The Hashemite University
Faculty of Engineering
Course Syllabus
Department of Mechanical Engineering

Course Title:	**Thermal System Design**	**Course Number:**	ME554
Designation:	Elective	**Prerequisite(s):**	
Instructor:	Dr. Mohammad Tarawneh	Email: Mohammad.tarawneh@hu.edu.jo	
Office Hours:	9:00 – 10:00: Sun/Tue/Thur, 9:30 – 11:00: Mon. & Wed.		

Course Description (catalog): This is a senior-level course in mechanical engineering aims at conveying to students various aspects of dealing with thermal energy and systems. The course begins with introduction to system designs and optimization, followed by analysis and design of heat exchangers, assessment of special systems (cooling towers, heat pumps and absorption cycles analysis), fluid equipments evaluation and selection, and design optimization methods.

Textbook(s) and/or Other Supplementary Materials:
Design and Optimization of Thermal Systems, by Y. Jaluria, 2nd edition or later..
References:
1- *Fundamentasl of Heat and Mass Transfer;* by T. Bergman, A. Lavine, F. Incropera, D. Dewitt
2- *Thermodynamics for Engineers;* by Y. Gengel, M. Boles
3- *Fundamentals;ASHRAE;* latest edition

Major Topics Covered:

Topics	No. of Weeks	Contact hours*
Fundamental principles and introduction to system design and optimization	1.5	4.5
Analysis and design of heat exchanges	3.5	10.5
Analysis of special thermal systems: cooling tower, heat pumps and absorption cycles	3	9
Analysis and selection of fluid and heat devices	2	6
Mathematical modeling and optimization of thermal systems	3	9
Course design project	1	3
The issue of environmental and sustainability related to thermal System Design	1	3
Total	**15**	**45**

*Contact hours include lectures, quizzes and exams

Specific Outcomes of Instruction (Course Learning Outcomes):
After completing the course, the student will be able to:
CLO1; Understand basic principles for analyzing and designing thermal systems. **(a):**
CLO2; The ability to analyze and design thermal systems. **(a, c)**
CLO3; Understand how to model a thermal system based on preliminary designs **(c)**
CLO4; Be able to perform steady-state simulation of a thermal system determining a set of output conditions from a set of input conditions. **(a, e, c)**.
CLO5; Be able to optimize the design of a thermal system using any of several suitable approaches **(a, e, c)**.
CLO6; The ability to design and select components that to be integrated into a final thermal system. **(a, c, g)**

CLO7; The ability to apply and acquire necessary information to complete course design project **(a, c, k**)

Student Outcomes (SO) Addressed by the Course:

#	Outcome Description	Contribution
General Engineering Student Outcomes		
(a)	an ability to apply knowledge of mathematics, science, and engineering	H
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	H
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	M
H=High, **M**= Medium, **L**=Low		

Grading Plan:

Mid. Exam	30 Points	**Tue.19-Nov. (3-4)**
Course Project	20 Points	
HWs & Quizzes	10 Points	
Final exam	40 Points	
	TBA	

General Notes: A design of a thermal device as a course project is required. The project is individually made with inputs from a team of students. The project emphasizes the knowledge gained during the course time. Each student is required to submit a technical report about his/her project while one summary report from each team. Each team will give an oral presentation of the joint work.

Prepared by: *Dr. Mohammad Tarawneh* **Date:** 22.Sep. 2019