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

Course Title:	Thermal Fluid Lab.	**Course Number:**	110402482
Designation:	Compulsory	**Prerequisite(s):**	110402481
Instructor:	Eng.Ahmad Bani yaseen	**email:**	ahmadi_ah@hu.edu.jo
Office Hours:		**Semester:**	Fall semester 2020/2021
Required Course:	3 hours lectures per week		

Course Description: Conduct experiment 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, heat transfer and fluid mechanics. Experiments done on equipment such as: Marcet boiler apparatus, Gas calorific value apparatus, Thermal conductivity and insulating materials unit, Refrigeration cycle apparatus, Venturimeter, Fluid friction apparatus, Pressure gage calibration unit, Combined convection and radiation apparatus, Two stage compressor.

Textbook(s) and/or Other Supplementary Materials:
- Laboratory Manual, Dep. of Mechanical Engineering, The Hashemite University.
- Lecture Note.

References:
- Fundamentals of Thermal-Fluid Sciences, By Yunus A. Cengel, John M. Cimbala, Robert H. Turner, Mc Graw Hill, Fifth Edition.

Major Topics Covered:

Topic	# Weeks	# Contact hours*
Introduction to the lab [Lab policy, Equipment, Experiments, and safety]	1	**3**
Experiment 1: Gas calorific value	1	3
Experiment 2: Two stage compressor	1	3
Experiment 3: Refrigeration cycle	1	3
Experiment 4: Thermal conductivity and insulating materials	1	3
Experiment 5: Marcet boiler	1	3
MIDTERM EXAM	1	3
Experiment 6: Pressure gage calibration	1	3
Experiment 7: Bernoulli's theorem application/ flow through Venturi tube	1	3
Experiment 8: Fluid friction in pipes and losses from fitting	1	3
Experiment 9: Combined natural convection and radiation	1	3
Experiment 10: Combined forced convection and radiation	1	3
Total	**12**	**36**

*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: Study the flow through the Venturi meter and calculate the flow rate and coefficient of discharge. **[a,b,d,g]**
CLO2: Demonstrate friction losses in pipes and from fitting to determine experimentally the relationship between friction factor and Re number of the flow. **[a,b,d,g]**
CLO3: Learning how to establish a calibration curve for a Bourdon Gauge. **[a,b,d,g]**
CLO4: Determine thermal resistance of multilayer insulation materials. **[a,b,d,g]**

CLO5: Determine the combined heat transfer (radiation convection) from a horizontal cylinder in natural convection over a wide range of power input and corresponding surface temperatures, and to demonstrate the relationship between power input and surface temperature in free convection. **[a,b,d,g]**
CLO6: To determine the effect of force convection on heat transfer from the surface of a cylinder at varying air velocities and surface temperatures and to demonstrate the relation between air velocity and surface temperature for a cylinder subject to force convection. **[a,b,d,g]**
CLO7: Investing the relationship between (pressure) and (temperature) of a saturated steam, in equilibrium with (water). **[a,b,d,g]**
CLO8: Determine the polytropic index (n), for the compressor; calculate the isothermal and polytropic work, as well as the isothermal efficiency. **[a,b,d,g]**
CLO9: Determine the calorific value of a gaseous fuel. **[a,b,d,g]**
CLO10: Find the coefficient of performance of a refrigeration cycle. **[a,b,d,g]**

Grading Plan:

Mid Exam	(30 Points)
Experiment's reports	(30 Points)
Final Exam	(40 Points)

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	L
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	H
(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	
(d)	an ability to function on multidisciplinary teams	L
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	L
(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.	
H=High, **M**= Medium, **L**=Low		

Prepared by: Eng.Ahmad bani yaseen **Date**:18/10/2020