



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

<b>Course title:</b>	Internal Combustion Engines 2 (2,0, 0)	<b>Course Number:</b>	110402561
<b>Designation:</b>	Compulsory	<b>Prerequisite(s):</b>	110402222
<b>Instructor:</b>	Dr. Mohammad Tarawneh	<b>E-mail:</b>	<a href="mailto:Mohammad.tarawneh@hu.edu.jo">Mohammad.tarawneh@hu.edu.jo</a>
<b>Office Hours:</b>	{Mon, Wed} → (11:00 - 12:00), {Mon, Wed} → (9:30 - 11:00)		

**Course Description (catalog):** Spark ignition and compression ignition engine types, design and operating parameters; thermo chemistry of fuel-air mixture and thermodynamic models of working fluids and engine cycles. Gas exchange processes and volumetric efficiency. Combustion chamber design and octane number.

**Textbook(s) and/or Other Supplementary Materials:**

“Engineering Fundamentals of the Internal Combustion Engine” by W. Pulkrabek, Pearson Prentice Hall, 2nd Int. edition, 2004.

**References:**

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**Major Topics Covered:**

Topics	No. of Weeks	Contact hours*
Engine classifications and terminology.	1	2
Engine operating characteristics and performance parameters.	1	2
Air standard engine cycles including: Otto, Diesel, Dual and two-stroke cycles.	4	8
Common fuels used in IC engines, combustion reactions and the associated thermo chemical calculations.	3	6
Engine emissions and their control technologies and strategies.	2	4
Air and fuel induction methods and technologies, the physics of the combustion phenomena.	2	4
Friction losses, lubricants and lubrication systems. Engine-based experiments	2	4
<b>Total</b>	<b>15</b>	<b>30</b>

\*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:** Identify modern engine components and their functions. (a)

**CLO2:** Analyze engine operating characteristics & standard engine cycles and implement engineering principles to evaluate and compare engine performance parameters. (a,e,c)

**CLO3:** Implement the principles of chemistry and thermodynamics to carry out basic combustion reactions and emissions calculations and Identify common engine fuels available in local markets and Explain the health and environmental implications of engine emissions and identify modern emission control technologies (a,e, g, h)

**CLO4:** Assess and compare modern air and fuel induction technologies and perform basic turbocharger calculations and Identify engine lubricants and major sources of engine friction. **(a,e, g)**

**CLO5:** an ability to design an internal combustion engine and its components, to meet desired needs within realistic constraints and present it professionally. **(a,e,c)**

**CLO6:** Apply computer skills, numerical analysis find thermodynamic relationships between the different parameters of the internal combustion systems to enhance the research ability of the students for long life learning issues **(k)**.

**Student Outcomes (SO) Addressed by the Course:**

#	Outcome Description	Contribution
<b>General Engineering Student Outcomes</b>		
(a)	an ability to apply knowledge of mathematics, science, and engineering	<b>H</b>
(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	<b>M</b>
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	<b>H</b>
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	<b>L</b>
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	<b>L</b>
(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.	<b>M</b>
<b>H=High, M= Medium, L=Low</b>		

(30 Points)  
Mid\_Exam Wed.4/12/2020  
2:00-3:30

**Grading Plan:**  
HWs & Quizzes (30 points)  
Final Exam (40 points) TBA

**Prepared by:**

*Dr. Mohammad Tarawneh*

**Date:** 11. Oct. 2020