Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	ADVANCED ENERGY CONVERSION	Instructor	KANG SHUNG-WEN
Course Class	TEBXM1A MASTER'S PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG9 Industry, Innovation, and Infrastructure 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:60.00)

B. Hand: Hands-on skills and practical realization.(ratio:10.00)

C. Heart: Love of learning and innovation.(ratio:20.00)

D. Eye: Vision of progress and improvements.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:20.00)

2. Information literacy. (ratio:10.00)

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

4. Moral integrity. (ratio:10.00)

5. Independent thinking. (ratio:20.00)

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

7. A spirit of teamwork and dedication. (ratio:10.00)

8. A sense of aesthetic appreciation. (ratio:10.00)

Course Introduction	This course covers fundamentals of thermodynamics, flow and transport processes as applied to energy systems. Topics include analysis of energy conversion in thermomechanical, electrochemical, and photoelectric processes in existing and future power and transportation systems, with emphasis on efficiency, environmental impact and performance. Applications include Concentrated Solar Power Stirling Engine Generation System, Thermal Storage System, and fuel cells and batteries, etc.

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 goal of the course is to provide fundamentals of thermodynamics, flow and transport processes as applied to energy systems.	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, Discussion	Testing, Study Assignments, Discussion(including classroom and online), Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	114/02/17 ~ 114/02/23	Introduction of the course	
2	114/02/24 ~ 114/03/02	Energy Conversion and General Energy Analysis	
3	114/03/03 ~ 114/03/09	The first law of thermodynamics	

4	114/03/10 ~ 114/03/16	The second law of thermodynamics	
5	114/03/17 ~ 114/03/23	Entropy	
6	114/03/24 ~ 114/03/30	Irreversibility and availablity	
7	114/03/31 ~ 114/04/06	Power and refrigeration cycles	
8	114/04/07 ~ 114/04/13	Exergy: A Measure of Work Potential	
9	114/04/14 ~ 114/04/20	Vapor and Combined Power Cycles	
10	114/04/21 ~ 114/04/27	Midterm test	
11	114/04/28 ~ 114/05/04	Concentrated Solar Power Stirling Engine Generation System	
12	114/05/05 ~ 114/05/11	Thermal Storage System	
13	114/05/12 ~ 114/05/18	fuel cells and batteries	
14	114/05/19 ~ 114/05/25	future power and transportation systems	
15	114/05/26 ~ 114/06/01	Gas–Vapor Mixtures and Air-Conditioning	
16	114/06/02 ~ 114/06/08	Chemical Reactions	
17	114/06/09 ~ 114/06/15	Chemical and Phase Equilibrium	
18	114/06/16 ~ 114/06/22	Final test	

Key capabilities	
Interdisciplinary	
Distinctive teaching	
Course Content	Environmental Safety Green Energy

Requirement	
Textbooks and Teaching Materials	Using teaching materials from other writers:Presentations, Handouts
References	Thermodynamics An Engineering Approach, 5th ed, McGraw-Hill
Grading Policy	◆ Attendance： 10.0 % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： 30.0 % ◆ Final Exam： 30.0 % ◆ Other〈homework〉：10.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . **※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**