

1. Course Description

COURSE DESCRIPTION FORM													
Course Code and Title	CHE273 ENGINEERING THERMODYNAMICS												
Course Semester	3												
Catalog Description (Content) of the Course	Thermodynamic equilibrium, temperature and reversibility concepts. Work and heat. First law of thermodynamics for closed and open systems. Ideal and real gases, equations of state. Thermodynamic properties of pure substances. Second law of thermodynamics. Entropy. Third law of thermodynamics. Compressors. Power cycles. Cooling and low temperature processes.												
Main Textbook	Smith, J. M., Van Ness, H. C., Abbot, M. M., "Introduction to Chemical Engineering Thermodynamics" 6th Ed. Mc Graw Hill, 2001.												
Supporting Textbooks	Sandler, S.I., "Chemical, Biochemical and Engineering Thermodynamics" 4rd Ed., Wiley, 2006 Tosun, İ., "Thermodynamics- Principles and Applications", World Scientific Publishing Com., Singapore, 2015. Yalçın, H., Gürü, M. "Mühendislik Termodinamiği-Genişletilmiş 2.Baskı", Palme Yayıncılık, ISBN: 975-8624-88-1, Ankara, 2004. Yalçın, H. ve M. Gürü, "Mühendislik Termodinamiği Problemleri", Palme Yayıncılık, ISBN: 975-8624-89-4, Ankara, 2004.												
Course Credit (ECTS)	5												
Prerequisites of the Course (Compulsory attendance should be indicated here.)	There is no prerequisite for this course. The minimum attendance requirement is 70%.												
Type of the Course	Compulsory												
Instruction Language of the Course	English												
Object and Target of the Course	<ul style="list-style-type: none"> Thermodynamic analysis of processes in engineering field and giving necessary information about processes design. Application of thermodynamic rules on systems. To gain an ability about solving encountered thermodynamic problem with modern equipments and technics. The ability of self perpetuation via following scientific and technical developments and gaining information about current problems. 												
Learning Outcomes of the Course	To gain an ability on application of the thermodynamic laws to engineering practice and solutions of the problems that can be encountered in engineer.												
Mode of Delivery	The mode of delivery of this course is Face to face												
Weekly Schedule of the Course	<table> <tr> <td>1. Week</td><td>Content of thermodynamics. Basic concepts and definitions. Temperature, pressure, thermodynamic equilibrium. Work and heat.</td></tr> <tr> <td>2. Week</td><td>Content of thermodynamics. Basic concepts and definitions. Temperature, pressure, thermodynamic equilibrium. Work and heat.</td></tr> <tr> <td>3. Week</td><td>First Law of thermodynamics. Application of first law of thermodynamics to open and closed systems</td></tr> <tr> <td>4. Week</td><td>First Law of thermodynamics. Application of first law of thermodynamics to open and closed systems</td></tr> <tr> <td>5. Week</td><td>Volumetric properties, ideal gases and ideal gas operations. Real gases and equations of state.</td></tr> <tr> <td>6. Week</td><td>Volumetric properties, ideal gases and ideal gas operations. Real gases and equations of state.</td></tr> </table>	1. Week	Content of thermodynamics. Basic concepts and definitions. Temperature, pressure, thermodynamic equilibrium. Work and heat.	2. Week	Content of thermodynamics. Basic concepts and definitions. Temperature, pressure, thermodynamic equilibrium. Work and heat.	3. Week	First Law of thermodynamics. Application of first law of thermodynamics to open and closed systems	4. Week	First Law of thermodynamics. Application of first law of thermodynamics to open and closed systems	5. Week	Volumetric properties, ideal gases and ideal gas operations. Real gases and equations of state.	6. Week	Volumetric properties, ideal gases and ideal gas operations. Real gases and equations of state.
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	<div>7. Week</div> <div>Thermodynamic properties of pure substances. Use of thermodynamic diagrams and tables.</div> <div>8. Week</div> <div>Second law of thermodynamics. Entropy and thermodynamic analysis.</div> <div>9. Week</div> <div>Second law of thermodynamics. Entropy and thermodynamic analysis.</div> <div>10. Week</div> <div>Compressors</div> <div>11. Week</div> <div>Carnot and Rankine cycles</div> <div>12. Week</div> <div>Gas and air cycles</div> <div>13. Week</div> <div>Cooling Rules.</div> <div>14. Week</div> <div>Refrigeration and ILow Temperature processes</div>																																												
<div>Educative Activities</div> <div>(Credit will be determined based on the time given for these activities. Should be filled carefully.)</div>	<div>Theoretical Study Hours of Course Per Week</div> <div>Reading</div> <div>Searching in Internet and Library</div> <div>Preparing Reports</div> <div>Mid-Term and Studying for Mid-Term</div> <div>Final and Studying for Final</div>																																												
<div>Assessment Criteria</div>	<table><tr><td></td><td>Quantity</td><td>Total Contribution (%)</td></tr><tr><td>Midterm</td><td>2</td><td>40</td></tr><tr><td>Homework</td><td>2</td><td>10</td></tr><tr><td>Assignment</td><td>0</td><td>0</td></tr><tr><td>Projects</td><td>0</td><td>0</td></tr><tr><td>Practice</td><td>0</td><td>0</td></tr><tr><td>Quiz</td><td>2</td><td>10</td></tr><tr><td>Contribution of In-term Studies to Overall Grade</td><td></td><td>60</td></tr><tr><td>Contribution of Final Examination to Overall Grade</td><td></td><td>40</td></tr><tr><td>Attendance</td><td></td><td></td></tr></table>		Quantity	Total Contribution (%)	Midterm	2	40	Homework	2	10	Assignment	0	0	Projects	0	0	Practice	0	0	Quiz	2	10	Contribution of In-term Studies to Overall Grade		60	Contribution of Final Examination to Overall Grade		40	Attendance																
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	Other		0	0	0		
	Total work load				125		
	Total work load/25				5		
	ECTS of the course				5		
Course's Contribution To Program	No	Program Learning Outcomes	1	2	3	4	5
	1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.				X	
	2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.			X		
	3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	X				
	4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.		X			
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	X				
	6	Ability to work efficiently in intra-disciplinary teams.	X				
	7	Ability to work efficiently in multi-disciplinary teams;	X				
	8	Ability to work individually.		X			
	9	Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations,		X			
	10	prepare design and production reports, give and receive clear and intelligible instructions.	X				
	11	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.			X		
	12	Awareness of professional and ethical responsibility.	X				
	13	Information about business life practices such as project management, risk management, and change management.	X				
	14	Information about awareness of entrepreneurship, innovation, and sustainable development.	X				
	15	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.		X			
	16	Knowledge about awareness of the legal consequences of engineering solutions.	X				
	17	Knowledge on standards used in engineering practice.	X				

Name of Lecturer(s) and Contact Information	Prof. Dr. Ö. Murat Doğan (mdogan@gazi.edu.tr) Prof. Dr. Metin Gürü (mguru@gazi.edu.tr) Prof. Dr. Meltem Doğan (meltem@gazi.edu.tr) Assoc. Prof. Dr. S. Ferda Mutlu (sfmutlu@gmail.com)
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