



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 212	Number of Weekly Lecture Hours	3	Number of Weekly Lab/Tutorial Hours	0	Number of Credit Hours	3
Course Web Site	me212.cankaya.edu.tr			ECTS Credit	7.00		

Course Name <i>This information will appear in the printed catalogs and on the web online catalog.</i>	
English Name	Thermodynamics II
Turkish Name	Termodinamik II

Course Description <i>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.</i>
The course covers the following topics; irreversibility and availability, vapor power and refrigeration cycles, air standard power and refrigeration cycles, thermodynamic relations, ideal gas mixtures, gas and vapor mixtures, chemical reactions, psychometric applications, chemical equilibrium, combustion.

Prerequisites (if any) <i>Give course codes and check all that are applicable.</i>	1 st ME 211	2 nd	3 rd	4 th
	<input type="checkbox"/> Consent of the Instructor	<input type="checkbox"/> Senior Standing	<input type="checkbox"/> Give others, if any.	
Co-requisites (if any)	1 st	2 nd	3 rd	4 th
Course Type <i>Check all that are applicable</i>	<input checked="" type="checkbox"/> Must course for dept. <input type="checkbox"/> Must course for other dept.(s) <input type="checkbox"/> Elective course for dept. <input type="checkbox"/> Elective course for other dept.(s)			

Course Classification <i>Give the appropriate percentages for each category.</i>				
Category	Mathematics and Natural Sciences	Engineering Sciences	Engineering Design	General Education
Percentage	15.00	45.00	30.00	10.00

Part II. Detailed Course Information

Course Objectives

Explain the aims of the course. Maximum 100 words.

To provide a through understanding of the application of classical thermodynamics to practical problems. Applications include refrigeration and air conditioning, power plants, internal combustion engines, gas turbine engines, reactive systems. To provide an introductory treatment of thermodynamics for an expanded range of materials including gas mixtures and reacting systems.

Learning Outcomes

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

1. Students will be able to apply the concepts of availability (exergy) to various engineering systems.
2. Students will be able to analyze cycles.
3. Students will be able to analyze mixtures and psychrometric processes.
4. Students will be able to analyze combustion processes.

Textbook(s)

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

Author(s)	Title	Publisher	Publication Year	ISBN
Principles of Engineering Thermodynamics, 9th Ed., SI Version Moran, Shapiro, Boettner and Bailey, John Wiley and Sons Inc., 2017				

Reference Books

List the reference books as supplementary materials, if any.

Author(s)	Title	Publisher	Publication Year	ISBN
Engineering Thermodynamics, 2nd, P.Chattopadhyay, Oxford University Press, 2016				

Teaching Policy

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

The format of the class consists of lectures, in-class exercises, homework assignments, reading assignments, Students should become familiar with Matlab or Maple programming language. Study assignments weekly are expected to reinforce and expand understanding of the material covered in class.

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.

No

Computer Usage

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

Students are encouraged to use Matlab or Maple programming language for solution of some problems

Course Outline

List the topics covered within each week.

Wee k	Topic(s)
	1. Gas power cycles; Otto, Diesel, Stirling, Ericsson, Brayton 2. Gas power cycles; Otto, Diesel, Stirling, Ericsson, Brayton 3. Vapor Cycles; Rankine Cycle, Reheat and Regenerative Cycles, Combined Power Cycles 4. Vapor Cycles; Rankine Cycle, Reheat and Regenerative Cycles, Combined Power Cycles 5. Refrigerators and heat pumps 6. Thermodynamic property relations; real gases 7. Thermodynamic property relations; real gases 8. Properties of gas mixtures 9. Properties of gas mixtures; air-conditioning processes 10. Chemical reactions 11. Chemical reactions 12. Chemical equilibrium; equilibrium reactions 13. Chemical equilibrium; equilibrium reactions 14. Chemical equilibrium; equilibrium reactions

Grading Policy <i>List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.</i>								
Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Quizzes	6	20	Midterm Exam	2	35	Attendance	14	5
Final Exam	1	40						

ECTS Workload <i>List all the activities considered under the ECTS.</i>			
Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (<i>weekly basis</i>)	14	3.00	42.00
Attending Labs/Recitations (<i>weekly basis</i>)			
Preparation beforehand and finalizing of notes (<i>weekly basis</i>)	14	1.00	14.00
Collection and selection of relevant material (<i>once</i>)	1	2.00	2.00
Self study of relevant material (<i>weekly basis</i>)	14	1.00	14.00
Homework assignments	7	5.00	35.00
Preparation for Quizzes	6	6.00	31.00
Preparation for Midterm Exams (<i>including the duration of the exams</i>)	2	9.00	18.00
Preparation of Term Paper/Case Study Report (<i>including oral presentation</i>)			
Preparation of Term Project/Field Study Report (<i>including oral presentation</i>)			
Preparation for Final Exam (<i>including the duration of the exam</i>)	1	10.00	10.00
TOTAL WORKLOAD / 25			171.00/25
ECTS Credit			7

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						
<i>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..</i>						
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.		1			
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.		1			

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 <input type="checkbox"/>	No <input type="checkbox"/>	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 <input type="checkbox"/>	No <input type="checkbox"/>	Most Similar Course's Code	Most Similar Course's Name
Frequency of Offerings <i>Check all semesters that the course is planned to be offered.</i>	<input type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer			
First Offering	Academic Year 2019	Semester <input type="checkbox"/> Fall <input type="checkbox"/> Spring		
Maximum Class Size Proposed		Student Quota for Other Departments		Approximate Number of Students Expected to Take the Course
Justification for the proposal <i>Maximum 80 words</i>				

Part IV Approval

Proposed by	Faculty Member <i>Give the Academic Title first.</i>	Signature	Date
	Dr. Öğr. Üyesi Ekin ÖZGİRGIN YAPICI		27/04/2022

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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