



### DESIGN PROJECT PROPOSAL FORM

<b>Academic Year</b>	<b>2022 -2023</b>	<b>Semester</b>	Fall <input type="checkbox"/> Spring <input checked="" type="checkbox"/>
<b>Project Type</b>	<b>Research</b> <input type="checkbox"/> ME 411 Thermal & Fluid Design <input type="checkbox"/> ME 413 Mechanical Design <input type="checkbox"/> ME 415 Robotics & Control Design	<b>Application</b> <input checked="" type="checkbox"/> ME 412 Thermal & Fluid Design <input type="checkbox"/> ME 414 Mechanical Design <input type="checkbox"/> ME 416 Robotics & Control Design	
<b>Advisor</b>	Assoc.Prof.Dr.Sercan Acarer		
<b>Project Title</b>	Detailed Thermodynamic Modeling and Turbocharger Design of Automobile Engines (Gasoline and Diesel) and Investigate the Effects of Ambient Conditions, Turbocharger and Supercharger.		
<b>Purpose and Scope</b>	The work covers detailed thermodynamic modeling of Automobile Engines, both gasoline and diesel. Then several scenarios with different seasonal conditions and engine configurations (diesel+turbocharger, diesel+supercharger, atmospheric gasoline and so on) will be analysed. Results will be reported and a comprehensive understanding of major parameters will be revealed. Then, a turbocharger specification belonging to one of the investigated engine configurations will be realized by a detailed turbocharger design and its virtual test with CFD simulations.		
<b>Work Packages</b>	<ul style="list-style-type: none"><li>• Develop a comprehensive thermodynamic model that goes beyond ideal cycles to consider realistic effects</li><li>• Determine the cases to be investigated (diesel and gasoline; atmospheric intake, with turbocharger and with supercharger; different ambient temperatures, different ambient pressures, etc.)</li><li>• Design a turbocharger system completely</li><li>• Virtually test the design with CFD simulations</li><li>• Report findings</li></ul>		
<b># of Team Members</b>	1 student		
<b>This section to be filled by the Commission</b>	The Project Proposal <input type="checkbox"/> is approved. <input type="checkbox"/> should be revised considering the following suggestions:		



The projects are aimed to prepare students to attain the following program educational objectives:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (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
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (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.

Therefore, the final report of the project should contain the followings:

- i. Definition of the design problem and its limitations
- ii. Theoretical information about the topic, standards and patents
- iii. Different design options and selection criteria
- iv. Optimal solution with appropriate selection criteria
- v. Cost accounting, feasibility, compliance with regulations and standards, environmental impacts, and compliance with ethical rules
- vi. Engineering drawing and presentation methods for presenting