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

Course title:	**Thermal Science Lab II** **1 (0,1, 3)**	**Course Number:**	110402426
Designation:	Compulsory	**Prerequisite(s):**	110402324 & 110402325
Instructor:	Dr. Mohammad Tarawneh	**e-mail:**	Mohammad.tarawneh@hu.edu.jo
Office Hours:	{Mon, Wed} ➔ (11:00 - 12:00), {Mon, Wed} ➔ (9:30 - 11:00)		
Coordinator:	Dr. Mohammad Tarawneh		

Course Description (catalog): Conduct experiments in teams, analyze data, and communicate experimental results in written technical reports in order to improve student knowledge and understand of basic concepts of thermodynamics, air-conditioning, internal combustion engines and solar energy, experiments done on equipment such as : condensation apparatus, boiling heat transfer apparatus, central heating system, refrigeration cycle apparatus, weather station , Four stroke spark ignition engine.

Textbook(s) and/or Other Supplementary Materials:
Thermal science -II laboratory Manual, Dept. of Mechanical engineering, The Hashemite University.

References:
1. Thermodynamics, an Engineering Approach, 8th edition , Yunus A. Cengel, and Michael A. Boles,
2. Fundamentals of Heat and Mass Transfer, F.P. Incropera, D.P. DeWitt, T.L. Bergman, and A.S. Lavine, 7th Edition (John Wiley & Sons)
3. "Engineering Fundamentals of the Internal Combustion Engine" by W. Pulkrabek, Pearson Prentice Hall, 2nd Int. edition, 2004.

Major Topics Covered:

Topic	# Weeks	# Contact hours*
Introduction to the lab [Lab policy, Equipment, Experiments, and safety]	1	3
Experiment 1: Boiling Heat Transfer	1	3
Experiment 2: Film and drop wise condensation	1	3
Experiment 3: Heating, humidification	1	3
Experiment 4: Cooling & Dehumidification	1	3
Experiment 5: Central heating system	1	3
MID EXAM Material included [Exp. 1, 2, 3,4 and 5]	1	3
Experiment 6: Air-conditioning, refrigeration cycle	1	3
Experiment 7: Weather station & solar collector	2	6
Experiment 8: Four stroke engine	1	3
Experiment 9: Emission analysis of SI engine	1	3
Design of an experiment	3	9
Total	**15**	**45**

*Contact hours include lectures, quizzes and exams

Specific Outcomes of Instruction (Course Learning Outcomes):

A student who successfully fulfills the course requirements will be able to:

1. Be familiar and with different types of boiling heat transfer and measure the heat flux and the convective heat transfer coefficient. **[a,b,d,i]**
2. Measure the heat flux and the convective heat transfer coefficient during condensation. **[a,b,d,i]**
3. Investigate the sensible heating and study the humidification of moist air. **[a,b,d,i]**
4. Investigate the cooling and dehumidification process of moist air**[a,b,d,i]**
5. Demonstrate the hot water heating system and identify all its components and compare between different types of radiators. **[a,b,d,i]**
6. Demonstrate the refrigeration cycle as a part of the air-conditioning systems and calculate the coefficient of performance for both refrigerates and heat pumps. **[a,b,d,i]**
7. Tabulate and evaluate the radiation energy and study solar collectors performance. **[a,b,d,i]**
8. to demonstrate the components of spark ignition engine and Study the full load performance of a single cylinder four stroke spark ignition engine of an internal combustion engine . **[a,b,d,i]**
9. Calculate the equivalence ratio of mixture and determine its type. **[a,b,d,i]**
10. **Design and build a device to run an experiment in Thermal science field. [a,b,d,e,g,k]**
11. **Write and present reports. [d,g,k]**

Grading Plan:

Reports:	30 points	
Midterm Exam:	30 points	Wed. 11/12/2020 2:00-3:30
Final Exam:	40 points	TBA

Student Outcomes (SO) Addressed by the Course:

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

Prepared by: Dr. Mohammad Tarawneh **Date:** 11. Oct. 2020