

Course Syllabus

1. **Course Title:** Experiments on supply water treatment

2. **Course Code:** EOWT326410

3. **Credit Units:** 2 credits (0/2/6) (0 units of theory/ 2 unit of practice/ 6 units of self-study)

Duration: 6 weeks (0 hours of theory+10 hours of practice, and 20 hours of self-study per week)

4. **Course Instructors:**

1 / Ms. Hoang Thi Tuyet Nhung

2 / Dr. Tran Thi Kim Anh

5. **Course Requirements:**

Prerequisite courses: None

Previous courses: Experiments on Environmental Chemical Engineering

Parallel courses: Supply water treatment.

6. **Course Description:**

The basic knowledge of physical, chemical, methods in supply water treatment is reinforced after course. Students operate the supply water treatment methods, such as color adsorption, hardness removal, filtration...

7. **Course goals**

Goals	Goal description	Programme Expect learning outcome (ELOs)
G1	Specialized knowledge in the field of supply water treatment.	ELO3
G2	Practise calculation, present, plot, explain the results and the phenomenon in the experiment.	ELO5, ELO8
G3	Practise team-work skill.	ELO9
G4	Deploy the design and operation of supply water treatment systems in reality.	ELO15

8. **Course Learning Outcomes (CLOs)**

CLOs	CLO Description	Programme ELOs	
G1	CLO1	Summarize the principles and technical process of chemicals and equipment using in supply water treatment.	ELO3

	CLO2	Interpret the theory of supply water treatment methods learned.	
G2	CLO3	Operate several supply water treatment models.	ELO5
	CLO4	Evaluate experiments's result.	
	CLO5	Perform a precise, meticulous manual in experiments.	
	CLO6	Demonstrate honesty in experiments's reporting as well as in scientific research.	ELO8
G3	CLO7	Work in team	ELO9
G4	CLO8	Deploy the design and operation of water treatment systems in reality.	ELO15

9. Learning Resources

- Textbooks:

1. Textbook of experiments on supply water treatment, Environmental technology Department, HCMC University of Technology and Education.

- References:

1. Trinh Xuan Lai, Water treatment, Construction Publishing House, 2009
2. Tomonori Matsuo, Advances in water and wastewater treatment technology, Elsevier Science B.V., 2001
3. Nicholas P. Cheremisinoff, Handbook of Water and Wastewater Treatment Technologies, Butterworth-Heinemann, 2002.

10. Student assessment:

- Grading scale: **10**

- Assessment plan:

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Subtest					15
BT#1	Summarize document of experiments on water treatment before class.	Weeks 2-5	Small questions in class	CLO1 CLO2	15
Essay - Report					35
BL #1	Report process of experiments, results, all exercises of experiments.	Week 6	Report	CLO3 CLO4 CLO5 CLO6 CLO7 CLO8	35

Final exam					50
	The content covers all of course outcomes.		Writing / practical test	CLO1 CLO2 CLO3 CLO4 CLO5 CLO6	50

11. Course Content:

Week	Contents	CLOs
1 -2	Chapter 1: WATER TREATMENT BY COAGULATION AND FLOCCULATION (0/20/40)	
	A/ Teaching content in classroom :(10) 1.1. Theory of coagulation and flocculation 1.2. By water flocculation system alum / polymer anion 1.3. Coagulation of water with FeCl ₃ / anionic polymer Summary of teaching methodology: + Presentation of lecture + Group discussion + Guide to how to manual experiments, do the report	CLO1 CLO2 CLO3 CLO4 CLO5 CLO6 CLO7 CLO8
	B/ Self-study content The contents of home self-study + Compare the optimal pH and the effectiveness of treatment with different coagulants. + Do the report + Prepare the test lesson for the next class.	CLO1 CLO2 CLO3 CLO4 CLO5 CLO6 CLO7 CLO8
3	Unit 2: HARDNESS REMOVAL (0/10/20)	

	<p>A/ Teaching content in classroom :(10)</p> <p>2.1. Hardness removal by chemical</p> <p>2.2. Hardness removal by ion exchange</p> <p>Summary of teaching methodology:</p> <ul style="list-style-type: none"> + Presentation of lecture + Group discussion + Guide to how to manual experiments, do the report 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
	<p>B/ Self-study content (20)</p> <ul style="list-style-type: none"> + Compare the effectiveness of adsorption level 1 and level n + Do the report + Prepare the test lesson for the next class. 	
4	<p>Unit 3: IRON REMOVAL (0/10/20)</p>	
	<p>A/ Teaching content in classroom :(10)</p> <p>3.1. Iron removal by chemical</p> <p>3.2. Iron removal by Aerotation methods</p> <p>Summary of teaching methodology:</p> <ul style="list-style-type: none"> + Presentation of lecture + Group discussion + Guide to how to manual experiments, do the report 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
	<p>B/ Self-study content (20)</p> <ul style="list-style-type: none"> + Do the report + Prepare the test lesson for the next class. 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
5	<p>Unit 4 : ADSORPTION (0/10/20)</p>	
	<p>A/ Teaching content in classroom :(10)</p> <p>4.1. Adsorption by activated carbon single stage</p>	<p>CLO1</p> <p>CLO2</p>

	<p>4.2. Adsorption by activated carbon multiple stage</p> <p>Summary of teaching methodology:</p> <ul style="list-style-type: none"> + Presentation of lecture + Group discussion + Guide to how to manual experiments, do the report 	<p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
	<p>B/ Self-study content (20)</p> <ul style="list-style-type: none"> + Do the report + Compare the effectiveness of models 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
<p>Unit 5: FILTRATION (0/10/20)</p>		
<p>6</p>	<p>A/ Teaching content in classroom :(10)</p> <p>5.1 Definition</p> <p>5.2 Practice</p> <p>Summary of teaching methodology:</p> <ul style="list-style-type: none"> + Presentation of lecture + Group discussion + Guide to how to manual experiments, do the report 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>
	<p>B/ Self-study content</p> <ul style="list-style-type: none"> + Do the report + Compare the effectiveness of models 	<p>CLO1</p> <p>CLO2</p> <p>CLO3</p> <p>CLO4</p> <p>CLO5</p> <p>CLO6</p> <p>CLO7</p> <p>CLO8</p>

12. Learning Ethics:

- Students study seriously and follow the instructions of experiments.

- Strictly implement the rules laboratories.
- Students who do not complete the task, banned exam.
- In case of the detection of students who replace the others in the exam, all of them will be suspended or leaved the learning program.

13. Date of first approval: August 1st, 2012

14. Approved by:

Dean

Head of Department

Compiler

A/Prof. Nguyen Van Suc

MSc Nguyen Thi Minh Nguyet

Dr. Nguyen My Linh

15. Date and Up-to-date content

<p>1st time: Date: 2015</p> <p>- Update content and structure of the programme adjusted in: Updated content of Experiments on Supply water treatment.</p>	<p>Instructor:</p> <p>Head of Department:</p>
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