

Tamkang University Academic Year 112, 1st Semester Course Syllabus

Course Title	ADVANCED HEAT TRANSFER	Instructor	KANG SHUNG-WEN
Course Class	TEBXM1A MASTER'S PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	<p>SDG7 Affordable and clean energy</p> <p>SDG9 Industry, Innovation, and Infrastructure</p>		
Departmental Aim of Education			
<p>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.</p> <p>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.</p> <p>III. To motivate students who will pursue continuing education as a means to stay on the cutting edge of global competitiveness and meet changes in their careers and the workplace with confidence and ease.</p>			
Subject Departmental core competences			
<p>A. Head: Knowledge of mechanical and electromechanical engineering.(ratio:40.00)</p> <p>B. Hand: Hands-on skills and practical realization.(ratio:20.00)</p> <p>C. Heart: Love of learning and innovation.(ratio:20.00)</p> <p>D. Eye: Vision of progress and improvements.(ratio:20.00)</p>			
Subject Schoolwide essential virtues			
<p>1. A global perspective. (ratio:20.00)</p> <p>2. Information literacy. (ratio:10.00)</p> <p>3. A vision for the future. (ratio:10.00)</p> <p>4. Moral integrity. (ratio:5.00)</p> <p>5. Independent thinking. (ratio:30.00)</p> <p>6. A cheerful attitude and healthy lifestyle. (ratio:5.00)</p> <p>7. A spirit of teamwork and dedication. (ratio:15.00)</p> <p>8. A sense of aesthetic appreciation. (ratio:5.00)</p>			

Course Introduction	<p>The course will cover the following topics:</p> <p>PART 1.: Conservation equations, viscosity and stress terms, boundary layer equations for momentum, heat and mass transfer.</p> <p>PART 2: Momentum and heat transfer for laminar boundary layers, laminar flow in pipes/ducts, turbulent boundary layers, turbulent flow in pipes/ducts, heat transfer by natural convection, influence of temperature-dependent fluid properties on convective heat transfer and friction.</p>
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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 objectives of the course is to provide students an advanced understanding on heat transfer. Students who may have taken this course as his or her graduate work will be able to master these advanced topics through self study.	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)

Course Schedule

Week	Date	Course Contents	Note
1	112/09/11 ~ 112/09/17	Fundamentals of heat transfer	
2	112/09/18 ~ 112/09/24	Boundary Layer Fundamentals	
3	112/09/25 ~ 112/10/01	Conservation Equations of Mass, Momentum, and Energy for Laminar Flow Over a Flat Plate	

4	112/10/02 ~ 112/10/08	Approximate Integral Boundary Layer Analysis	
5	112/10/09 ~ 112/10/15	Analogy Between Momentum and Heat Transfer in Turbulent Flow Over a Flat Surface	
6	112/10/16 ~ 112/10/22	Mixed Boundary Layer	
7	112/10/23 ~ 112/10/29	Introduction of Natural Convection	
8	112/10/30 ~ 112/11/05	Combined Forced and Natural Convection	
9	112/11/06 ~ 112/11/12	Forced Convection Inside Tubes and Ducts	
10	112/11/13 ~ 112/11/19	Mid-term test	
11	112/11/20 ~ 112/11/26	Analogy Between Momentum and Heat Transfer in Turbulent Flow	
12	112/11/27 ~ 112/12/03	Heat Transfer Enhancement and Electronic-Device Cooling	
13	112/12/04 ~ 112/12/10	Forced Convection Over Exterior Surfaces	
14	112/12/11 ~ 112/12/17	Heat Exchangers	
15	112/12/18 ~ 112/12/24	Heat Exchanger Effectiveness	
16	112/12/25 ~ 112/12/31	Heat Transfer with Phase Change	
17	113/01/01 ~ 113/01/07	Condensation	
18	113/01/08 ~ 113/01/14	Final test	
Key capabilities			
Interdisciplinary			
Distinctive teaching			
Course Content		Logical Thinking Green Energy Sustainability issue	

Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks, Handouts
References	
Grading Policy	<p>◆ Attendance : 10.0 % ◆ Mark of Usual : 30.0 % ◆ Midterm Exam : 30.0 %</p> <p>◆ Final Exam : 30.0 %</p> <p>◆ Other < > : %</p>
Note	<p>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 .</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p>