



**Gazi University**  
**Department of Mechanical Engineering**  
**2023-2024 Spring**

**COURSE SYLLABUS**

## **ME 430 INTERNAL COMBUSTION ENGINES**

<b>Course Code and Title:</b>	ME430 Internal Combustion Engines
<b>Course Level:</b>	4 <sup>th</sup> year Technical Elective Course
<b>Course Prerequisite (s) :</b>	ME203, ME204, ME301, ME302
<b>Instructor's Information's:</b>	Assoc. Prof. Dr. Fatih AKTAŞ Office: 454 <a href="mailto:fatihaktas@gazi.edu.tr">fatihaktas@gazi.edu.tr</a> <a href="https://avesis.gazi.edu.tr/fatihaktas">https://avesis.gazi.edu.tr/fatihaktas</a>

<b>Course module description:</b>	This course provides the material needed for the basic understanding of the operation and design of internal combustion engines.
<b>Course module objectives:</b>	At completing this module, the student should be able to: <ul style="list-style-type: none"><li>• Recognize the basic types of internal combustion engines.</li><li>• Estimate the performance of internal combustion engines</li><li>• Know the fundamental thermochemistry as applied to fuels.</li><li>• Follow the various operational processes from intake to exhaust.</li><li>• Be familiar with experimental and numerical analysis method for internal combustion engines.</li></ul>
<b>Ref. book &amp; Supplementary Materials:</b>	Pulkrabek, W.W., Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall, New Jersey, 2003.  John B. Heywood, Internal Combustion Engine Fundamentals, McGRAW Hill Book Comp., New York, 1988.  Lecture Notes by F. Aktaş (Electronic copy – Pdf presentations)

## Course Plan

Week	Topics
1	Introduction to ICE / Engine Classifications / Engine Components
2	Operation of Basic Engine Types / Engine Emissions and Air Pollution
3	Engine Characteristics and Operating Parameters-1
4	Engine Characteristics and Operating Parameters-2
5	Air Standard Ideal Cycles: Otto, Diesel, Dual Cycles / Thermal efficiencies
6	Analysis of Ideal Cycles/ Tutorial and Problem Solving
7	Thermochemistry of Fuel-Air Mixture
8	Midterm-I
9	Analysis of Engine Operations / Tutorial and Problem Solving
10	Air and Fuel Induction
11	Properties of Working Fluid / Charge Motion within the Cylinder
12	Introduction to Combustion Characteristics in SI and CI Engines
13	Midterm-II / Emissions and Air Pollution
14	Introduction to Experimental and Numerical Methods to Analyses ICE
15	Present and Future Studies on ICE'S

## Assessment instruments

- Minimum attendance: 70%
- Midterms: 40 points
- Short reports and/ or presentations and/ or Short research projects / 10 points
- Quizzes / W3 – W6 – W11 / 6 points
- Home works / 4 points
- Final examination: 40 points

Allocation of Marks	
Assessment instruments	Point
First examination / Midterm-I	20
Second examination / Midterm-II	20
Final examination / Final Exam	40
Mini Research Projects, Quizzes, Homework's	20
Total	100

“The engine is the ideal teaching tool- it features all of the elements of engineering: materials, fluids, thermodynamics, lubrication, chemistry, electronics, etc. The only thing missing is nuclear reaction”

Phil Myers  
Founder Engine Research Center  
University of Wisconsin, Madison, USA.