

Wastewater Engineering

Course Code: 0901471

Credit: 3 hours

prerequisite: 0901371

Catalog data (*according to the Civil Engineering Plan of the year 2010*): Sources, quantities and quality of wastewater. Primary treatment for removal of suspended solids. Chemical reaction and reactors' types. Secondary treatment; including suspended and attached growth processes. Management of treatment residuals and design of sewer system.

Instructor: Ghada Kassab, PhD

Office hours: 12:30-1:30 Monday and Wednesday
10-11 Sunday and Tuesday

Text book: Mackenzie L. Davis. (2011). Water and Wastewater Engineering, Design Principles and Practice. McGraw Hill.

References: Metcalf and Eddy/AECOM (2014). Wastewater Engineering, Treatment and Resource Recovery, McGraw Hill International Edition.

Reynolds and Richards (1996). Unit Operations and Processes in Environmental Engineering. Cengage Learning.

Hammer, M. and Hammer, M. (2011). Water and Wastewater Technology. Pearson-Prentice Hall.

Davis, M. and Masten, S. (2009). Principles of Environmental Engineering and Science. McGraw Hill.

Mihelcic, J. and Zimmerman, J. (2010). Environmental Engineering, Fundamentals, Sustainability and Design. John Wiley and Sons.

Course learning outcomes:

As an outcome of completing this course; students:

- I. will be able to understand the adverse impacts of improper wastewater management on the aquatic environment.
- II. will be able to identify the qualitative characteristics of domestic wastewater.
- III. will be able to identify wastewater quality criteria and standards and their relation to public health and environment.

- IV. will be able to estimate wastewater flow rates and design a wastewater collection system.
- V. will understand the principles related to the design and selection of wastewater treatment processes
- VI. will be able to select and design appropriate wastewater treatment unit processes.

Students outcomes:

Upon completion of this course, students will acquire:

- I. Ability to design system component or process to meet desired needs (outcome **C** according to ABET criteria).
- II. An ability to identify, formulate and solve engineering problems (outcome **E** according to ABET criteria).
- III. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (outcome **H** according to ABET criteria)

Topics covered:

- Sources and quantities of wastewater;
- Qualitative characteristics of domestic wastewater;
- Governing legislations and standards;
- Wastewater collection system;
- pre and primary treatment of wastewater.
- Principles of Biological Treatment;
- Suspended Growth Processes;
- Attached growth processes;
- An overview of nutrient Removal;
- An overview of sludge treatment and disposal.

Student Assessment:

First exam: 20%

Midterm exam: 30%

Final exam: 50%

Assignments and pop quizzes: Bounce up to 5%

Examination policy:

Any type of communication is not permitted during the examinations, nor copying from others, or collaborating in any way. **Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.**

