

Environmental Health Department
Faculty of Health Sciences

ENHL 233 Quality Determination of Water and Wastewater
(3 credits) Course Syllabus

Spring AY 2019-20

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 B, VIII A-D).
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	11:00- 12:00 noon	Room 203
Wednesday	11:00- 12:00 noon	Room 203

Lab. Section 1: Thursday	9:00-11:00 am	Room 403
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Lab. Section 2: Thursday	12:00-2:00 pm	Room 403
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V. Course Coordinator: Dr. Mey Jurdi mjurdi@aub.edu.lb

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

VI. Office Hours: Monday and Wednesday: 10:00 – 11:00 am OR
By Appointment

VII. Course Content:

Session	Date	Topic	Reference Book
<u>1</u>	<u>Lecture :</u> Jan 22 <u>Lab:</u> Jan 23	<ul style="list-style-type: none"> ➤ Important Points in Water Quality Assessment ➤ Assignment of Working Groups 	R1 ; Sec. 1: p. 37-46
<u>2</u>	<u>Lecture & Case study:</u> Jan 29 & Jan 28 <u>Lab:</u> Jan 30	<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 ; p. 228 & p.230
<u>3</u>	<u>Lecture & Case study:</u> Feb 3 & Feb 5 <u>Lab:</u> Feb 6	<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 ; p. 175, 177, 409, 471, & p. 501-503
<u>4</u>	<u>Lecture & Case study:</u> Feb 10 & Feb 12 <u>Lab:</u> Feb 13	<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 ; p. 223, 225, & p. 333-334
<u>5</u>	<u>Lecture & Case study:</u> Feb 17 & Feb 19 <u>Lab:</u> Feb 20	<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 ; p. 398-402
<u>6</u>	<u>Lecture & Case study:</u> Feb 24 & Feb 26 <u>Lab:</u> Feb 27	<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 ; p. 227, p. 419-420 & p. 501-502

	<u>Lecture & Case study:</u> Mar 2 & Mar 4 <u>Lab:</u> Mar 5	➤ Chemical Examination of Water 1. Iron (Phenanthroline Method) 2. Manganese: (Persulfate Method)	R1 ; Sec.3: p.76-80 & p. 85-87 R2 ; p. 226, p. 381-382, p. 386-387, & p. 501
<u>7</u>	<u>Lecture & Case study:</u> Mar 9 & Mar 11 <u>Lab:</u> Mar 12	➤ Chemical Examination of Water 1. Fluoride 2. Trace Metals 3. Pesticides Residues 4. Na & K ➤ Microbiological Water Profile 1. Total Coliform 2. Fecal Coliform	R1 ; Sec3: p. 14-33 Sec 4: p.83-88 Sec 5: p. 21-28 Sec 6: p. 87-135 R2 ; p. 370-371, & P. 190 R1 : Sec 9: p. 49-59 & p. 77 -83 R2 ; p. 26, p.65. & p. 294-301
<u>8</u>	<u>Lecture & Case study:</u> Mar 16 & Mar 18 <u>Lab:</u> Mar 19	➤ Wastewater Quality Assessment 1. D.O, BOD 2. Settable Matter	R1 ; Sec 2: p.62-69 Sec 4: p. 137-142 Sec 5: p. 4-12, p. 16-21 R2 : p. 225
<u>9</u>	<u>Lecture & Case study:</u> <u>Mar 23</u> <u>Lab: Mar 26</u>	Wastewater Quality Assessment (cont'd) 1. COD, Total Residue 2. TOC ➤ Algae Detection & Identification	R1 ; Sec 2: p.62-69 Sec 4: p. 137-142 Sec 5: p. 4-12, p. 16-21 R2 : p. 225
<u>10</u>	<u>Lecture:</u> Mar 30 & April 1 <u>Lab:</u> Apr 2	➤ Treatment Processes Chemical Coagulation = Jar test	R2 ; p. 489-490
<u>11</u>	<u>Lecture:</u> Apr 6 & Apr 8 <u>Lab:</u> Apr 9	➤ Treatment Processes (cont'd) 1. Chlorination 2. Ion Exchange	R1 ; Sec 4: p.58-72 R2 ; p. 485-493
<u>12</u>	Presentations' Submission electronic copy Apr 14, 2020	<ul style="list-style-type: none"> • Presentations: Session 1, Apr 15 • Presentations: Session 2, Apr 16 • Presentations: Session 3, Apr 22 • Presentations: Session 4, Apr 23 	
<u>13</u>	Presentation Quiz	Apr 29, 2020	

VIII. Course Evaluation:

<u>A</u>	Quizzes: Weekly Case Studies	<u>15%</u>
<u>B</u>	Weekly Laboratory Reports	<u>15%</u>
<u>C</u>	Laboratory Work Assessment	<u>25%</u>
<u>D</u>	Course Project 1. Presentation 2. Report 3. Exam	<u>25%</u> 10 5 10
<u>E</u>	Final Course Assessment	<u>20%</u>
		<u>100%</u>

IX. Course Project

A. *Topic selection*; Group topics will be selected based choice and availability (Refer to Appendix)

1. Enteric Viruses in Water (characterization, detection, health impacts & management).
2. Water Distillation process (applicability, advantages & limitations).
3. Household Water Filters (characterization & management).
4. Watershed Management (characterization & impacts on water quality).
5. Management of Distribution Networks (problem characterization, operation & maintenance).
6. Pharmaceuticals and Personal Care Products in Water Supplies (characterization, detection, health impacts & management).
7. Water Complaints: air/milky water, dirty/colored, taste, odor, hard water, garden damage etc. (characterization, impacts and management).
8. Water Disinfection with Ozone (applicability, advantages & limitations).
9. Organics in Water Supplies (characterization, detection, health effects and management).
10. Arsenic in Water Supplies (detection, management & health effects).
11. Wastewater Reuse in Agriculture and Industry.
12. Water Safety Plans (objectives and applications)
13. Algae in water supplies (detection, effects, quality management).

B. Oral Presentations (10%)

- Each group will be required to **give** an oral presentation (15 minutes).
- Each student will be asked to **respond** to questions (instructors & students).
- All students are required to **attend** the presentations of their colleagues and will **have** to ask questions.
- Students should **use** PowerPoint for presentations.

Summary Document (5%); the report should include:

A Comprehensive Summary (Maximum of 2 pages, 1.5 spacing). This should be distributed to the class during the presentation session. N.B: Material of the project is included in the presentation quiz at the end of the semester (Apr 29, 2020).

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.

D. Presentation Evaluation; presentations will be evaluated based on the following:

- Introduction (10%) (Did the student introduce the topic to the listeners? Was there an outline of the material to be covered?)
- Clarity (45%) (Did the student provide a coherent presentation enabling the listeners to understand the key points being made? Was the material of the slides properly referenced?)
- Oral Skills (10%) (Did the student present in a confident manner which could be heard by the listener? Was the voice used to emphasize important ideas? Did the student keep the listeners attention?)
- Visual Aids (10%) (Did the student make good use of visual aids? Were appropriate techniques used, or were they distracting?)
- Response to Questions (25%) (Did the student respond to questions in a clear, correct manner?)

X. Reference Books; all reference books are present in the Environmental Health Department.

- ◆ **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) (2017). Guidelines for Drinking-water Quality, 4th Edition, incorporating the 1st Addendum https://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/
- ◆ **R3** Williams, I. (2011). Environmental Chemistry. Wiley and Sons. USA. (p. 223- 263, p. 289-303 & p. 323- 332)

XI. Attendance

Attendance is obligatory unless justified and approved by course instructors. However, missing any of the Lab. sessions is not acceptable, except when cleared with the Lab Instructor (Ms. Rola Ajib). **Missing more than two lab sessions will result in automatic course withdrawal.** Additionally, students are responsible for the work that is done, and for any announcements that are made during their absence.

XII. Students with Special Needs

If you have documented special needs and anticipate difficulties with the content or format of the course due to a physical or learning disability, please contact me and/or your academic advisor, as well as the Counseling Center in the Office of Student Affairs (Ext. 3196), as soon as possible to discuss options for accommodations. Those seeking accommodations must submit the Special Needs Support Request Form along with the required documentation.”

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>)

Enjoy the Semester

Work Hard

And

Good Luck

ENHL 233 Spring AY 2019-20**PROJECT TOPIC CHOICE**

Names of Group Members: 1. _____

2. _____

1st choice: _____

Project Number: _____

Project Title: _____

2nd choice: _____

Project Number: _____

Project Title: _____

3rd choice: _____

Project Number: _____

Project Title: _____

4th choice: _____

Project Number: _____

Project Title: _____

Note that:

You must enter four choices and submit form by Thursday February 12, 2020

The project allocation will be announced on Monday February 17, 2020

The Deadline for outline submission is Thursday March 12 , 2020

The Deadline for getting feedback on developed outline is Monday March 16, 2020