



Course Syllabus (Academic Year 2022)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED 344 Solid Waste Engineering
Credit (study hours) : 3 (3-0-6)
2. **Program Name** : Bachelor of Engineering in
 Environmental Engineering and Disaster Management
3. **Course Module** : Required course (Environmental Engineering)
Pre/co-requisite : KAED225, KAED231
4. **Class Semester** : 1st Semester 2nd Semester Academic Year 2021
5. **Class Schedule & Venue** : Thursday 13:00 – 16:00, Onsite
 Room
 Laboratory Room
6. **Class Coordinator** : Dr. Jutamas Kaewsuk
 Contact No. : +66825496465 Email : jutamas.kae@mahidol.ac.th

7. Course Description

Development of municipal solid waste management system, generation source, composition, quantities and characteristics of municipal solid waste, handling and collection, transfer and transport, processing and transformation technologies, source reduction and recycling, disposal of solid waste and residual matter, incineration, composting and sanitary landfill.

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
8.1	To explain the characteristics of municipal waste, source and the related laws and regulation of municipal waste in Thailand	SS1-SS8		K1-K10	1 (Reinforced)
8.2	To explain the	SS1-SS8		Solid waste /	1

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
	waste management system in Thailand	-Problem Identification -Systematic Thinking		Hazardous Waste Engineering	(Reinforced)
8.3	To select the suitable technology for municipal waste treatment and/or suitable policy for municipal waste management in the different contexts	SS4 and SS8 - Innovation -Attention to detail	-Ability to motivate others -Independent thinking -Adaptability -Creative thinking -Entrepreneurship	K2-K10 - Drawing/sketching -Product design -Financial	6 (Reinforced)
8.4	To design the basic landfill for municipal waste in accordance with engineering standards	SS4 and SS8 - Innovation -Attention to detail	-Ability to motivate others -Independent thinking -Adaptability -Creative thinking -Entrepreneurship	K2-K10 - Drawing/sketching -Product design -Financial	6 (Reinforced)

9. Class Instructor List

9.1 Dr. Jutamas Kaewsuk (JK) Contact No. : +66956466473 Email : jutamas.kae@mahidol.ac.th

10. Course Outline

Week	Date	Contents	CLOs	Teaching & Learning Method	Instructor
1	11 Aug 2022	Introduction to municipal waste system in Thailand	1	Lecture, problem practice, and homework assignment	JK
2	18 Aug 2022	Law and regulation	1		JK
3	25 Aug 2022	Population estimates and projections	1,2		JK
4	1 Sep 2022	Sources, characteristics, and collection (1.4, 1.5, 2.1, 2.2)	1,2		JK
5	8 Sep 2022	Waste segregation, collection and transfer	1		JK
6	15 Sep 2022	Integrated Municipal waste management system	2		JK
7	22 Sep 2022	Integrated Municipal waste	2		JK

		management system			
8	29 Sep 2022	Waste utilization	3		JK
9	Mid-term Examination (6 Oct 2022)				
10	20 Oct 2022	Composting	3	Lecture, problem practice, and homework assignment	JK
11	27 Oct 2022	Thermal process and incineration	3		JK
12	3 Nov 2022	Landfill	4		JK
13	10 Nov 2022	Engineering design for landfill	4		JK
14	17 Nov 2022	Engineering design for landfill	4		JK
15	24 Nov 2022	Disaster waste management	4		JK
16	1 Dec 2022	Disaster waste management	4		JK
17	Final Examination (15 Dec 2022)				
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"/> Open note <input checked="" type="checkbox"/> Faculty-approved calculator	1,2,3	9	30
11.2	Final exam	<input checked="" type="checkbox"/> Content (Week 10-16) <input checked="" type="checkbox"/> Open note <input checked="" type="checkbox"/> Faculty-approved calculator	1,2,3	17-18	30
11.3	Quiz	<input checked="" type="checkbox"/> Content (composition analysis, solid waste forecasting, waste management flow, waste minimization) <input checked="" type="checkbox"/> Closed book <input checked="" type="checkbox"/> Faculty-approved calculator	1,2	3,5,8,11	10
11.4	Homework	Group and individual project on - discussing waste management technologies in other countries - designing landfill for a case study - suggesting suitable waste management and technologies for a case study	4	2-7, 10-15	20
11.5	Class participation	Student must attend a class more than 80% of the whole course.	-	All	10

				Total	100
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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 ศ.ดร. ชเรศ ศรีสถิตย์. วิศวกรรมการจัดการมูลฝอยชุมชน พิมพ์ครั้งที่ ๑. วิศวกรรมฐานแห่งประเทศไทย ในพระบรมราชูปถัมภ์. ๒๕๕๘

13.2 Tchobanoglous G. Theisen H. and Vigil S. Integrated Solid Waste Management. McGraw-Hill :New York. 1993.

Note:

Specific Skill (SS)	
SS1	Assess the number of people in the city
SS2	Assess quantity of municipal waste per capita
SS3	Understand concepts of the whole system of municipal waste management in Thailand
SS4	Calculate waste balances in basic material flow analysis
SS5	Understand types of waste disposal sites
SS6	Understand the 3Rs concepts for waste reduction
SS7	Understand parameters, equations and operational principles of each disposal site, reuse, and recycling
SS8	Design fundamental sanitary landfill
Generic Skill (GS)	
GS1	Systematic thinking, problem solving and analytical skills
GS2	Basic computer skills
GS3	Risk awareness
GS4	Professional ethics and responsibilities
Knowledge (K)	
K1	Characteristics of municipal waste and household hazardous waste
K2	Municipal waste and household hazardous waste collection and transportation
K3	Municipal waste and household hazardous waste management system in Thailand
K4	Law and regulation of municipal waste and household hazardous waste in Thailand
K5	Reuse and recycle of municipal waste and household hazardous waste
K6	Composting from municipal waste
K7	Municipal waste and household hazardous waste disposals

K8	Incineration
K9	Principle and design of Landfill
K10	Engineering design for landfill

Program Learning Outcomes (PLOs)

PLOs	Description
1. Apply environmental engineering principles and knowledge to systematic solutions according to Professional Standards	1.1 Accurately explain basic concepts, theories and principles of environmental engineering 1.2 Systematically summarize important issues from collected data 1.3 Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards
2. Apply practical skills in environmental engineering and disaster management to real situations based on academic principles and professional ethics	2.1 Accurately define the problems in simulated scenarios 2.2 Select appropriate methods and analyze data systematically 2.3 Express an understanding in professional responsibility and ethics
3. Apply geo-informatics system and information technologies in planning to handle environmental and disaster problems in accordance with academic principles	3.1 Express an understanding in professional 3.2 Properly explain updated geo-informatics system technological tools for environmental engineering works and disaster management works 3.3 Select an appropriate geo-informatics system technology for actual situations 3.4 Create a simple GIS modelling as a decision-making tool
4. Effectively present and discuss engineering knowledge to related professional people for objective fulfillment by using proper language and media	4.1 Well summarize the main idea of contents in Thai and English language through reading and listening 4.2 Express ideas and use appropriated media for communication in the consideration of future consequences 4.3 Write a report using proper languages with logical results and discussion
5. Work as an environmental engineer with other people to solve complicated problems according to economic, social, and environmental issues	5.1 Integrate economics, social and environmental issues to environmental engineering and disaster management works 5.2 Work as a part of a multidisciplinary team to achieve the team goals 5.3 Fully comply with the role and take responsibility as a member of team 5.4 Apply knowledge in environmental engineering and disaster management to create benefits and positive impact to local communities and societies 5.5 Learn and experience from real working environments and solve engineering problems occurred in organizations or industries
6. Develop a creative technology in environmental engineering and disaster management	6.1 Acquire essential knowledge and skills by oneself for life-long learning 6.2 Systematic plan to achieve target goals in short-term and long-term periods 6.3 Develop a conceptual model or prototype from fundamental engineering knowledge 6.4 State problems, design research methodology, analyze and discuss the results reasonably