ÇANKAYA UNIVERSITY
Engineering
Course Definition Form

This form should be used for either an elective or a compulsory course being proposed and curricula development processes for an undergraduate curriculum at Çankaya University, Faculty of Engineering. Please fill in the form completely and submit the printed copy containing the approval of the Department Chair to the Dean's Office, and mail its electronic copy. Upon the receipt of *both copies*, the printed copy will be forwarded to the Faculty Academic Board for approval. Incomplete forms will be returned to the Department. The approved form is finally sent to the President's office for approval by the Senate.

Part I. Basic Course Information

Department Name	Mechanical Engineering				**Dept. Numeric Code**		15
Course Code	**ME 303**	**Number of Weekly Lecture Hours**	**3**	**Number of Weekly Lab/Tutorial Hours**	**0**	**Number of Credit Hours**	**3**
Course Web Site	http://me303.cankaya.edu.tr/course.php?page=index				**ECTS Credit**		4.00

Course Name *This information will appear in the printed catalogs and on the web online catalog.*	
English Name	Fluid Mechanics I
Turkish Name	Akışkanlar Mekaniği I

Course Description
Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog. Maximum 60 words.

Introduction to fundamental concepts and fluid properties, description and classification of fluid motion, fluid statics, buoyancy and stability, concepts of system and control volume, derivation and application of basic equations in integral form for a control volume, laminar and turbulent flows in pipes and ducts, major and minor losses.

Prerequisites (if any) *Give course codes and check all that are applicable.*	1st	2nd	3rd	4th
	☐ Consent of the Instructor	☐ Senior Standing	☐ Give others, if any.	
Co-requisites (if any)	1st	2nd	3rd	4th
Course Type *Check all that are applicable*	☒ Must course for dept.	☐ Must course for other dept.(s)	☐ Elective course for dept.	☐ Elective course for other dept.(s)

Course Classification
Give the appropriate percentages for each category.

Category	Mathematics & Natural Sciences	Engineering Sciences	Engineering Design	General Education	
Percentage	20.00	60.00	20.00	0.00	

Part II. Detailed Course Information

Course Objectives
Explain the aims of the course. Maximum 100 words.

To introduce basic properties and importance of fluids in engineering applications. To teach and apply basic methods employed for analysis of engineering problems involving fluids.

Learning Outcomes
Explain the learning outcomes of the course. Maximum 10 items.

1. Students will be able to derive and use the equation of fluid statics.
2. Students will be able to use the fundamental laws and basic principles to derive the fundamental equations in integral form.
3. Students will be able to use integral equations for flow analysis.
4. Students will be able to analyze the flows in pipe systems.

Textbook(s)
List the textbook(s), if any, and other related main course materials.

Author(s)	Title	Publisher	Publication Year	ISBN
Robert W. Fox, Alan T. McDonald, Philip J. Pritchard and John W. Mitchell, Fluid Mechanics, John Wiley & Sons, Inc., Nineth Edition, 2016, 978-1-118-96127-8.				

Reference Books
List the reference books as supplementary materials, if any.

Author(s)	Title	Publisher	Publication Year	ISBN
Donald F. Young, Bruce R. Munson, Theodore H. Okiishi and Wade W. Huebsch, A Brief Introduction to Fluid Mechanics, John Wiley & Sons, Inc., 5th Edition, 2011, 978-0470-59679-1 Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, Mechanics of Fluids, Prentice Hall, 5th Edition, 2017, 978-1-305-63761-0 Yunus A. Çengel and John M. Cimballa, Fluid Mechanics Fundamentals and Applications, McGraw Hill, 2006, 0-07-111566-8				

Teaching Policy
Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)

3 hours of lecture per week. Homeworks and exams are given.

Laboratory/Studio Work
Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work, and list the names of the laboratories/studios in which these sessions will be conducted.

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Computer Usage
Briefly describe the computer usage and the hardware/software requirements in the course.

Students are encouraged to prepare their homeworks using computer, and Matlab, Maple, or Mathematica

Course Outline
List the topics covered within each week.

Week	Topic(s)

1. Introduction: Definition of fluid, fluid mechanics in engineering, scope of fluid mechanics, methods of analysis, dimensions and units.
2. Fundamental Concepts: Definition of continuum, fluid as a continuum, velocity field, timeline, pathline, streakline and streamline. Stress field.
3. Fundamental Concepts: Viscosity, Newtonian and non-Newtonian fluids, vapor pressure and surface tension, description and classification of fluid motion.
4. Fluid Statics: The basic equation of fluid statics, analysis of hydrostatic force on plane submerged surfaces.
5. Fluid Statics: Analysis of hydrostatic force on curved submerged surfaces. Buoyancy and stability.
6. Fluid Statics: Analysis of fluids in rigid-body motion.
7. Basic Equations for a System: Conservation of mass, momentum, moment of momentum and energy equations.
8. Basic Equations in Integral Form: Derivation of Reynolds transport equation. Derivation of conservation of mass and momentum equations for a control volume
9. Basic Equations in Integral Form: Application of conservation of mass and momentum equations for a control volume.
10. Basic Equations in Integral Form: Derivation and application of moment of momentum and conservation of energy equations for a control volume.
11. Analysis of Internal Incompressible Flow: Derivation of extended Bernoulli equation. Calculation of major and minor head losses and usage of tables and graphs.
12. Analysis of Internal Incompressible Flow: Flow analysis in serial system of pipes,
13. Analysis of Internal Incompressible Flow: Flow analysis in parallel system of pipes.
14. Analysis of Internal Incompressible Flow: Analysis of pipe networks, analysis of interconnected reservoir systems.

Grading Policy
List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.

Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Midterm Exam	2	45	Quiz	4	10	Attendance	1	5
Final Exam	1	40						

ECTS Workload
List all the activities considered under the ECTS.

Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (*weekly basis*)	14	3.00	42.00
Attending Labs/Recitations (*weekly basis*)			
Preparation beforehand and finalizing of notes (*weekly basis*)	14	0.50	7.00
Collection and selection of relevant material (*once*)	1	1.00	1.00
Self study of relevant material (*weekly basis*)	14	1.00	14.00
Homework assignments			
Preparation for Quizzes	5	1.00	5.00
Preparation for Midterm Exams (*including the duration of the exams*)	5	8.00	40.00
Preparation of Term Paper/Case Study Report (*including oral presentation*)			
Preparation of Term Project/Field Study Report (*including oral presentation*)			
Preparation for Final Exam (*including the duration of the exam*)	1	8.00	8.00
		TOTAL WORKLOAD / 25	117.00/25
		ECTS Credit	**5**

Total Workloads are calculated automatically by formulas. To update all the formulas in the document first press CTRL+A and then press F9.

Program Qualifications vs. Learning Outcomes
Consider the below program qualifications determined in terms of learning outcomes of all the courses in the curriculum and capabilities. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right..

No	Program Qualifications	Contribution				
		0	**1**	**2**	**3**	**4**
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to engineering; ability to use theoretical and applied information in these areas to model and solve complex engineering problems.					4
2	Ability to identify and define complex engineering problems; ability to select and apply proper analysis tools and modeling techniques for formulating and solving such problems.				**3**	
3	Ability to design a complex system, a process or product under realistic constraints and conditions in such a way as to meet the desired requirements; ability to apply modern design methods for this purpose.	**0**				
4	Ability to devise, select and use modern techniques to analyze and solve complex problems for engineering practice; ability to use information technologies effectively.	**0**				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	**0**				
6	Ability to work efficiently in intra-disciplinary and multidisciplinary teams by collaborating effectively; ability to work individually.		**1**			
7	Ability to communicate effectively in Turkish and in English both orally and in writing; knowledge of at least one foreign language; ability to write report, to read report, to prepare design and production reports, to give presentation, to give instruction and receive instruction, effectively.	**0**				
8	Awareness of life-long learning; ability to access information, to follow developments in science and technology, and to keep continuous self-improvement.	**0**				
9	Awareness of professional and ethical responsibility; knowledge in standarts used in engineering applications.	**0**				
10	Knowledge in project management, risk management and change management; awareness of entrepreneurship and innovation; knowledge in sustainable development.	**0**				
11	Knowledge in global and social effects of engineering practices on health, environment, safety and contemporary issues; awareness of the legal consequences of engineering solutions.	**0**				

Contribution Scale to a Qualification: **0**-None, **1**-Little, **2**-Medium, **3**-Considerable, **4**-Largest

Part III New Course Proposal Information
State only if it is a new course

Is the new course **replacing** a former course in the curriculum**?**	Yes ☐	No ☐	Former Course's Code	Former Course's Name
Is there any similar course which has content **overlap** with other courses offered by the university**?**	Yes ☐	No ☐	Most Similar Course's Code	Most Similar Course's Name
Frequency of Offerings *Check all semesters that the course is planned to be offered.*	☒ Fall	☐ Spring	☐ Summer	

First Offering	Academic Year 2019			Semester ☒ Fall	☐ Spring
Maximum **Class Size** Proposed	30	Student **Quota** for Other Departments		Approximate **Number of Students** Expected to Take the Course	70

Justification for the proposal
Maximum 80 words

Learning outcomes were revised

Part IV Approval

	Faculty Member *Give the Academic Title first.*	Signature	Date
Proposed by	Prof. Dr. Haşmet TÜRKOĞLU		22/04/2022

Departmental Board Meeting Date		Meeting Number		Decision Number	
Department Chair	Prof. Dr. Haşmet TÜRKOĞLU	Signature		Date	

Faculty Academic Board Meeting Date		Meeting Number		Decision Number	
Dean	Prof. Dr. Sıtkı Kemal İDER	Signature		Date	

Senate Meeting Date		Meeting Number		Decision Number	

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