

**Environmental Health Department
Faculty of Health Sciences**

**ENHL 233 Quality Determination of Water and Wastewater (3 credits)
Course Syllabus- Spring AY 2024**

I. Course Title:

Quality Determination of Water and Wastewater

II. Course Description:

This course focuses on the quality determination (physical, chemical, and microbiological) of water and wastewater using standard analytical techniques. Proper presentation and interpretation of results and practical recommendations for preventive or corrective measures are emphasized.

III. Course Learning Outcomes:

1. Conduct physical, chemical and microbiological quality assessment of water and wastewater samples (VIII C).
2. Prepare and present scientific lab reports (VIII B-C).
3. Assess quality profile of water and wastewater sources and recommend proper treatment (VIII A-E).
4. Identify Major Challenges facing the Management of Water Sources and Wastewater Effluents, assess Health Impacts and recommend Intervention Strategies (VIII D-E).

IV. Course Schedule:

Lecture:	Monday:	2:00- 2:50 pm	Rm 233
	Wednesday:	1:00- 1:50 pm	Rm 233
Lab. Section:	Thursday:	3:30 -5:30 pm	Lab 403

V. Course Coordinator: Dr. Mey Jurdi mjurdi@aub.edu.lb

Lab Instructor: Ms. Rola Ajib ra64@aub.edu.lb

VI. Office Hours: Monday: 1:00-2:00 pm and/or by Appointment

VII. Course Content:

Session	Date	Topic	Reference Book
<u>1</u>	<u>Lecture:</u> Jan 22 & Jan 24 <u>Lab:</u> Jan 25	<ul style="list-style-type: none"> ➤ Important Points in Water Quality Assessment ➤ Revision Session ➤ Assignment of Working Groups 	R1 = Sec. 1: p. 37-46 R2 =Section 4.3
<u>2</u>	<u>Lecture & Case study:</u> Jan 29 & Jan 31 <u>Lab:</u> Feb 1	<ul style="list-style-type: none"> ➤ Physical Examination of Water <ol style="list-style-type: none"> 1. Temperature 2. Color 3. Turbidity 4. Conductivity and Salinity 	R1 = Sec.2: p.69- 70 Sec.2: p.5-9, p. 12- 15& p. 52-57 R2 = Section 8
<u>3</u>	<u>Lecture & Case study:</u> Feb 5 & Feb 7 <u>Lab:</u> Feb 8	<ul style="list-style-type: none"> ➤ Chemical Examination of Water <ol style="list-style-type: none"> 1. Acidity 2. CO₂ 3. Alkalinity 4. pH 	R1 = Sec. 2: p. 31-38 Sec. 4: p. 30-36 & p. 91-96 R2 = Section 8
<u>4</u>	<u>Lecture & Case study:</u> Feb 12 & Feb 14 <u>Lab:</u> Feb 15	<ul style="list-style-type: none"> ➤ Chemical Examination of Water <ol style="list-style-type: none"> 1. Total Hardness (Ca & Mg) EDTA Method 2. Chlorides (Mercuric Nitrate Method) 	R1 = Sec. 2: p. 44-47 Sec. 4: p. 72-78 R2 = Section 8
<u>5</u>	<u>Lecture & Case study</u> Feb 19 & Feb 21 <u>Lab:</u> Feb 22	<ul style="list-style-type: none"> ➤ Chemical Examination of Water <ol style="list-style-type: none"> 1. Nitrogen Cycle 2. Ammonia (Direct Nesslerization Method) 3. Nitrates (Cadmium Reduction Method) 4. Nitrites (Diazotization Method) 	R1 ; Sec.4: p. 110-128 R2 = Section 8
<u>6</u>	<u>Lecture & Case study:</u> Feb 26 & Feb 28 <u>Lab:</u> Feb 29	<ul style="list-style-type: none"> ➤ Chemical Examination of Water <ol style="list-style-type: none"> 1. Phosphates (Stannous Chloride Method) 2. Sulfates (Turbidimetric Method) 	R1 = Sec.4: p. 148-157 & p. 188-191 R2 = Section 8
<u>7</u>	<u>Lecture & Case study:</u> Mar 4 & Mar 6 <u>Lab:</u> Mar 7	<ul style="list-style-type: none"> ➤ Chemical Examination of Water <ol style="list-style-type: none"> 1. Iron (Phenanthroline Method) 2. Manganese: (Persulfate Method) 	R1 = Sec.3: p.76-80 & p. 85-87 R2 = Section 8

<u>8</u>	<u>Lecture & Case study:</u> Mar 11 & Mar 13 <u>Lab:</u> Mar 14	➤ Chemical Examination of Water 1. Fluoride 2. Trace Metals 3. Pesticides Residues 4. Na & K	R1= Sec3: p. 14-33 Sec 4: p.83-88 Sec 5: p. 21-28 Sec 6: p. 87-135 R2= Section 12.1-12.2
<u>9</u>	<u>Lecture & Case Study:</u> Mar 18 & Mar 20 <u>Lab:</u> Mar 21	➤ Wastewater Quality Assessment 1. DO, BOD 2. Settable Matter	
<u>10</u>	<u>Case Study:</u> Mar 27 <u>Lab:</u> Mar 28 Lab will be extended an hour to make up for Monday 25	➤ Wastewater Quality Assessment 1. COD 2. TOC ➤ Algae in Water Supplies (Demonstration) ➤ Microbiological Water Profile 1. Total Coliform 1. Fecal Coliform	R1= Sec 2: p.62-69 Sec 4: p. 137-142 Sec 5: p. 4-12, p. 16-21 R1= Sec 9: p. 49-59 & p. 77 -83 R2= Section 11.6
<u>11</u>	<u>Case study:</u> Apr 3 <u>Lab:</u> Apr 4	➤ Treatment Processes Chemical Coagulation = Jar test	R2= Annex 5
<u>12</u>	<u>April 8</u> <u>April 15</u> <u>April 17</u> <u>Lab:</u> Apr 18 Lab will be extended for an additional hour	➤ Work on project presentation ➤ Work on project presentation ➤ Treatment Processes (cont'd) 1. Chlorination 2. Ion Exchange	R1= Sec 4: p.58-72 R2= Annex 5
<u>13</u>	<u>Presentations E-copy Submission</u> <u>Apr 22, 2024</u> <u>Apr 22</u> <u>Apr 24</u> <u>Apr 25</u>	3 presentations 2:00-3:15pm (extended time) 3 presentations 2:00- 3:15pm(extended time) 6 presentations	
<u>15</u>	<u>Presentation Quiz With Final Assessment</u>	As Scheduled by AUB Registrar	

VIII. Course Evaluation:

	Type of Evaluation	<u>Couse Learning Outcome Assessment</u>	<u>Percentage of Grade Allocation</u>
<u>A</u>	Quizzes: Weekly Case Studies (Individual Assessment)	<u>III3 and III4</u>	<u>15%</u>
<u>B</u>	Weekly Laboratory Reports (Group assessment)	<u>III2 and III3</u>	<u>15%</u>
<u>C</u>	Laboratory Work Assessment (Individual Assessment)	<u>III1</u>	<u>20%</u>
<u>D</u>	Course Project 1. Presentation 2. Report 3. Exam	<u>III4</u>	<u>30%</u> 15 5 10
<u>E</u>	Final Course Assessment (Individual Assessment)	<u>III3 and III4</u>	<u>20%</u>
			<u>100%</u>

IX. Course Project

Topic selection: Individual Topics will be selected based Choice and Availability (Refer to Appendix)

1. Enteric Viruses in Water (characterization, health impacts, detection & management from source to end-user).
2. Water Distillation Processes (applicability, advantages & limitations).
3. Household Water Filters (types, characterization & management).
4. Watershed Management (characterization & impacts on water quality and water safety plans).
5. Management of Distribution Networks (problem characterization, operation & maintenance).
6. Organics in Water Supplies (types, characterization, health effects, detection & management from source to end-user).
7. Wastewater Treatment and Reuse in Agriculture
8. Wastewater Treatment and Reuse in Industry
9. Algae in Freshwater Supplies (characterization, detection, health Impacts & management strategy).
10. Water Complaints (air/milky water, dirty/colored, taste, odor, hard water, garden damage etc.)
11. Microplastic in fresh water supplies (characterization, health effects, detection & management).
12. Contamination with Forever Chemicals – PFAS (per—and polyfluoroalkyl substances) (characterization, health effects, detection & management from source to end-user)

A. Oral Presentations (15% of Course Grade):

- ❖ Each student will be required to give an oral presentation (10 minutes)
- ❖ Each student will be asked to respond to questions (instructors & students)
- ❖ All students have to attend the presentations of their colleagues and ask questions
- ❖ Criteria for Presentation Evaluation = Presentations will be evaluated based on the following guidelines:

Introduction (15/100)

- *Did the presenter introduce the topic clearly?*

Clarity and comprehensiveness (45/100):

- *Did the group provide a coherent presentation enabling the listeners to understand the key points made?*
- *Was the presentation comprehensive addressing all aspects of the topic as presented in the outline?*
- *Was the material of the slides properly referenced?*

Oral Skills and visual aids (20/100):

- *Did the presenter deliver in a confident manner which could be heard?*
- *Did the presenter keep the listeners attention?*
- *Did the presenter make good use of visual aids?*
- *Were presentation techniques used appropriately, or were they distracting?*

Response to Questions (20/100):

- *Did the presenters respond to questions in a clear, correct manner?*

B. Summary Document (5% of Course Grade) = the report should include:

A Comprehensive Summary (Maximum of two pages, 1.5 spacing); this summary should be shared with classmates during the presentation session. The Summary should be properly referenced (APA Style); improper referencing will result in an immediate ZERO, that is loss of the 5% allocated to the Summary Document.

C. Presentation Quiz (10% of Course Grade)

Material of the projects are included in the presentation quiz at the end of the semester with the Final Assessment

X. Reference Books and Resources

- ◆ **R1** American Water Works Association (AWWA), American Public Health Association (APHA) and Water Environment Federation (WEF) (2017). Standard Methods for the Examination of Water and Wastewater. 23rd Ed, USA. (**Main Ref. Book**)
- ◆ **R2** World Health Organization (WHO) (2022). Guidelines for Drinking-water Quality, 4th Edition, incorporating the 1st and 2nd Addendum <https://www.who.int/publications/i/item/9789240045064>
- ◆ **R3** Williams, I. (2011). Environmental Chemistry. Wiley and Sons. USA (p. 223- 263, p. 289-303 & p. 323- 332)

- ◆ **Additionally, All** Lecture Material will be posted on Moodle in due time so you have to read the slides before class time.

XII. Students with Special Needs

“AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office”. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314

XIII. Code of Conduct

Based on the rules and regulations of AUB, any attempt of cheating or plagiarism or moral misconduct would result in actions against student. (Student Code of Conduct: <http://www.aub.edu.lb/pnp/generaluniversitypolicies/Documents/StudentCodeConduct/StudentCodeConduct.pdf>)

IX. Non-Discrimination – Title IX – AUB

“AUB is committed to facilitating a campus free of all forms of discrimination including Sex/ gender-based harassment prohibited by Title IX. The University’s non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University’s Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Ms. Mitra Tauk at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com”.

Enjoy the Semester

Work Hard

And

Good Luck

ENHL 233 Spring 2023**PROJECT TOPIC CHOICE**

Name: _____

1st choice: _____

Project Number: _____

Project Title: _____

2nd choice: _____

Project Number: _____

Project Title: _____

3rd choice: _____

Project Number: _____

Project Title: _____

Note that:

You must enter 3 choices and submit form by Monday February 5, 2024

The project allocation will be announced on Thursday February 8, 2024

The Deadline for outline submission is Monday March 11, 2024

The Deadline for getting feedback on developed outline is Thursday March 14, 2024