with the tests of cement, aggregate, fresh and hardened concrete |
| **Indicative Contents** | Indicative content includes the following.<br><br><u>Fresh Concrete:</u><br>Methods of mixing, transporting and placing of concrete. Workability – Definition<br>and requirement, factors affecting workability, various tests as IQ Standard. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various<br>methods, micro-cracking.<br><br><u>Strength of Concrete:</u> |

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| | The compressive strength of concrete is one of the most important and useful properties of concrete. In most structural applications concrete is employed primarily to resist compressive stresses.<br><br>Elasticity, Creep and Shrinkage:<br>Volume change is one of the most detrimental properties of concrete, which affects the long-term strength and durability.<br><br>Durability and permeability of concrete:<br>Definitions, causes, carbonation, cracking, Concrete in aggressive environment:<br>Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea<br>water, special coating for water proofing, sulphate chloride and acid attack, concrete<br>for hot liquids.<br><br>Special Concrete:<br>Review of behavior and characteristics of high strength concrete, high performance<br>concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight<br>concrete, Precast concrete.<br><br>Special concreting techniques:<br>Pumped concrete, concrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete.<br><br>Concrete Mix Design under ACI code:<br>Mix design is the proportioning of the various constituents of concrete to produce the desired properties in both the fresh and hardened states. |

| Learning and Teaching Strategies | |
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| **Strategies** | The student acquires the skill of differentiating between the different types of cement, as well as the different types of aggregates involved in the production of concrete. The student acquires the skill of identifying the methods of producing concrete, methods of dealing with it on the site, and the problems facing concrete |

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| | in hot weather. Also, the student will Know the skill of concrete mix design. |

## Student Workload (SWL)

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| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 93 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 6 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 82 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 5.5 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **175** | | |

## Module Evaluation

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
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| **Formative assessment** | **Quizzes** | 4 | 5% (5) | 3, 6 and8, 10 | LO #1, #2 and #3, #4 |
| | **Assignments** | 2 | 5% (5) | 2 and 12 | LO #5, and #6 |
| | **Projects / Lab.** | 1 | 15% (10) | Continuous | All |
| | **Report** | 1 | 5% (5) | 13 | LO #1, #2 and #3, #4 |
| **Summative assessment** | **Midterm Exam** | 2hr | 20% (20) | 7 | LO #1 - #3 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

| | **Material Covered** |
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| **Week 1** | Fresh concrete : Methods of mixing, transporting and placing of concrete. |
| **Week 2** | Fresh concrete: Workability – Definition and requirement, factors affecting workability, various tests, Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking. |

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| **Week 3** | Hardened concrete: Compressive and tensile strength and their relationship, various tests, Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. |
| **Week 4** | Hardened concrete: Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and nondestructive tests with their limitations, test methods |
| **Week 5** | Hardened concrete: Durability and permeability of concrete: Definitions, causes, carbonation, cracking |
| **Week 6** | , Concrete in aggressive environment: Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids. |
| **Week 7** | Mid-term exam |
| **Week 8, 9** | Special Concrete: Review of behavior and characteristics of high strength concrete, high performance concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete. |
| **Week 10, 11, 12** | Special concreting techniques: Pumped concrete, concrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete. |
| **Week 13 , 14** | Concrete mix design: Principles of mix proportioning, probabilistic parameters, factors governing selection of mix. British and ACI method of concrete mix design, |
| **Week 15** | **Preparatory week before the final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)** | |
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| | **Material Covered** |
| **Week 1** | Test on Design concrete- fresh concrete : workability of concrete |
| **Week 2** | Test on Design concrete- fresh concrete : compacting factors |
| **Week 3** | Test on Design concrete- fresh concrete : VEE-BEE time test |
| **Week 4** | Test on Design concrete- fresh concrete Kelly ball test also called as a ball penetration test. |
| **Week 5** | Test On Designed Concrete, Hardened Concrete, Compressive Strength of Concrete Cubes Test |
| **Week 6** | Test On Designed Concrete , Hardened Concrete, Compressive Strength of Concrete Cylinder Test |
| **Week 7** | Test On Designed Concrete , Hardened Concrete, Splitting Tensile Strength Test Method |
| **Week 8** | Test On Designed Concrete , Hardened Concrete, Flexural Test |

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| **Week 9** | Test On Designed Concrete , Hardened Concrete, Rebound Hammer Test |
| **Week 10** | Test On Designed Concrete , Hardened Concrete, Rebound Hammer Test |
| **Week 11, 12** | Trail mixes for normal concrete . |
| **Week 13, 14** | Trail mixes for Special kind concrete . |
| **Week 15** | Lab exam |

| **Learning and Teaching Resources** | | |
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| | **Text** | **Available in the Library?** |
| **Required Texts** | Concrete Technology | Yes |
| **Recommended Texts** | Properties of concrete by A.M. Neville.<br>Concrete technology by A.M. Neville and Brook J.J 2nd Edition. | No |
| **Websites** | https://www.cement.org/learn/concrete-technology | |

## Appendix

| **Grading Scheme**<br>مخطط الدرجات | | | | |
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| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **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 |
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**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.