



Course Syllabus (Academic Year 2017)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED321 WATER SUPPLY ENGINEERING AND DESIGN
Credit (study hours) : 3(3-0-6)
2. **Program Name** : Bachelor of Engineering in Environmental and Disaster Management
3. **Course Module** : Major Required Courses
Pre/co-requisite : KAED 312 Environmental Unit Operations
4. **Class Semester** : 1st Semester 2nd Semester Academic Year 2017
5. **Class Schedule & Venue** : Friday 13:00 – 16:00, Room XXXX, Lecture Building
6. **Class Coordinator** : Dr. Wimonmas Boonyungyuen
 Contact No. : 08-1906-6678 Email : wimonmas.boon@mahidol.ac.th

7. Course Description

Importance of water; nature and sources of water. Water crisis related to environment. Estimation of water demand; requirement and consumption in household, industrial, and public units. Estimation of the quantities of nature raw water resources, river, lake and groundwater. Evaluation of surface and groundwater quality and standards. Criteria for selecting water sources for water supply system and standards for water supply. Water treatment processes; aeration, pH adjustment and softening, coagulation and flocculation, sedimentation, filtration and disinfection. Design of distribution system.

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs	ABET Criteria
		Specific	Generic	Knowledge		
8.1	Learn and understand importance of water for water supply system and criteria for selecting water sources for water supply system and standards for water supply.	SS1+SS2	GS1+GS3+GS4 +GS6+GS7+GS8 +GS9+GS10+GS11 +GS12	K1+K2+K3+ K4+K5+K6+ K7+K8+K9+ K10+K11+K12+ K25+K26+K27	1, 2, 3, 4	a, c, d, e, f, g, l, j
8.2	Ability to design water supply system and distribution system.	SS1+SS2	GS1+GS3+GS4 +GS6+GS7+GS8 +GS9+GS10+GS11 +GS12	K1+K2+K3+ K4+K5+K6+ K7+K8+K9+ K10+K11+K12+ K25+K26+K27	1, 2, 3, 4	a, c, d, e, f, g, l, j

9. Class Instructor List

9.1 Name : Dr. Wimonmas Boonyungyuen

Contact No. : 08 1906 6678 Email : wimonmas.boo@mahidol.ac.th

10. Course Outline

Week	Date	Contents	CLOs	Instructor's Names
1	24/08/18	Importance of water; nature and sources of water. Water crisis related to environment.	8.1	Dr. Wimonmas Boonyungyuen
2	31/08/18	Water critical situation.	8.1	Dr. Wimonmas Boonyungyuen
3	07/09/18	Estimation of water demand; requirement and consumption in household, industrial, and public units.	8.1	Dr. Wimonmas Boonyungyuen
4	14/09/18	Estimation of the quantities of nature raw water resources, river, lake and groundwater.	8.1	Dr. Wimonmas Boonyungyuen
5	21/09/18	Evaluation of surface and groundwater quality and standards.	8.1	Dr. Wimonmas Boonyungyuen
6	28/09/18	Criteria for selecting water sources for water supply system and standards for water supply.	8.1, 8.2	Dr. Wimonmas Boonyungyuen
7	05/10/18	Design of water supply. Standards and Regulations	8.1, 8.2	Dr. Wimonmas Boonyungyuen
8	12/10/18	Water Treatment Processes; Aeration	8.1, 8.2	Dr. Wimonmas Boonyungyuen
9	Mid-term Examination (16-22/10/18)			
10	26/10/18	Water Treatment Processes; pH Adjust and Softening	8.1, 8.2	Dr. Wimonmas Boonyungyuen
11	02/11/18	Water Treatment Processes; Coagulation and Flocculation	8.1, 8.2	Dr. Wimonmas Boonyungyuen
12	09/11/18	Water Treatment Processes; Sedimentation	8.1, 8.2	Dr. Wimonmas Boonyungyuen
13	16/11/18	Water Treatment Processes; Filtration	8.1, 8.2	Dr. Wimonmas Boonyungyuen
14	23/11/18	Water Treatment Processes; Disinfection	8.1, 8.2	Dr. Wimonmas Boonyungyuen

15	30/11/18	Design of distribution system.	8.1, 8.2	Dr. Wimonmas Boonyungyuen
16	07/12/18	Presentation	8.1, 8.2	Dr. Wimonmas Boonyungyuen
17	Final Examination (11-21/12/18)			

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	<input checked="" type="checkbox"/> Content (Week 1-8) <input checked="" type="checkbox"/> Closed book <input checked="" type="checkbox"/> Faculty-approved calculator <input checked="" type="checkbox"/> 3 Hours	8.1, 8.2	9	30
11.2	Final exam	<input checked="" type="checkbox"/> Content (Week 10-16) <input checked="" type="checkbox"/> Closed book <input checked="" type="checkbox"/> Faculty-approved calculator <input checked="" type="checkbox"/> 3 Hours	8.1, 8.2	17	30
11.3	Quiz / Activities	Each 30-min quiz will be given in class and cover the content from the previous weeks. There will be no make-up quizzes.	8.1, 8.2	4,5,6,10, 11,12,13, 14,15	10
11.4	Reports / Assignments	Each student will receive assignments or Homework by the given deadline. You will have one week to finish each set of Homework.	8.1, 8.2	1,5,7,16	25
11.5	Class participation	Student must attend class more than 80% of course.	8.1, 8.2	1-8 and 10-16	5
				Total	100

12. Grading System

Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	≥ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

13. References

13.1 มั่นสิน ตัณฑุลเวช. วิศวกรรมประปา เล่ม ๑. จุฬาลงกรณ์มหาวิทยาลัย. ๒๕๔๓

13.2 มั่นสิน ตัณฑุลเวช. วิศวกรรมประปา เล่ม ๒. จุฬาลงกรณ์มหาวิทยาลัย. ๒๕๔๓

13.3 มั่นสิน ตัณฑุลเวช. การปรับปรุงคุณภาพน้ำโรงงานอุตสาหกรรม. กรุงเทพฯ. ๒๕๔๓

13.4 กรมโรงงานอุตสาหกรรม. ตำราระบบบำบัดมลพิษน้ำ. พิมพ์ครั้งที่ ๒. กรุงเทพมหานคร : สำนักเทคโนโลยีสิ่งแวดล้อมโรงงาน. ๒๕๔๘.

13.5 Renolds T.D. and Richards P.A. (1996). Unit Operation and Process in Environmental Engineering. PWS.

13.6 American Water Works Association. (1990). Water Treatment Plant Design. McGraw-Hill.

Note:

Specific Skill (SS)	
SS1	Assess Quantity & Quality of Water Resource Demand and Supply
SS2	Specify Important Criteria for Suitable and Reliable* Water Supply System** *based on regulations, economics, and disaster awareness **based on treatment, sanitary, distribution, and storage systems
Generic Skill (GS)	
GS1	Systematic Thinking, Problem Solving and Analytical Skills
GS2	Basic Computer Skills
GS3	Environmental and Disaster Risk Awareness
GS4	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
GS5	A knowledge of contemporary issues
GS6	an ability to communicate effectively
GS7	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
GS8	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
GS9	a knowledge of contemporary issues
GS10	a recognition of the need for, and an ability to engage in life-long learning
GS11	Creativity and Carefulness
GS12	Interpersonal and Coordinating Skills
GS13	Flexibility and Adaptability
GS14	Basic Listening, Speaking, Reading, and Writing Skills in English
GS15	Formal and Informal Communication
GS16	Leadership and Decision Making
Knowledge (K)	

K1	Water Quality
K2	Probability and statistics
K3	Water Demand/Supply
K4	Hydrology Process
K5	Material and Energy balances
K6	Environmental Unit Operation for Water Supply (water treatment)
K7	Water Network
K8	Standards of Water Supply
K9	Risk Identification Method
K10	Wastewater Characteristics
K11	Environmental Unit Operation for Wastewater Treatment
K12	Standards of Effluents
K25	Laboratory experiments
K26	Basic microbiology
K27	Water reuse and reclamation
PLOs	
PLO1	Design, Operate, and Control Water Supply and Pollutant Treatment Systems According with Criteria of Council of Engineers and Concepts of Disaster Risk Management (Adaptation)
PLO2	Apply Suitable Information Technology (IT) for Environmental System Design, Environmental Impact Assessment, and Disaster Risk Prediction.
PLO3	Use both Formal/Informal and Verbal/Non-verbal Thai and English to Effectively Communicate in Technical Contexts.
PLO4	Apply Professional Ethics and Responsibilities under Up-to-date Regulations and Agreements Related to Environment and Disaster Issues
ABET	
(a)	an ability to apply knowledge of mathematics, science, and engineering
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data
(c)	an ability to design a system, component, or process to meet desired needs within and safety, manufacturability, and sustainability realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d)	an ability to function on multidisciplinary teams
(e)	an ability to identify, formulate, and solve engineering problems
(f)	an understanding of professional and ethical responsibility
(g)	an ability to communicate effectively
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i)	a recognition of the need for, and an ability to engage in life-long learning
(j)	a knowledge of contemporary issues
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering

	practice.
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