國立中正大學機械工程學系 112 學年度第一學期教學大綱表

課程名稱：(中文) 二相流與沸騰熱傳(全英授課) (英文) Two-phase flow and boiling heat transfer					開課單位	機械系
					課程代碼	4205518
授課教師	林昱辰	學分數	3	選修	開課年級	大四/碩博士班
先修科目或先備能力： Basic knowledge of Fluid Mechanics and Heat Transfer						

課程概述：

This course will introduce: two-phase flow regime; governing equations for two-phase boiling flow; pool boiling, nucleate boiling, and flow boiling; condensation in boiling flow; pressure drops in two-phase flow; applications in industry.

目標：

Students will learn basic concepts of two-phase flow and boiling heat transfer. They will learn the key concerns of designing two-phase flow device for industry applications.

教科書	1. No textbook is required. Handouts will be provided. 2. Reference book: 沸騰熱傳與雙相流，潘欽著，俊傑書局股份有公司 「請尊重智慧財產權，不得非法影印教師指定之教科書籍」

課程大綱		分配時數				可達成核心能力
單元主題	內容綱要	講授	示範	習作	其它	
Introduction to two-phase flow	1. Two-phase flow regime 2. Governing equations	6				D1
Boiling heat transfer	1. Pool boiling curve 2. Nucleate boiling mechanism 3. Flow boiling 4. Modeling and calculation	15				D1, D2, D4
Condensation	1. Condensation 2. Modeling and calculation	6				D1, D2, D4
Pressure drops	1. Pressure drops 2. Modeling and calculation	9				D1, D2, D4
Applications in industry	1. Nuclear power plant 2. Heat exchanger 3. Heat pipe 4. Microfluidic boiling flow	12				D4, D6
Presentation	Project presentation				3	D3, D5, D7

可達成核心能力		核心能力達成指標
D1	具機械與光機電整合工程領域之專業知識	具二相流與沸騰熱傳領域之專業知識
D2	策劃及執行機械及光機電整合工程領域專題研究之能力	策劃及執行二相流與沸騰熱傳及相關領域專題研究之能力
D3	撰寫科技論文與簡報之能力	撰寫二相流與沸騰熱傳相關專業論文與簡報之能力
D4	創新思考與獨立解決機械與光機電整合工程問題之能力	創新思考與獨立解決二相流與沸騰熱傳相關問題之能力

D5	跨領域人員協調整合之能力	跨領域人員協調整合之能力
D6	良好的國際觀	良好的二相流與沸騰熱傳國際觀
D7	具備團隊合作精神及領導、管理、規劃、溝通之能力	具備團隊合作精神及領導、管理、規劃、溝通之能力

教學要點概述:

上課時間	上課地點	評量方式	Office hour	教學品質評量方式
Tue.: 13:10-16:00	Engineering Building II 215 Right	Homework: 30% Final exam: 35% Project: 35%	Tue.: 9:00-12:00 Or by appointments	教學意見調查核心能力重要性及達成度分析問卷

週次	教學與作業進度	備註
1	Two-phase flow regime Governing equations	
2	Governing equations	
3	Pool boiling curve	
4	Nucleate boiling mechanism	
5	Flow boiling	HW 1 due
6	Flow boiling	
7	Boiling heat transfer modeling and calculation	
8	Condensation	
9	Condensation modeling and calculation	HW 2 due
10	Pressure drops	
11	Pressure drops modeling and calculation	
12	Application: nuclear power plant	Project proposal due
13	Application: heat exchanger	HW 3 due
14	Application: heat pipe	
15	Application: microfluidic boiling flow	
16	(No class) Project presentation	
17	Final exam	
18	Project report due	Report due