# Course Specification
## (Bachelor)

| | |
|---|---|
| **Course Title:** | Water supply and drainage system |
| **Course Code:** | CE 4502 |
| **Program:** | Bachelor of Science in Civil Engineering |
| **Department:** | Civil Engineering Department |
| **College:** | College of Engineering & Architecture |
| **Institution:** | Umm Al-Qura University |
| **Version:** | 1 |
| **Last Revision Date:** | 31 January 2025 |

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## A. General information about the course:

### 1. Course Identification

| 1. Credit hours: ( 2 ) | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| **2. Course type** | | | | | |
| A. | ☐ University | ☐ College | ☒ Department | ☐ Track | ☐ Others |
| B. | ☒ Required | | ☐ Elective | | |
| **3. Level/year at which this course is offered: (9)** | | | | | |
| **4. Course General Description:** | | | | | |
| This course provides students with a comprehensive introduction to water supply and sewer systems, covering the estimation of water, wastewater, and stormwater quantities. It includes the design principles for water supply and sewer systems, and their key appurtenances. Additionally, the course integrates the application of computer software for the analysis and design of water and sewer networks. | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| Hydraulics | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| | | | | | |
| **7. Course Main Objective(s):** | | | | | |
| The course aims to enhance students' competence and technical skills in analyzing, designing, and solving engineering challenges related to water supply and sewer systems. | | | | | |

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 4 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

### 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | 15 |
| 2. | **Laboratory/Studio** | 45 |
| 3. | **Field** | |
| 4. | **Tutorial** | |
| 5. | **Others (specify)** | |
| **Total** | | 60 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | demonstrate the water supply and sewer systems and appurtenances. | K.1, K.2 | • Lectures<br>• Training tutorials<br>• Small group work<br>• Computer Lab | • Assignments<br>• Quizzes<br>• Written exams<br>• Term Project |
| 1.2 | describe engineering requirements of different water supply and sewer systems. | K.1, K.2 | • Lectures<br>• Training tutorials<br>• Small group work<br>• Computer Lab | • Assignments<br>• Quizzes<br>• Written exams<br>Term Project |
| **2.0** | Skills | | | |
| 2.1 | professionally analyze basic water supply and drainage systems using modern engineering tools. | S.2, S.3 | • Lectures<br>• Training tutorials<br>• Small group work<br>• Computer Lab | • Assignments<br>• Quizzes<br>• Written exams<br>• Term Project |
| 2.2 | Design optimum water supply systems. | S.1, S.3 | • Lectures<br>• Training tutorials<br>• Small group work<br>• Computer Lab | • Assignments<br>• Quizzes<br>• Written exams<br>• Term Project |
| 2.3 | Design optimum sewer systems. | S.1, S.3 | • Lectures<br>• Training tutorials | • Assignments<br>• Quizzes |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | | | • Small group work<br>• Computer Lab | • Written exams<br>• Term Project |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | function effectively in modes of independent learning and multi-disciplinary teams. | V.2 | • Lectures<br>• Training tutorials<br>• Small group work<br>Computer Lab | • Term Project |
| 3.2 | comply with code requirements for the design of water supply and sewer systems. | V.1 | • Lectures<br>• Training tutorials<br>• Small group work<br>Computer Lab | • Written exams<br>• Term Project |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Introduction to water supply systems | 4 |
| 2 | Water supply system, including storage and appurtenances. | 4 |
| 3 | Types of water distribution systems – components of water distribution systems | 4 |
| 4 | Analysis of water distribution system | 4 |
| 5 | Design of water distribution system | 4 |
| 6 | Implementation of water distribution system | 4 |
| 7 | Quantity of storm water | 4 |
| 8 | Sewerage systems and appurtenances | 4 |
| 9 | Hydraulics of sewers | 4 |
| 10 | Design of sanitary and storm sewers | 4 |
| 11 | Pumping stations and pumps selection | 4 |
| 12 | Quantity of storm water - Sewerage systems and appurtenances | 4 |
| 13 | Hydraulics of sewers - Design of sanitary and storm sewers | 4 |
| 14 | Evaluation of existing water systems considering global, economic, environmental, and societal factors (through a project) | 4 |
| 15 | Evaluation of existing sanitary and storm systems considering global, economic, environmental, and societal factors (through a project) | 4 |
| **Total** | | **60** |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | Assignments | Weekly | 5% |
| 2. | Quizzes | 3, 6 &12 | 15% |
| 4. | Group project | 13 | 5% |
| 5. | Mid-Term Exam | 8 | 25% |
| 6. | Lab Report | 15 | 10% |
| 7. | Final Exam | 16/17 | 40% |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| **Essential References** | • Introduction to Environmental Engineering 5th Edition (January 2012), by Mackenzie L. Davis & David A. Cornwell, Publisher: McGraw-Hill Higher Education, ISBN-10: 0073401145, ISBN-13: 9780073401140 |
| **Supportive References** | • Environmental Engineering: Fundamentals, Sustainability, Design", 2nd Edition, James R. Mihelcic, Julie B. Zimmerman, Wiley, 2014.<br>• Wastewater Engineering: Treatment and Reuse 4th Edition (March 2014 by Metcalf & Eddy, Inc., George Tchobanoglous, Franklin Burton & David H. Stensel, Publisher: McGraw-Hill Higher Education, ISBN-10: 0070418780, ISBN-13: 9780070418783<br>• Water Supply & Sewerage 6th Edition (October 1990) by Terence J. McGhee & E. W. Steel, Publisher: McGraw-Hill Higher Education, ISBN-13: 9780070609389<br>Butler, David_ Davies, John W._ James Digman, Christopher_ Makropoulos, Christos - Urban Drainage, 5th ed. |
| **Electronic Materials** | Institution of Civil Engineers |
| **Other Learning Materials** | • WATER CAD<br>• SEWER CAD<br>• Storm CAD |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities** | • Classrooms for lectures and exams with |

| Items | Resources |
|---|---|
| (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | students working on their laptops for 30 students during the scheduled class hours.<br>• Well-equipped Laboratory |
| **Technology equipment**<br>(projector, smart board, software) | A white board, Computer with multi-media, a printer, internet connection, data show. |
| **Other equipment**<br>(depending on the nature of the specialty) | None |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | • Students<br>• Instructor<br>Program leader | • Indirect<br>• Direct<br>• Direct |
| Effectiveness of Students assessment | Independent member teaching staff | • Direct |
| Quality of learning resources | • Students<br>Instructor | • Indirect<br>Indirect |
| The extent to which CLOs have been achieved | • Instructor<br>• Students<br>Program leader | • Direct<br>• Indirect<br>Direct |
| Other | | |

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

## G. Specification Approval

| | |
|---|---|
| **COUNCIL /COMMITTEE** | **CIVIL ENGINEERING COUNCIL** |
| **REFERENCE NO.** | **THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446** |
| **DATE** | **30 APRIL 2025** |

