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**Water Resources Engineering Department**

**College of Engineering**

**University of Salahaddin**

**Subject: Water Supply and Sewerage**

**Course Book – 3rd Year**

**Lecturer's name: Enas Sa'ad Fakhrey**

**Academic Year: 2020/2021**

**Course Book**

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| **1. Course name** | **Water Supply and Sewerage** |
| **2. Lecturer in charge** | **Enas Sa'ad Fakhrey** |
| **3. Department/ College** | **Water Resources Engineering/ College of Engineering** |
| **4. Contact** | **e-mail:** enas.fakhrey@su.edu.krd |
| **5. Time (in hours) per week**  | **Theory: 2** **Practical: 2**  |
| **6. Office hours** | **16 hours** |
| **7. Course code** | **WRE3066** |
| **8. Teacher’s academic profile**  | I was born in Erbil, Iraq, in 1984. I received the B.E. degree in Civil engineering from the University of Tikret, Iraq, in 2006, and the High Diploma. and MS. C. degrees in Dams and Water Resources engineering from Salahaddin University, Erbil, Iraq, in 2008 and 2016, respectively. |
| **9. Keywords** | **Water, water supply, water sanitation, water networks, sewer networks, Water Treatment Plant, Wastewater Treatment Plant** |
| **10. Course overview:** Fundamental consideration of water supply sources, Quantity of water demand and population forecasting, Water quality and analysis, Pipes and Pipe fittings, water distribution system and water tanks, Water treatment processes, Intakes, Sedimentation, Coagulation and flocculation, Filtration, and disaffection, Miscellaneous water treatment methods, Sewerage quality and analysis, Sewer system and appurtenances, Fundamental consideration of sewage treatment, Primary treatment, Secondary treatment, Lab. Tests |
| **11. Course objective:*** To understand the quantity and quality of water and wastewater
* To understand the collection system and distribution system of water
* To understand water treatment system
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| **12. Student’s obligation**The attendance and completion of all exams, assignments, reports and essays.  |
| **13. Forms of teaching**Different forms of teaching will be used to reach the objects of the course. Notes to be written on the board especially design equations, head titles, definitions and summary of conclusions, classification of materials and any other illustration, there will be class room discussions and the lecture will give enough background to solve examples.  Power points presentation will be use when required; besides work sheets will be designed to let the chance for practicing. Students should read the lectures notes regularly and to participate the class room discussions.  |
| **14. Assessment scheme**The final grade will be based upon the following criteria:

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| --- | --- |
| Midterm exam | 20% |
| Quiz / Assignments/Homework’s  | 15% |
| Laboratory | 15% |
| Final Exam  | 50% |
| Total | 100% |

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| **15. Student learning outcome:**The students will able to design water distribution system, know all water tests, preliminary design of conventional water treatment plant.   |
| **16. Course Reading List and References‌:**1. McGhee, Terence J., “*Water Supply and Sewerage*”, McGraw Hill International Edition, 6th Edition 1991.
2. Steel & McGhee, “Water Supply and Sewerage”, McGraw Hill International Edition, 5th Edition 1979
3. Karia & Christian, “Wastewater Treatment, Concept and Design Approach” , Prentice-Hall India, 2006.
4. Davis, L. Mackenzie and David A. Cornwell”, *Introduction to Environmental Engineering*”, Hill International Edition, 4th Edition 2008.
5. Hickey, Harry E.,” *Water Supply Systems and Evaluation Methods, Volume I: Water Supply System Concepts”*, McGraw Hill International Edition 2008
6. Hickey, Harry E.,” *Water Supply Systems and Evaluation Methods, Volume II: Water Supply Evaluation Methods”*, McGraw Hill International Edition 2008
7. Singh, Gurcharan” *Water Supply and Sanitary Engineering*”, McGraw Hill International Edition 6th Edition 2003
8. Dr. B.C. Punmia, Er. Ashook Kumar Jain and Dr. Arun K. Jain “Water Supply Engineering” 2008
9. Core Engineering Concepts for Students and Professionals. By Michael R. Lindeburg, PE. 2010
10. Principles of Fluid Mechanics and Fluid Machines (second Edition). By Narayana N. Pillai, C.R. Ramakrishnan, C.R. Ramakrishnan. 2006
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|  **17. The Theory and Practical Topics:**Course program (Theory and Application 3hours per week)

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| **Week No.** | **Topic description** |
| Weeks1🡪 4 | * Fundamental consideration of water supply sources
* Quantity of water demand and population forecasting
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| Weeks 5 🡪 8 | * Water quality and analysis
* Pipes and Pipe fittings
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| Weeks9 🡪 12 | * Water treatment processes
* Sewer system and appurtenances
* Fundamental consideration of sewage treatment
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| **18. Practical Topics**

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| **Week No.** | **Topic description** |
| Weeks1🡪 4 | * pH and Turbidity
* Acidity
* Alkalinity
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| Weeks 5 🡪 8 | * Hardness
* Chloride
* Total Solids
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| Weeks9 🡪 12 | * Dissolved Oxygen
* BOD
* COD
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| **19. Examinations:**Sample of Test: Forecast the population for the year 2021, 2031, and 2041 from the following population data by arithmetic increase method.

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| --- | --- | --- | --- | --- | --- | --- |
| Year | 1961 | 1971 | 1981 | 1991 | 2001 | 2011 |
| Population | 858,500 | 1,015,600 | 1,201,000 | 1,690,500 | 2,077,000 | 2,580,800 |

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