

## Introduction of SEU International Summer School Program 2021

### Theme

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#### Low-carbon technologies for Building energy and application

### Overview

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In view of the increasing demand for internationalized talents in the field of energy and power, this project plays an equal role in training Chinese and international students. Distinguished experts from Europe and Australia have been invited to deliver lectures for Refrigeration and Air Conditioning design for low-carbon built environment: Professor Christos Markides from Imperial College London, Professor Xiaolin Wang from the University of Tasmania, Dr. Hongwei Wu from University of Hertfordshire. Three professors will also organize open forums in cutting edge technologies and application. Focusing on practice and innovation, this project will give students opportunity to study advanced low-carbon technologies, building energy and environment in China, UK and Australia, and arrange them to carry out innovative design of refrigeration and air conditioning application for buildings. This project will be run for 20 consecutive working days for 3 courses, which can replace the basic and applied courses of *Design of Air Conditioning*, *Design of Refrigeration System* and *Advanced Practicum*.

### Schedule

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#### **Course 1: Low-carbon technologies for Built Environment and Design** (*Design of Air Conditioning*)

Time	Content	Lecturer	Platform
16/July 8:30-10:30	Introduction Overview of Energy	Xiaolin Wang	Zoom
16/July 15:30-17:00	Technologies for effective solar energy thermal utilization	Christos Markides	Zoom
17/July 8:30-10:30	Project description- Description of a design project for a residential air-conditioning system	Xiaolin Wang	Zoom
17/July 15:30-17:00	High efficiency energy use via heat recovery, conversion and co-generation	Christos Markides	Zoom
18/July	Geothermal heat pump	Xiaolin Wang	Zoom

8:30-10:30			
19/July 8:30-10:30	Thermal circuit theory	Xiaolin Wang	Zoom
20/July 8:30-10:30	Psychometric analysis of air-conditioning system	Xiaolin Wang	Zoom
21/July 14:00-16:00	Heat exchanger design	Xiaolin Wang	zoom
22/July 8:30-10:30	Project consultation	Xiaolin Wang	Zoom
23/July 9:30-11:30	Interactive cross making of the design project	Xiaolin Wang	Zoom
23/July 14:00-16:00	Project presentations	Xiaolin Wang & Yonggao Yin	Zoom

### Course description

This course focuses on how to design an energy efficient built environment and analyze energy conservation potential through utilization of renewable energy. Low-carbon technologies and demonstration cases for built environment, such as solar thermal utilization, geothermal heat pump, will be discussed. Some basic knowledge for air conditioning design will also be introduced, such as psychometric analysis of air-conditioning system, heat exchanger design, heat/cooling load evaluation. This course would promote students aware of energy efficiency of green buildings involving leading-edge technologies when making of air conditioning system design.



### Lecturer introduction

#### Professor Christos Markides





Date	Lecture & Seminar & Project Design with Defence	Time
2021/08	The Fundamentals Concepts of Thermodynamics	To be announced
	Heat Engine; Heat Pump; Refrigeration	
	Research project presentation and discussion (I)	
	Methods of Cooling and the Reversed Carnot Cycle	
	Rankine Cycle	
	Research project presentation and discussion (II)	
	A Vapour-Compression Refrigeration Cycle incorporating a throttle valve	
	Theoretical and Practical Cycle	
	Research project presentation and discussion (III)	
	A Single-stage vapour-compression refrigeration cycles with superheating and subcooling	
	Tutorial Session	
	Research project presentation and discussion (IV)	
	Multistage vapour-compression Refrigeration cycles water refrigeration	
	Tutorial Session	
	Research project presentation and discussion (V)	
	Absorption and gas cycle refrigeration	
	Heat Pump System (Fundamental concept)	
	Research project presentation and discussion (VI)	
	Renewable Energy and Heat Pump System	
	Renewable Energy Introduction	
Research project presentation and discussion (VII)		
Introduction to various types of heat pump		
Refrigeration system design		
Research project presentation and discussion (VIII)		
<b>Project Design (Design of a Chiller or Uitary Air Conditioner)</b>		
2021/08	<p>Project Defence/Presentation (each student will make 30 minute presentation for the project design).                      Marking will be evaluated based on: (1) presentation and layout; (2) pace and clarity; (3) Selection of material presented, results, critical analysis etc; (4) Level of technical competence demonstrated (including answering questions).</p>	

**Course introduction**

This module provides an introduction to several subject areas in refrigeration and management and efficiency. The topics covered in the module mainly include: Energy conversion technologies; Methods of cooling and the reversed Carnot cycle; Single-stage vapour-compression refrigeration cycle; Multistage vapour-compression refrigeration cycles; Heat pump system; Renewable energy and heat pump system. The module will also include visiting several real industries.

The module will be delivered through lectures and knowledge will be consolidated in seminar and problem solving sessions. Assessment will be an individual assignment.

### Dr. Hongwei Wu



Dr Wu joined University of Hertfordshire as a Senior Lecturer in the School of Engineering and Computer Science since Jan. 2017. Dr Wu received his BEng (1st Class Honours, 1998), MSc (Distinction, 2000) and joint PhD (2004, with Hongkong University of Science and Technology) with specialisation in Thermofluids all from Beihang University (formerly Beijing University of Aeronautics and Astronautics). He has an academic/research profile previously developed at Northumbria University (Senior Lecturer, 2015-2017), University of the West of Scotland (Lecturer, 2013-2015), Birmingham University (Research Fellow, 2012-2013) and Brunel University London (Research Fellow, 2009-2012) in UK, Beihang University in China (Associate Professor, 2007-2009), as well as University of British Columbia & University of Alberta in Canada (Postdoc, 2004-2007). His research has been focused on Thermofluid Modelling/Simulation and experimental study for Energy & Flow Physics. He has an international profile with more than 120 peer-reviewed journal and conference publications in his academic career, including top journals such as Applied Energy, Applied Thermal Engineering, Fuel, International Journal of Heat and Mass Transfer etc. He has been a regular reviewer of many leading journals and serves as Editor/Editorial Board Members of several International Journals. He also serves as general Chair and session Chairs/co-Chairs, TPC members at a number of International Conferences. He is currently an EPSRC Peer Review Full College Member and regular reviewer for EPSRC proposals.

## Faculty

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