Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	OPTIMAL DEVELOPMENT AND REUSE OF WASTE GASIFICATION POWER GENERATION SYSTEM	Instructor	CHANG, SHIH-HSING
Course Class	TEBXD1A DOCTORAL PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education SDG7 Affordable and clean energy SDG11 Sustainable cities and communities		

Departmental Aim of Education

Ⅰ. To prepare students who have a comprehensive understanding of the principles of applied sciences and engineering to be innovators in the field of mechanical and electromechanical engineering.

Ⅱ. To train emerging professionals who possess a high level of expertise and ethical standards who will become independent research and development leaders in the industry.

Ⅲ. To motivate students who will pursue continuing education as a means to stay on the cutting edge of global competiveness and meet changes in their careers and the workplace with confidence and ease.

Subject Departmental core competences

A. Head: Knowledge of mechanical and electromechanical engineering.(ratio:30.00)

B. Hand: Hands-on skills and practical realization.(ratio:15.00)

C. Heart: Love of learning and innovation.(ratio:30.00)

D. Eye: Vision of progress and improvements.(ratio:25.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:30.00)

2. Information literacy. (ratio:10.00)

3. A vision for the future. (ratio:10.00)

4. Moral integrity. (ratio:5.00)

5. Independent thinking. (ratio:25.00)

6. A cheerful attitude and healthy lifestyle. (ratio:10.00)

7. A spirit of teamwork and dedication. (ratio:5.00)

8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction	The process of gasification technology can start from the source of organic materials (such as agricultural and forestry waste, plastic waste, household kitchen waste, etc.), and the resulting combustible gas or synthesis gas will produce water vapor and carbon dioxide after combustion or chemical conversion. According to the literature, the filtered synthesis gas can be converted into methane gas through the "Sabatier Reaction" or converted into diesel-like synthetic fuel through the "Fischer-Tropsch process".

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.
II.Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.
III.Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	The strength of cultivating students' hands and brains is based on academic theory, turning knowledge into skills. When they enter the industry, it can be an excellent engineer who can design and manufacture.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCD	12345678	Lecture	Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Definition, scope and concept of renewable energy	
2	114/09/22 ~ 114/09/28	Definition, scope and application of green energy and biomass energy	
3	114/09/29 ~ 114/10/05	Form 1 of biomass energy generation: combustion power generation	

4	114/10/06 ~ 114/10/12	Form 2 of biomass energy generation: hybrid power generation	
5	114/10/13 ~ 114/10/19	Form 3 of biomass energy generation: gasification power generation	
6	114/10/20 ~ 114/10/26	Form 4 of biomass energy generation: biogas power generation	
7	114/10/27 ~ 114/11/02	Form 5 of biomass energy generation: garbage power generation	
8	114/11/03 ~ 114/11/09	Form 1 of renewable energy generation: rubber power generation	
9	114/11/10 ~ 114/11/16	Form 2 of renewable energy generation: plastic power generation	
10	114/11/17 ~ 114/11/23	Form 3 of renewable energy generation: sludge power generation	
11	114/11/24 ~ 114/11/30	Introduction to power generation theory	
12	114/12/01 ~ 114/12/07	Extraction of water gas and hydrogen	
13	114/12/08 ~ 114/12/14	Biomass tar reduction 12 methods	
14	114/12/15 ~ 114/12/21	Flue gas purification 17 methods	
15	114/12/22 ~ 114/12/28	Process optimization and accurate modeling prediction methods	
16	114/12/29 ~ 115/01/04	Discussion on optimization of biomass gasification	
17	115/01/05 ~ 115/01/11	Discussion on optimization of biomass power generation	
18	115/01/12 ~ 115/01/18	Final exam	

Key capabilities	self-directed learning International mobility Information Technology Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)
Distinctive teaching	Special/Problem-Based(PBL) Courses

Course Content	Logical Thinking Green Energy
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Presentations
References	
Grading Policy	◆ Attendance： 50.0 % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： % ◆ Final Exam： 30.0 % ◆ Other〈 〉： %
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