



**İZMİR KÂTİP ÇELEBİ UNIVERSITY**  
**FACULTY OF ENGINEERING ARCHITECTURE**  
**MECHANICAL ENGINEERING DEPARTMENT**

**Form No:** FRM-1

**First Pub Date:**  
15/11/2016

**Rev. No/Date:**  
25/01/2017

**DESIGN PROJECT PROPOSAL FORM**

<b>Academic Year</b>	<b>2022-2023</b>	<b>Semester</b>	<del>Fall</del> • Spring <input checked="" type="checkbox"/>
<b>Project Type</b>	<b>Research</b> <ul style="list-style-type: none"><li>• ME 411 Thermal &amp; Fluid Design</li><li>• ME 413 Mechanical Design</li><li>• ME 415 Robotics &amp; Control Design</li></ul>	<b>Application</b> <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> ME 412 Thermal &amp; Fluid Design</li><li>• ME 414 Mechanical Design</li><li>• ME 416 Robotics &amp; Control Design</li></ul>	
<b>Advisor</b>	Asst. Prof. Dr. Umut Ceyhan		
<b>Project Title</b>	Investigation of interfacial flows on liquid infused surfaces		
<b>Purpose and Scope</b>	This project aims to analyze some fundamental fluid flow problems including ternary fluids on rigid surfaces using lattice Boltzmann method. It consists of two main parts: application of the numerical method to integrate flow equations and solution of an initial boundary value problem to understand the effects of liquid infused surfaces with the purpose of controlling the interface motions.		
<b>Work Packages</b>	(a) Literature study on interfacial flows with ternary fluids and lattice-Boltzmann method (b) Development of a solver to integrate the model equations (c) Validation of the solver (d) Analysis of interfacial flow on surfaces		
<b># of Team Members</b>	1-2		
<b>This section will be filled by the Commission</b>	The Project Proposal <input type="checkbox"/> fulfills the regulations of the Department <input type="checkbox"/> should be revised according to the following suggestions:		



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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