



PRGR 668 Wastewater and Sludge Treatment

Course Syllabus

Course Number: PRGR 668

Instructor Information

Instructor: Karim El Khoury

Office Location: JKD offices - 4th Floor - Byblos Sun Building - Jbeil - Lebanon

Telephone: +961 9 945 121 or +961 9 945 548

Office Hours: Monday through Friday 08:30 till 17:00 (EET)

E-mail: karimk@jkdevelop.com

Technical Support Information

E-mail: moodle@progreendiploma.com

Telephone: +961 1 350000 ext. 3586

Office Hours: Monday through Friday 08:00 till 17:00 (EET)

Course Identification

Course Number: PRGR 668

Course Name: Wastewater and Sludge Treatment

Course Location: Online

Class Times: 24/7 online access

Course Description/Overview

Analysis and design using commercially available software: wastewater treatment plant; sizing of tanks; effluent concentration. Results visualizations and assessment: cost analysis, operation and maintenance. The following topics will be covered.

- 1- Introduction to wastewater treatment
- 2- Pricing and cost estimation of wastewater treatment schemes
- 3- Treatment of carbonaceous organic matter
- 4- Treatment of nutrients like nitrogen and phosphorous
- 5- Budding models



- 6- Simulation techniques
- 7- Editing layouts and using scenarios
- 8- Influent data and influent advisor
- 9- The define function
- 10- Sensitivity analysis
- 11- Examples of actual plans (case studies: A2O model, Bardenpho model, ...)

Course Learning Objectives

The overarching goals of this course are: a) Design a civil engineering component/ system by applying standards appropriate for design including codes and regulations and incorporating multiple constraints into the design in the civil engineering areas of environmental engineering. b) Identify problem setting and related assumptions, limitations and solution requirements in the environmental engineering field. c) Formulate methods and strategies considering all relevant perspectives, solution models, and alternative solution paths. d) Use selected models, methods, and data to produce the appropriate solution. e) Use industry standard software to analyse and design engineering components.

Course Content Learning Outcomes

At the end of this course, each student will be able to do the following:

- 1- Create a customized model for a wastewater treatment plan
- 2- Perform cost analysis for different plant layouts
- 3- Apply advanced simulation techniques within scenarios and influent advisor interface.
- 4- Perform treatment of carbonaceous organic matter.
- 5- Perform treatment of nutrients like nitrogen and phosphorous.
- 6- Perform sensitivity analysis.
- 7- Perform Monte Carlo Analysis.
- 8- Apply the software for case studies.
- 9- Perform a preliminary design of the most widely used wastewater treatment unit operations.
- 10- Evaluate different approaches to wastewater treatment.

Course Resources

Course Website(s)

<http://moodle.progreendiploma.com>

Required Course Texts and Materials

All notes, lectures and handouts given to students throughout the course



Suggested Course Texts and Materials

- Theory and practice of water and wastewater treatment, by R.L. Droste, John Wiley and sons.
- Wastewater engineering, by Metcalfe and Eddy, third edition, McGraw Hill.

Optional Course Texts and Materials

1. GPS-X User's Guide.
2. GPS-X Tutorial Guide: A STEP-BY-STEP GUIDE FOR LEARNING AND GETTING FAMILIAR WITH GPS-X

Assignments and Grading Scheme

Grading System

0 to 100

Grading Policy

Grades can be based on the following:

Group discussion forum #1 (Extended over weeks 1 and 2)	10
Assignment 1	10
Group discussion forum #2 (Extended over weeks 3 to 10)	10
Assignment 2	10
Assignment 3	10
Assignment 4	10
Assignment 5	10
Assignment 6	10
Assignment 7	10
Group design project with research emphasis	10

Total Points	100
---------------------	------------

Course Policies

Late Assignments

It is essential that homework and other assignments be completed and submitted on time which is due one week after the assignment. Once the due date is past, without notice and justification, the submission is not accepted.

Classroom Protocol

Online participation	You are expected to study all modules and follow up with the course content on a weekly basis. All lectures are fundamental to the comprehensive understanding of the course. It is the students responsibility to obtain study the notes and learning tools, submit all assignments and interact with the instructor if further clarification is required.
Academic integrity	<ul style="list-style-type: none"> • We expects all students to maintain the highest level of integrity. Cheating or plagiarism will not be tolerated. University politics regarding academic integrity are available in http://www.lau.edu.lb/governance-policies/policies/ . • The instructor will adhere to all LAU policies regarding academic integrity as stated • All work must be the result of students own efforts • Students who are suspected of plagiarism or other violations of academic integrity code will face investigation. Those found guilty will face disciplinary action repeated offenses will result in permanent expulsion from the university.
Homework policy	Homework must be neat and legible or it will not be graded and must be turned on time with no exceptions
Exam policy	The student will be evaluated with a set of assignments/home works. This aims to keep an updated progress check on all students in order to remediate any difficulties with the learning outcomes if needed.
Course website	Syllabus, solution of homework, solution of tests, solution of previous tests, hand-outs, and any relevant material are placed online
Cheating	Students caught cheating will receive a grade of zero on the relevant assignment in the first cheating attempt and a warning. Students caught cheating for the second time in the same course will receive an F grade in the course and a second warning.

Studying	<ul style="list-style-type: none"> • You need to study on a regular basis (after each lecture) do not postpone studying till just before the tests • Solve the assigned homework as soon as it is announced in the lecture. • You are responsible for all the material covered in the lectures. Any material that is in the textbook and not covered in class will not be included in the tests. • Take advantage of the online interactive platform. It is your chance to get individual attention and explanation. It is also an opportunity to learn from other people's questions and group discussions. • Finally, a well prepared student will find it easy to pass the course.
----------	--

Dissability

Students who have disabilities should have a confidential appointment to discuss their need for accommodations. Establishing reasonable accommodations should be considered on a case-by-case basis.

Course Structure

Module	Topics (Details on assignments and bibliography are available in the course modules)
1	CapdetWorks - Basic waste water treatment plant layout. Editing parameters. Cost parameters
2	CapdetWorks - Advanced database modification. Cost override. Design override. Comparing several layouts. Sensitivity analysis. Generating a report
3	GPSX - Basic modelling. Introduction to simulation interface. Outputs and results.
4	GPSX - Creating scenarios
5	GPSX - Data input and output
6	GPSX - Automatic controllers and tuning
7	GPSX - Define function
8	GPSX - Sensitivity analysis
9	GPSX - Monte Carlo analysis and probability analysis



10	GPSX – Case study : Nutrients removal (A2O model, Bardenpho model, CMAS with post-anoxic treatment).
----	--