

Pro-Green Diploma

Waste to Energy Processes and Technologies

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Office Hours: Every Monday at 3:30 p.m. Beirut time or by appointment

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Overview of the Course

Fundamental principles of Waste Management with particular emphasis on Organic Waste.
Overview of Waste-To-Energy Technologies, including project implementation concepts

Credit Hours

The course counts for 2 credits.

Delivery Format

This course is offered in an online format. Students are expected to download course material and upload their assignment on the course webpage: <http://moodle.progrendiploma.com>.

In case of problems with accessing the course website, the students are expected to contact: moodle@aub.edu.lb

Course Prerequisites

No pre-requisite courses are required for this course, however it is preferable the students are familiar with wastewater treatment principles

Course Contents

Part 1

Fundamental principles of waste management, with particular emphasis on organic wastes. Waste generation and characterization, and techniques for waste collection, storage, transport, utilization (including recycling and recovery). Focus is on the application of engineering science to develop integrated waste management systems.

Part 2

Waste-to-energy technology: mass burning & modular combustion, refuse derived fuel systems, anaerobic digestion, composting. Comparison and benchmarking of the technologies with respect to energy efficiency, environmental impacts, costs etc. Hazardous waste generation, producer responsibility and legislation.

Part 3

Waste-to-energy projects implementation concepts: risk assessment (waste, energy and materials market, environmental protection & legal issues); implementation process including; feasibility, siting, procurement/ownership, financing, plant construction & operations.

Course Key Learning Outcomes

Part 1:

1. Describe the waste management hierarchy and principles of composting, anaerobic digestion and incineration;
2. Demonstrate specialized, detailed knowledge of the essential elements of a waste management plan;
3. Communicate the knowledge and rationale underpinning the design and operation of a modern landfill.

Part 2:

4. Articulate the scientific principles of waste to energy processes and describe the practicable options for set scenarios;
5. Integrate knowledge to assess the most appropriate waste-to-energy conversion processes with due regard to the available technologies, waste feedstock, and active policies and legislation including environmental protection considerations.

Part 3:

6. Demonstrate comprehensive knowledge on the issues to be considered when planning and implementing waste-to-energy process plants and be able to defend choices/decisions.

Texts and Supplementary Materials

Required Text

- TBA

References

- TBA

Technical Requirements

No specific computer program is required for this course.

Grading Policy

The grade breakdown is as follows:

- Part 1 activities and Tests (50%)
- Part 2 activities and Tests (30%)
- Part 3 activities and Tests (20%)

Total Points: 100 pts

Description of Course Requirements (assessments)

Discussion Forum

A forum activity module enables participants to have asynchronous discussions, i.e. discussions that take place over an extended period of time. Forum posts can be rated by teachers or students (peer evaluation). Ratings can be aggregated to form a final grade which is recorded in the gradebook. Forums have many uses, such as providing a social space for students to get to know each other, making course announcements, discussing course content or reading materials, continuing online an issue raised previously in a face-to-face session, and serving as a help center where tutors and students can give advice

Knowledge Checks/Quizzes

You will take quizzes as part of the module activities throughout the semester, all delivered via Moodle. These quizzes include multiple-choice questions and essay writing. The quiz content will be largely based on readings.

Internet Etiquette

Netiquette (short for "network etiquette" or "Internet etiquette") is a set of social conventions that facilitate interaction over networks.

General Rules

1. Make your messages easier to read by making your paragraphs short and to the point.
2. TYPING IN ALL CAPS IS CONSIDERED SHOUTING ON THE INTERNET.
3. Messages in all lowercase letters can be difficult to read, instead, use normal capitalization.
4. *Asterisks* surrounding a word can be used to make a stronger point.
5. Be careful when using sarcasm and humor. Without face-to-face communications your joke may be viewed as criticism. When being humorous, use emoticons to express humor. (tilt your head to the left to see the emoticon smile) :-) = happy face for humor
6. Never give your user ID or password to another person. System administrators that need to access your account for maintenance or to correct problems will have full privileges to your account.

Make-up Policy

Students are expected to take exams in the allocated time. In case of an emergency warranting the student to miss the exam time, the student is required to contact the instructor as soon as possible. The instructor reserves the right to allow the student to take a make-up exam.

Tentative Schedule

WEEK	TOPIC	ACTIVITY	DUE DATE
1	Fundamental Principles of Waste Management	Ice-breaker Waste Reduction Ideas	February 26 & March 4 March 4
2	Introduction to Integrated Solid Waste Management		
3	Functional Elements & Hierarchy of ISWM		
4	5 Rs and Treatment Overview	Waste Technology Presentation	March 31
5	Main Treatment Technologies & Waste Management Approaches	Presentation on Technology	April 7
6	Waste Management in Sludge		
7	Waste Minimization Planning	Waste minimization plan	April 17
8	WTE Options and Design Considerations		
9	Economic Assessments - CAPEX		

10	Economic Assessments - OPEX		
11	Review	Technology Debate	April 27
12	Final Test	CAPEX/OPEX calculation	Final Week