Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED 383 Basic Eco-Product Design

   Credit (study hours) : 3 (3-0-6)

2. **Program Name** : Bachelor Degree of Environmental Engineering and Disaster Management

3. **Course Module** : Electives Course

   Pre/co-requisite : None

4. **Class Semester** : ☐ 1st Semester ☑ 2nd Semester Academic Year 2021

5. **Class Schedule & Venue** : 13:00 – 16:00, Roomxxx

6. **Class Coordinator** : Sirinon Suwanmolee, Ph.D. Contact No. : 081-428-2303

   Email: sirinon.suw@mahidol.edu

7. **Course Description**

An introduction to product design and environmentally friendly product development. design review system Identifying customer needs and conducting market survey research Sustainable Design Principles, Bio-mimic, Preliminary production process creative improvement techniques 3D model basics; various case studies

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

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
8.1	CLO1 is able to explain the principles of environmentally friendly product design.			✓	1.1,1.2, 2.1,2.2
8.2	CLO2 is able to systematically assess the life cycle of a product.		✓		3.1, 5.1
8.3	CLO3 is able to identify customer needs and conduct market research.		✓		4.2,5.2, 5.3,5.4, 5.5
8.4	CLO4 is able to develop product prototypes by Bio-mimic approach.		✓		4.2, 5.1
8.5	CLO5 is able to create prototypes of products using basic knowledge of 3D models.		✓		3.1,5.2, 5.3,5.4, 5.5

8.6	CLO6 is able to design production processes and perform preliminary product testing.	✓			4.2, 6.1, 6.2

9. Class Instructor List

9.1 Sirinon Suwanmolee, Ph.D. Contact No. : 081-428-2303 Email: sirinon.suw@mahidol.edu

10. Course Outline

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
1	Introduction to Eco-design & Product Modeling	1:00		Lecture: ppt	SS
			1:00	Practice: Define product and process	
			1:00	Group discussion: Matching result	
2	Life Cycle Thinking/Eco-design Pilot Assistant	1:00		Lecture: ppt	SS
			2:00	In-Class practice: Filpchart&Post-it for brainstroming	
3	Life Cycle Assessment	1:00		Lecture: ppt	SS
			2:00	In-Class practice: Filpchart&Post-it for brainstroming	
4	Business Model Canvas	0:30		Lecture: ppt	SS
			1:30	Roleplay: Customer need Group discussion: Plot Business Model Canvas	
			1:00	Present: Business Model Canvas	
5	Design Thinking: - Empathy - Define Problem - customer needs and market survey research	0:30		Lecture: ppt	SS
			2:30	In-Class practice: collect the data for customer needs and market survey research - Target group Empathy - Define Problem	
6	Design Thinking: - Ideate - Bio-mimic design	0:30		Lecture: ppt	SS
			2:30	In-Class practice: applied bio-mimic design idea into the design	
7	Design Thinking: - Prototype draft I	0:30		Lecture: ppt	SS
			2:30	In-Class practice: Create the first draft of prototype	
8	Design Thinking: - Prototype draft II - The principle of 3D printing	0:30		Lecture: ppt	SS
			2:30	In-Class practice: Create the second draft of prototype by using 3D printing	
9	Week 9 Midterm Examination Period				SS
10	Design Thinking: - Prototype draft III - Present and evaluate 3D printing	0:30		Lecture: ppt	SS
			2:30	In-Class practice: Create the third draft and Present and evaluate 3D printing	
11	Design Thinking: - Testing I: display the		2:30	Practice: Collecting Feedback in Public I	SS
			0:30	Group discussion: Analyze the feedback	

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
	prototype in public - Collect feedback				
12	Design Thinking: - Improve the prototype following the feedback		2:30 0:30	Practice: Collecting Feedback in Public I Group discussion: Analyze the feedback	SS
13	Design Thinking: - Testing II		2:30 0:30	Practice: Collecting Feedback in Public I Group discussion: Analyze the feedback	SS
14	Present the result of eco-design product,		1:00 2:00	Group discussion: Analyze the result Group project presentation: ppt	SS
15	Bridging result, How it minimizing the environment impact compare to life cycle of typical product in the market		1:30 1:30	Group discussion: Bridging result Group project presentation: ppt	SS
16	summarize		1:30 1:30	Group discussion: Bridging result Group project presentation: ppt	SS
	Total hours of the entire semester	**6**	**39**		

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	MEQ	Learner need to give reflection during class activity	CLO 1,2	Week 1-4	20
11.2	Practice exams / Prototype testing	Learner need to achieve in class activity's mission	CLO 3-6	Week 5-16	50
11.3	Presenting design / planning	Planning Presentation must reflect summative knowledge	CLO 3-6	Week 5-16	30
				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 %

Norm-referenced evaluation

*If use both criterion and norm-referenced evaluation, please tick two boxes.

13. References

13.1 Birkeland, J. (2002). Design for Sustainability: A Sourcebook of integrated eco-logical solutions. In Design for Sustainability: A Sourcebook of integrated eco-logical solutions. Earthscan.

13.2 Fiksel, J. (2009). Design for Environment. A Guide to Sustainable Product Development: Eco-Efficient Product Development.

13.3 Doru Talab, & Thomas Roche. (2004). Product Engineering, Technologies and Green Energy. In Journal of Chemical Information and Modeling (Vol. 53). Springer.

13.4 Vignali, G. (2016). Life-Cycle Assessment of Food-Packaging Systems. In Environmental Footprints and Eco-Design of Products and Processes. https://doi.org/10.1007/978-981-287-913-4_1

13.5 Wrisberg, N., Helias A. Udo de Haes, U. T., Clift, R., & Eder Peter. (2002). Analytical Tools for Environmental Design and Management in a Systems Perspective. Springer.

13.6 Plattner, H., Meinel, C., & Leifer, L. (2014). Design thinking research: Building innovation eco-systems. In Design Thinking Research: Building Innovation Eco-Systems. https://doi.org/10.1007/978-3-319-01303-