

# Course Syllabus

**1. Course title : Supply water treatment**

**2. Course code: SWTR 434310**

**3. Credit units: 3 (3/0/6)** (3 units of theory/ 0 units of practice, experiment/ 6 units of self- study)

Duration: 9 weeks (5 hours of theory + 0 hour of practice + 10 hours of self-study per week)

**4. Course intructors:**

1/ Tran Thi Kim Anh

2/ Nguyen My Linh

**5. Course requirements :**

Pre-resiquisite courses: None

Previous course: Environmental Engineering Chemistry

Parallel course: Expriment on Supply water treatment

**6. Course Description :**

The subject provides students with basic knowledge of water treatment technologies, calculations, design or construction, construction supervision, and operation of water treatment systems...

**7. Course Goals**

Goals	Goal description	Programme expected learning outcomes ELOs
<b>G1</b>	Knowledge in the field of water supply: water supply source, water treatment technology, processes and equipment for water treatment.	ELO3
<b>G2</b>	Analyzing the possible sources for water supply, causes of water pollution, and water supply technology in line with the needs of society.	ELO6
<b>G3</b>	Communicating in English for describing the water pollution and treatment methods.	ELO11
<b>G4</b>	Conceiving ideas of water pollution treatment, designing and operating the supply water treatment.	ELO12, ELO15, ELO16

## 8. Course learning outcomes (CLOs):

CLOs		CLOs description (After accomplishing this course, students are able to: )	Programme ELOs
G1	CLO1	Analyze water supply demands, water pollution parameters, water supply planning, and water supply system.	ELO3
	CLO2	Compare advanced water treatment technologies to satisfy the demands of water supply.	ELO3
G2	CLO3	Analyze the suitable treatment technology for each specific water supply conditions meet the demands of society.	ELO6
G3	CLO4	Read English documents for describing water pollution and treatment methods.	ELO11
G4	CLO5	Practise the role and responsibility of an environmental engineerer in water supply toward the society.	ELO12
	CLO6	Point out how to monitor the supply water treatment plant.	ELO15
	CLO7	Point out how to operate the supply water treatment plant.	ELO16

## 9. Learning Resources

### - Text book:

1. MHW's Water Treatment, Principals and Design, 3rd Edition, John C. Crittenden, R. Rhodes Trussell, David W. Hand, Kerry J. Howe and George Tchobanoglous, Jonh Wiley and Sons, 2012
2. Ronald L.Droste, Theory and Practice of Water and Wastewater Treatment, Jonh Wiley and Sons, 1997

### - References:

1. Trinh Xuan Lai – Xu ly nuoc cap sinh hoat va cong nghiep – NXB Khoa hoc và Ky thuat, 2003
2. Nguyen Thị Thu Thuy – Xu ly nuoc cap sinh hoat va cong nghiep – NXB Khoa hoc và Ky thuat, 2003
3. Trinh Xuan Lai – Tinh toan thiet ke cac cong trinh trong he thong cap nuoc sach – – NXB Khoa hoc và Ky thuat, 2003

## 10. Student Assesement :

- Grading scale : 10
- Assesement plan :

Type	Content	Timeline	Assesement Method	CLOs	Rate (%)
	Mid-term test				50%

Ex#1	Analyze the supply water demand, calculate designing parameters of coagulation process, sedimentation, filtration.	Week 5	Subtest	CLO1, CLO2 CLO4	16.7%
Ex#2	Select the suitable technology for water treatment, the suitable designing parameters of ion exchange process, adsorption, membrane process.	Week 9	Subtest	CLO1, CLO2 CLO4	16.7%
Ex#3	Site visiting at BOO supply water treatment plant	Week 12	Report	CLO5, CLO6, CLO7	16.7%
<b>Final test</b>					<b>50%</b>
	The content covers all of course outcomes (Water supply source, water treatment methods).  - 60 minutes duration.	School calendar	<i>Writing test/ Multi choice</i>	CLO1, CLO2, CLO3, CLO4, CLO6, CLO7	50%

### 11. Course content

Week	Content	CLOs
1	<b>Chapter 1: Water supply fundamentals (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Water source + Water pollution parameter + Supply water plan + Water treatment plan  <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO1, CLO4
	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about water supply fundamentals	CLO1, CLO4
2	<b>Chapter 2: Coagulation - Flocculation (5/0/10)</b>	

	<p><b>A/ Teaching content in classroom (5)</b></p> <ul style="list-style-type: none"> <li>+ Coagulation – Flocculation mechanisms</li> <li>+ Coagulation – Flocculation methods</li> <li>+ Coagulant - Flocculant</li> <li>+ Affecting factor</li> <li>+ Designing parameters</li> </ul> <p><b>Summary of teaching methodology:</b></p> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	<p>CLO2, CLO3, CLO4, CLO5, CLO6, CLO7</p>
	<p><b>B/ The contents of home self-study (10)</b></p> <ul style="list-style-type: none"> <li>+ Extra knowledge about coagulation – flocculation tank in Viet nam ...</li> </ul>	
3	<p><b>Chapter 3: Sedimentation - Flotation (5/0/10)</b></p>	
	<p><b>A/ Teaching content in classroom (10)</b></p> <ul style="list-style-type: none"> <li>+ Theory of sedimentation</li> <li>+ Kinds of sedimentation</li> <li>+ Design for clarifier</li> <li>+ Flotation process</li> <li>+ Dissolved Air flotation</li> <li>+ Design for DAF</li> </ul> <p><b>Summary of teaching methodology:</b></p> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	<p>CLO2, CLO3, CLO4, CLO5, CLO6, CLO7</p>
	<p><b>B/ The contents of home self-study (10)</b></p> <ul style="list-style-type: none"> <li>+ Extra knowledge about sedimentation tank and DAF in Vietnam</li> </ul>	
4	<p><b>Chapter 4: Filtration (5/0/10)</b></p>	
	<p><b>A/ Teaching content in classroom (5)</b></p> <ul style="list-style-type: none"> <li>+ Definition of filtration process</li> <li>+ Filtration process mechanisms</li> <li>+ Structure of filter (rapid filtration, slow filtration and pressure filter)</li> <li>+ Operation of filter</li> </ul> <p><b>Summary of teaching methodology:</b></p> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	<p>CLO2, CLO3, CLO4, CLO5, CLO6, CLO7</p>
	<p><b>B/ The contents of home self-study (10)</b></p>	

	+ Extra knowledge about rapid filtration tank and pressure filter	
5	<b>Chapter 5: Iron and Mangan removal (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Iron and mangan removal by aeration + Iron and mangan removal by chemical + Iron and mangan removal by other methods + Management and operation <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO2, CLO3, CLO4, CLO5, CLO6, CLO7
	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about iron and mangan removal plant in Vietnam	
6	<b>Chapter 6: Hardness removal (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Hardness definition + Hardness removal by chemicals (mixing, pellet reactor) + Hardness removal by ion exchange + Management and operation <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO2, CLO3, CLO4, CLO5, CLO6, CLO7
	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about ion exchange column and operation	
7	<b>Chapter 7: Adsorption (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Adsorption definition + Adsorption mechanisms + Design of adsorption filter <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO2, CLO3, CLO4, CLO5, CLO6, CLO7

	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about adsorption filter in Vietnam	
8	<b>Chapter 8: Membrane (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Membrane definition + Low pressure membrane filtration (MF, UF) + High pressure membrane filtration (NF, RO) + Electrical – driven membrane <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO2, CLO3, CLO4, CLO5, CLO6, CLO7
	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about membrane	
9	<b>Chapter 9: Disinfection (5/0/10)</b>	
	<b>A/ Teaching content in classroom (5)</b> + Disinfection definition + Disinfection by Chlorinator, UV + Design for disinfection process <b>Summary of teaching methodology:</b> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Slide presentation (Powerpoint)</li> </ul>	CLO2, CLO3, CLO4, CLO5, CLO6, CLO7
	<b>B/ The contents of home self-study (10)</b> + Extra knowledge about membrane	

## 12. Learning ethics:

The homework and projects must be implemented by the students themselves. If the copy is detected, the students will be evaluated with the zero of the processing grade and final exam.

**13.Date of first approval:** August 1<sup>st</sup>, 2012

**14.Approved by:**

**Dean**

**Head of Department**

**Compiler**

**Nguyen Văn Suc**

**Nguyen Thi Minh Nguyet**

**Tran Thi Kim Anh**

**15.Date and Up-to-date content**

<p><b>1<sup>st</sup> time:</b> Date: 2015</p> <ul style="list-style-type: none"><li>- Update content and structure of the programme adjusted in:</li><li>+ Update the content, assessment methods</li></ul>	<p>Instructor:</p>  <p>Head of Department:</p>  <p>Tran Thi Kim Anh</p>
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