Course Description Form	
Course Code and Name	**ETM230 PERSPECTIVE**
Course Semester	4
Catalog Content	Aksonometric, isometric, dimetric, and trimetric perspective types and application skills Various types of inclined, cavalier, cabinet, and bird's-eye perspectives and application skills Different types of conic perspective and application skills Ability to create shadows in perspective
Textbook	1. Çetinkaya, S., Teknik Perspektif, Ankara, 1995. 2. Çaylak, A., Bilgi ve Uygulama Yaprakları-I, Ankara, 2005.
Supplementary Textbooks	1. Ali Pancarcı - M.Emin Öcal Yapı Teknik Resmi 2. Harbi Hotan - Mimari Perspektif ve Gölge, YEM Yayın, İstanbul, 3.Baskı , 1999 3. Esen Onat - Perspektif ve Perspektifde Gölge Çizimi 4. Francis D.K.Ching - Mimarlık ve SanattaYaratıcı Bir Süreç Çizim, Çev.: Çelen Birkan, YEM Yayın 5. Francis D.K. Ching with Steven P. Juroszek - Desing Drawing, John Wiley&Sons, Inc. New York, 1998 6. Jose M. Parramon - Çizim ve Resim Sanatı, Remzi Kitabevi , İstanbul, 2.Baskı , 1995
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning to make drawings more realistic and dimensional Learning to draw objects correctly from different angles Developing creative thinking skills by experimenting with different perspectives Learning different perspective techniques to determine when to use which technique Learning to convey ideas and designs more effectively by understanding the visual impact of perspective
Course Learning Outcomes	1. Drawing skills are enhanced, gaining the ability to make drawings more realistic and dimensional. 2. Drawing abilities in perspective are developed, improving the skill to draw objects accurately from different angles. 3. Experimenting with drawing in various perspectives fosters creative thinking skills. 4. Acquiring analytical thinking skills, learning different perspective techniques, and determining when to use each technique.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction (Introduction and Importance of Perspective Drawing)
2. Week	Axonometric perspective and its types
3. Week	Isometric perspective and its applications
4. Week	Dimetric perspective and its applications
5. Week	Trimetric perspective and its applications
6. Week	Oblique perspective and its types
7. Week	Cavalier perspective and its applications
8. Week	Cabinet perspective and its applications
9. Week	Bird's-eye view perspective and its applications
10. Week	Conic perspective and its types
11. Week	One-point conic perspective and its applications
12. Week	Two-point conic perspective and its applications
13. Week	Three-point conic perspective and its applications
14. Week	Shadow in perspective

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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		**x**			
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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	**x**				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				**x**	
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.	**x**				

	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.			**x**		
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.	**x**				
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to			**x**		
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations	Prof. Dr. İsmail Şahin isahin@gazi.edu.tr						

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**2**		**1**	**4**	**1**	**1**	**3**		**1**	**3**	
Learning outcome 1	**1**			**1**			**1**			**1**	
Learning outcome 2	**1**			**1**			**1**			**1**	
Learning outcome 3			**1**	**1**			**1**			**1**	
Learning outcome 4				**1**	**1**	**1**			**1**		

Course Description Form	
Course Code and Name	**ETM232 ENGINEERING MATERIALS**
Course Semester	4
Catalog Content	Classification of engineering materials Steel, cast iron types and uses. Heat treatments of metals and alloys. Non-ferrous metals and their use. Types, properties and manufacturing methods of ceramics, polymers and composite materials. Material selection in engineering design.
Textbook	1. Wadhwa, A. S., Dhaliwal, E. H.S. (2008). *A textbook of engineering material and metallurgy*. India: Firewall Media. 2. Rajput, R. K. (2008). *Engineering material*. New Delhi: S. Chand & Company.
Supplementary Textbooks	1. Callister, W. (2018). *Material science and engineering*. USA: Wiley.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Introducing the basic properties of engineering materials and the material properties of atomic size, Teaching the relationships between physical, metallurgical and mechanical properties of materials, Ensuring understanding of the basic principles in material selection. Contributing to the material selection methodology and correct material selection in the design process of an industrial product.
Course Learning Outcomes	1. Students taking this course will be introduced to the physical and mechanical properties of materials, heat treatment, phase diagrams, etc. learns the subjects. 2. Gains information about the general properties of engineering materials. 3. Can create the function-purpose and constraints cycle in product design and determine the general properties of the required material. 4. Knows the material selection methodology and can select materials using the necessary data sources. 5. Can observe the behavior of the selected material according to the product and environment.
Instruction Method	Face to face

Weekly Schedule

1. Week	Materials and Design, Development of Engineering Materials, Indu and Material Selection
2. Week	Engineering Material Family, Metals, Ceramics, Polym Hybrid Materials, Functional Classification of Material
3. Week	Material Design and Selection, Design Principles and Selection Cri components, Product Function Definition and Loading States.
4. Week	Material Properties and Manufacturing Process Effects, Reverse En Selection and Data Sources
5. Week	Properties of metals and alloys
6. Week	Effect of alloying elements on the properties of steels
7. Week	Usage, types and coding of steel and cast iron.
8. Week	Non-ferrous metal and alloys
9. Week	Ceramic materials, production and applications
10. Week	Polymers production and applications
11. Week	Composite materials production and applications
12. Week	Damage to materials. Damage sources and prevention (fracture, fati
13. Week	Damage in materials, their sources and prevention (oxidation, corro adhesion wear)
14. Week	Case studies on material selection in industrial products

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	7	1	7
Studies	14	2	28
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	3	2	6
Final Exam and Preperation for Final Exam	3	2	6
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			**x**		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and					**x**
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			**x**		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.				**x**	
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**			
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and			**x**		
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations	Bölüm Yönetimi tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL		**3**	**5**	**3**	**1**	**4**	**1**	**2**		**3**	**1**
Learning outcome 1		**1**	**1**	**1**	**1**						
Learning outcome 2		**1**	**1**	**1**		**1**				**1**	
Learning outcome 3			**1**	**1**		**1**				**1**	
Learning outcome 4			**1**			**1**	**1**	**1**			
Learning outcome 5		**1**	**1**			**1**		**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM234 SEMIOLOGY AND SEMANTICS IN DESIGN**
Course Semester	4

Catalog Content	Interpretation skills of the symbolic qualities of design objects. Ability to apply the semiotic analysis process to products. Recognition of basic concepts and understanding the meaning of products. Ability to understand the relationship between the mental representations of products and the real world. Understanding the relationship between the representation and use of products. Ability to understand user and culture relationships. Understanding the cultural role of products. Application skills of design behaviors based on semantics. Ability to analyze different design movements.
Textbook	1. Hjelm, S.I., Semiotics in Product Design, Technical Report, Royal Institute of Technology, Stockhom, Sweden, 2002. 2. Krippendorff, K. (2005). The semantic turn: A new foundation for design. crc Press.
Supplementary Textbooks	7. Silverman, K., The subject of Semiotics, New York: Oxford University Press, 1983
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning about signs and semantics in design, and gaining the ability to apply them. Understanding the impact of signs on users and understanding the methodology of semiotics. Gaining the ability to implement design.
Course Learning Outcomes	1. Developing the ability to understand basic concepts in semantics and perform semiotic analysis. 2. Providing the ability to understand and interpret the interaction between mental processes and the real world. 3. Acquiring the ability to understand and evaluate user behaviors along with cultural interactions. 4. Developing a general understanding of the evolutionary processes of design and different design movements.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction and basic concepts
2. Week	Semiotic nature of design objects
3. Week	Semiotic analysis process of industrial products
4. Week	Conceptual prerequisites for product semiotics
5. Week	Mental-real world relationship in product semiotics and representation of product types
6. Week	Concept of product, product appearance
7. Week	Product image content, information related to the product, product meaning
8. Week	Functional and semantic structure of the human-object-society system
9. Week	Specific contents of information, meaning, and expression terms, product meaning profile
10. Week	Semantic structure of product image, company image, user culture group relationship
11. Week	Expressiveness and expression forms in the design process, product context and categorization
12. Week	Readability and conditions of objects, design behaviors based on product semiotics
13. Week	Semantic resolution of form elements, semantic resolution of product appearance
14. Week	Design behaviors, movements, trends, and styles explained semiotically

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	**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		**x**			
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	**x**				

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		**x**			
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.	**x**				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.					
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**2**	**1**	**2**	**1**	**1**				
Learning outcome 1	**1**				**1**						
Learning outcome 2		**1**	**1**								
Learning outcome 3						**1**	**1**				
Learning outcome 4			**1**	**1**	**1**						

Course Description Form	
Course Code and Name	**ETM236 FORM MATERIAL AND FUNCTION**
Course Semester	4
Catalog Content	To be able to have knowledge about basic issues such as material properties, design function and user needs, factors affecting product design and creative design process To be able to comprehend the relationship between material selection and design process To be able to understand various types of materials, forming techniques, joining methods and application examples
Textbook	3. Grillo, P.J. (2010). Form, function and design. New York: Dover Pub. 4. Ashby, M. and Johnson, K. (2010). *Materials and design – The art and science of materail selection in product design*. USA: B-H Pub.
Supplementary Textbooks	1. Elder, W.E. ve Hosnedl, S., Design Engineering: A Manual for Enhanced Creativity, CRC Press, Int. Edition, 2008.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To be able to analyze the relationship between form, function, material selection and production methods in design Creating composition using formal elements of design Developing ideas and manual skills to solve basic design problems To gain the ability to provide balance in material selection and design process
Course Learning Outcomes	1. To be able to produce creative solutions to design problems by examining sample applications in industrial design 2. To gain a different perspective on the problems encountered in the design process 3. Ability to understand the role of innovative materials in the design process and to encourage innovation in design. 4. Ability to develop harmonious designs by balancing form, material and function in the design process. 5. Understanding how materials and design processes affect each other and the ability to produce innovative solutions using this relationship.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** — Design engineering profession and professional ethics **2. Week** — The meaning and importance of design **3. Week** — Historical development of design **4. Week** — The place of design in industry and country development **5. Week** — Problem solving and communication skills **6. Week** — Design methodology and rules **7. Week** — Principles of design **8. Week** — Beginner design process **9. Week** — Analyze simple part designs **10. Week** — Part-level design **11. Week** — Simple part design applications **12. Week** — Analyzing simple system designs **13. Week** — System-level design **14. Week** — Simple system design applications

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 6 Internet browsing, library work: 4 Designing and implementing materials: 4 Report preparing: 3 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	6	12
Studies	2	4	8
Material Design and Implementation	3	4	12
Report Preparing	2	3	6
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	3	6
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.			x				
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x					
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x				

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**4**	**5**	**3**		**3**	**1**			**2**	**3**
Learning outcome 1	**1**	**1**	**1**	**1**							**1**
Learning outcome 2	**1**	**1**	**1**			**1**				**1**	**1**
Learning outcome 3		**1**	**1**								
Learning outcome 4		**1**	**1**	**1**		**1**					
Learning outcome 5			**1**	**1**		**1**	**1**			**1**	**1**

Course Description Form

Course Code and Name	**ETM238 COMPUTER GRAPHICS**
Course Semester	4
Catalog Content	Application areas of computer graphics include line and curve drawing, polygon drawing, polygon painting, transformations (translation, rotation, scaling, reflection, shifting), 2-D view, line clipping, polygon cropping, 3-D view, parallel and perspective projection, 3D clipping, visible surface detection, lighting, ray tracing, parametric curves and surfaces, animation.
Textbook	1. Fleet, D. and Hertzman, A., Computer Graphics Lecture Notes, Computer Science Dept., University of Toronto, Canada, 2006. 2. Shirley, P. and Marschner, S., Fundementals of Computer Graphics, Taylor & Francis Group, Int. Ed., 2010.
Supplementary Textbooks	Journal of Computer Graphics Techniques Computer & Graphics - Journal
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach introductory level the theory and application of computer graphics To gain application skills To be able to design various graphic design applications and finalize them in a computer environment ready for printing
Course Learning Outcomes	1. Knowledge of computer graphics (drawing, transformations, view, lighting, rendering). 2. Ability to design computer graphics software under realistic constraints and conditions, using theoretical and applied knowledge in these fields. 3. Ability to find, select and use modern tools and techniques necessary to design and implement computer graphics environments. 4. Gaining application skills on the practical aspects of the subjects. 5. Ability to work effectively individually and in interdisciplinary teams.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to charting
2. Week	Curves
3. Week	Conversions
4. Week	Coordinate independent geometry
5. Week	3D objects
6. Week	Camera models
7. Week	Basic lighting and reflection
8. Week	Shading
9. Week	Texture overlay
10. Week	Basic ray tracing, ray metering and projection
11. Week	Diffused ray tracing, interpolation
12. Week	Parametric curves and surfaces
13. Week	Animation
14. Week	Animation

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	9	1	9
Material Design and Implementation	10	2	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	2	10
Final Exam and Preperation for Final Exam	4	2	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		**x**			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and			**x**		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			**x**		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).			**x**		
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		**x**			
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		**x**			
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**2**	**1**	**3**	**3**		**1**	**1**	**3**		**2**	**2**
Learning outcome 1	**1**		**1**	**1**			**1**				
Learning outcome 2	**1**	**1**	**1**	**1**				**1**			
Learning outcome 3			**1**	**1**		**1**					
Learning outcome 4								**1**	**1**	**1**	**1**
Learning outcome 5								**1**	**1**	**1**	**1**

Course Description Form	
Course Code and Name	**ETM240 DESIGN CULTURE**
Course Semester	4

Catalog Content	Ability to comprehend the visual language and differences of art and design and aesthetic sensitivity and reflect them on their designs Ability to focus on the cultural relationship between design and consumption Ability to understand and convey the cultural context of design Ability to evaluate consumption products as part of the culture created in society
Textbook	1. Barnard, M., Sanat, Tasarım ve Görsel Kültür, 2002, Ütopya Yayınları
Supplementary Textbooks	1. Julier, G., The Culture of Design, SAGE Publications, 2013.
Credit	**3 AKTS**
Prerequisites of the Course (*Attendance Requirements***)**	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the cultural context of design from past to present To have knowledge about the development of cultural elements To learn the ability to comprehend the visual language and differences of art and design and aesthetic sensitivity and to reflect them on their designs To learn the steps in the development process of culture and design
Course Learning Outcomes	1. Have knowledge about the basic concepts, elements and principles of visual communication design and communication 2. To have knowledge about the visual language and differences of art and design and aesthetic sensitivity and reflection on design. 3. Steps in the development process of culture and design, analysis of production and technical processes are learned. 4. Comprehension of national and universal values; understanding of design from national to universal is learned. 5. To be able to adapt to new and emerging technologies and to have knowledge about the process of questioning thinking about technological changes.
Instruction Methods	Face to face

Weekly Schedule

1. Week	The concept and theory of culture
2. Week	Cultural content, relations and processes, biological evolution
3. Week	Renaissance and enlightenment philosophy
4. Week	Democratization Movements, French Revolution and its effects
5. Week	Traditions and innovations of the early modern period
6. Week	From image to image in the modern period
7. Week	Participation in modern art and design
8. Week	From equality to pluralism in the modern era
9. Week	Modern period spacecraft aesthetics
10. Week	Postmodern era individualism
11. Week	Postmodern design and technology
12. Week	Economic, social, industrial and technological developments
13. Week	The impact of new modes of production on society, art, design and economic relations
14. Week	The contribution of art and design to urban culture and the cultural cycle

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 3
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 2
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment	1	30
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10

Workload

Studies	5	3	15
Material Design and			
Report Preparing			
Preparing a Presentation	5	2	10
Presentations	3	2	6
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.	**x**				
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.					
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.							
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.							
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).			**x**				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.							
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**						
The Course's Lecturer(s) and Contact Informations		Head of Department tasarim@gazi.edu.tr							

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**1**		**1**				**3**		**1**
Learning outcome 1			**1**						**1**		
Learning outcome 2									**1**		
Learning outcome 3					**1**						
Learning outcome 4									**1**		
Learning outcome 5											**1**

Course Description Form	
Course Code and Name	**ETM242 DESCRIPTIVE GEOMETRY**

Course Semester	4
Catalog Content	Introduction (Introduction and Importance of Descriptive Geometry) Traces - Traces of Lines, Traces of Planes Piercing Points Sections of Planes Parallelism and Perpendicularity Transformations - Reflection, Rotation, Translation Tangents Vector Operations Shading and Shadowing General Applications
Textbook	1. Bayvas, Ş., Dericioğlu, N. ve Özgönül, O., Tasarı Geometri Temel Metot ve Uygulamalar I-II, Ankara, 1969. 2. Hawk, M. C., Schaum's Outline of Theory And Problems Of Descriptive Geometry, 1962 by McGraw-Hill, Inc.
Supplementary Textbooks	1. Smith, J. K. (2020). Mühendislik Çizim ve Tasarımı. Örnek Yayıncılık.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the fundamental concepts of descriptive geometry and how these concepts are applied to geometric modeling. Providing information about projection and explaining projection methods. Drawing developments of three-dimensional geometric shapes such as prisms, pyramids, cylinders, cones, spheres, and creating their sectional views. Generating cross-sectional views of objects formed by cutting them with a plane. Applying the concepts learned in descriptive geometry to examples.
Course Learning Outcomes	1. They will be able to use basic design geometry concepts to model complex systems. 2. They will be able to use projection techniques to analyze and model objects from different perspectives. 3. They will be able to integrate three-dimensional geometric shapes into engineering designs to develop suitable solutions for real-world problems. 4. They will be able to optimize their designs by examining the internal structures of objects. 5. They will be able to plan their projects by applying design geometry principles, considering environmental, economic, and social impacts.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction (Introduction and importance of descriptive Geometry)
2. Week	Traces
3. Week	Traces of lines
4. Week	Traces of planes
5. Week	Piercing points
6. Week	Sections of planes
7. Week	Parallelism and perpendicularity
8. Week	Transformations - Reflection, Rotation
9. Week	Transformations - Translation
10. Week	Tangents
11. Week	Vector operations
12. Week	Inclined projection
13. Week	Shading and shadowing
14. Week	General applications

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 2
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 1

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	2	10
Material Design and Implementation	14	2	28
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	3	2	6
Final Exam and Preperation for Final Exam	3	1	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				**x**	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and			**x**		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**4**	**1**	**3**	**2**	**1**	**1**	**1**				**1**
Learning outcome 1			**1**	**1**			**1**				**1**
Learning outcome 2	**1**	**1**	**1**								
Learning outcome 3	**1**			**1**							
Learning outcome 4	**1**		**1**								
Learning outcome 5	**1**				**1**	**1**					

COURSE DESCRIPTION FORM	
Course Code and Name	**ETM244 DESIGN METHODOLOGIES**
Course Semester	4

Catalog Content	Problem solving skills Creativity and innovation skills Design methodology and usage skills Design thinking skills Skills in the use of biomimicry and biomimetic concepts TRIZ method and application skills Skills in the use of contradiction matrix and 40 principles
Textbook	1. Birkhofer, H., The Future of Design Methodology, Springer, 2021. 2. Karen Gatt, TRIZ for Engineers: Enabling Inventive Problem Solving, Wiley, 2011 3. Yoram Reich Biomimetic Design Method for Innovation and Sustainability, Springer International Publishing, e-Book
Supplementary Textbooks	1. Blessing, L.T.M and Chakrabarti, A., DRM, a Design Research Methodology, Springer, 2009.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Problem solving concept learning Understanding and learning traditional and innovative problem-solving methodologies Learning the concept of design inspired by nature and understanding application examples Learning the theory of innovative and creative problem solving (TRIZ) and understanding application examples
Course Learning Outcomes	1. Learning the advantages and disadvantages of design methodologies. 2. Learning the ability to systematically follow the design process. 3. Learning to understand engineering design stages and determine appropriate methods to optimize design. 4. Learning to identify fundamental problems in the design process and utilize various problem-solving techniques.
Instruction Methods	Face to face
Weekly Schedule	

Week	Subjects
1	Problem concept
2	Traditional Problem solving techniques
3	Traditional Problem solving techniques
4	Innovative Problem solving techniques
5	Innovative Problem solving techniques
6	Innovation and creativity
7	TRIZ
8	The contradiction matrix and the 40 principles
9	Contradiction matrix and application examples in 40 principle design problems
10	General principles of Bio-inspired Design
11	General principles of Bio-inspired Design
12	Use of biomimicry in design and application examples in design problems
13	Design thinking
14	Design thinking application examples

Teaching and Learning Methods

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 4
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	4	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for	1	4	4
Final Exam and Preperation for Final	2	4	8
Other (should be emphasized)	-	-	-
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		x			

	3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.			x			
	4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x			
	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x				
	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions						
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.						
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		x				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.						
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x				
The Course's Lecturer(s) and Contact Informations		Head of Department tasarim@gazi.edu.tr						

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program çıktısı 8	Program Outcome 9	Program Outcome10	Program Outcome11
TOTAL	**1**	**2**	**3**	**3**	**2**			**1**	**2**		**2**
Learning outcome 1			**1**								**1**
Learning outcome 2		**1**	**1**	**1**					**1**		
Learning outcome 3		**1**	**1**	**1**	**1**				**1**		**1**
Learning outcome 4				**1**	**1**			**1**			

Course Description Form	
Course Code and Name	ETM246 MATERIAL SELECTION IN DESIGN
Course Semester	4
Catalog Content	- The importance of material selection in design AND the basics of material selection are explained - Learning material selection and material selection diagrams in terms of mechanical and physical properties - Selection of materials (metals, polymers, ceramics, composites) in terms of application - Understanding the relationship between material selection and process
Textbook	1. Materials Selection in Mechanical Design, 3E, M.F. ASHBY, Elsevier Butterworth-Heinemann, 2005. 2. Malzeme Seçimi ve Uygulamaları, F. Fındık, Seçkin Yayıncılık, 2018
Supplementary Textbooks	1. Selection and Use of Engineering Materials, Butterworth J.A. Charles, Crane, FAA Heinemann, 1992.
Credit	3
Prerequisites of the Course	There is no prerequisite for the course.
Type of the Course	Selective
Instruction Language	Turkish
Course Objectives	To ensure that they acquire basic knowledge about material selection and design and apply this knowledge to possible situations.

Course Learning Outcomes

1. Can classify materials and knows their advantages and disadvantages.
2. Understands the material selection characteristics in terms of mechanical and physical properties.
3. Knows and applies material selection criteria.
4. It establishes criteria for special applications.
5. Selects suitable materials for design applications, taking into account working conditions.

Instruction Methods

Face to face

Weekly Schedule

1. Week	The importance of material in design
2. Week	The importance of basic factors in material selection and classification of engineering materials
3. Week	Types of metallic materials, chemical and physical properties
4. Week	Mechanical properties of metallic materials
5. Week	Application areas of metallic materials
6. Week	Ceramic material types, properties and application areas
7. Week	Polymer material types, properties and application areas
8. Week	Composite material types, properties and application areas
9. Week	Engineering material types, properties and application areas
10. Week	Material selection based on material properties
11. Week	Ashby diagrams
12. Week	Sample material selection applications
13. Week	Sample material selection applications
14. Week	Assignment presentations

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 1
Designing and implementing materials:
Report preparing: 2
Preparing a Presentation:
Presentations:
Preparation of Midterm and Midterm Exam: 8
Final Exam and Preparation for Final Exam: 14

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		

	Quiz			
	Percent of In-term Studies (%)		**60**	
	Percentage of Final Exam to Total Score (%)		**40**	
	Attendance			

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	10	1	10
Studies	5	1	5
Material Design and Implementation			
Report Preparing	5	2	10
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	1	8	8
Final Exam and Preparation for Final Exam	1	14	14
Other (should be emphasized)			
Total Workload			
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		x			
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.			x		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their	x				

			limitations.							
		5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x					
		6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
		7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.							
		8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		x					
		9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
		10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.							
		11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x				
The Course's Lecturer(s) and Contact Informations										

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL	4	2	3	1	2			2			3
Learning outcome 1	1	1	1								
Learning outcome 2			1		1						1
Learning outcome	1		1					1			

3											
Learning outcome 4	1				1			1			1
Learning outcome 5	1	1		1							1

Course Description Form	
Course Code and Name	**ETM330 USER CENTERED DESIGN**
Course Semester	6
Catalog Content	User-centered design skills Ability to apply scenario-based design approach Understanding and ability to apply human-centered design principles Acquiring knowledge and skills in user experience design Ability to apply iterative user-centered design methodology Ability to identify user requirements and usage scenarios Capability to generate and visualize design ideas based on user needs Ability to analyze user feedback and reshape the design Concept creation and prototyping skills Ability to evaluate created concepts and prototypes
Textbook	1. ChadiaAbras, Diane Maloney-Krichmar, Jenny Preece. (2004). UserCentered Design, InBainbridge, W. Encyclopedia of HumanComputerInteraction. ThousandOaks: Sage Publications. 2. NORMAN, D. A. 1986, Cognitiveengineering. In D. A. Norman and S. W. Draper (eds) User CenteredSystems Design (Hillsdale, NJ: Lawrence ErlbaumAssociatesInc.) 3. Goodman, E., Kuniavsky, M., &Moed, A. (2012). Observingtheuserexperience: A practitioner'sguidetouserresearch. San Francisco, CA: Morgan Kaufman
Supplementary Textbooks	1. Jesse J.G. (2011). TheElements of User Experience: User-Centered Design forthe Web and Beyond, Second Edition, USA.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning the concept of user-centered design. Gaining experience and knowledge in user experience design. Learning research skills to develop usability and user experience concepts. Acquiring the ability to conduct research involving the user perspective.
Course Learning Outcomes	1. Gaining knowledge about user-centered design theory. 2. Learning about the concept of usability and user experience processes. 3. Creating product usage scenarios. 4. Designing a tangible product using the user-centered design method.

Instruction Methods	Face to face
Weekly Schedule	

1. Week	History of user-centered design
2. Week	Scenario-based design
3. Week	Human-centered design
4. Week	User experience, usability, usability principles
5. Week	Usability tests (A/B testing, Survey, Field study, Observation)
6. Week	Usability tests (Interview, Focus Group, Experience Logs, 5-Second Tes
7. Week	Iterative user-centered design
8. Week	Identifying user requirements and usage scenarios
9. Week	Visualizing design ideas
10. Week	Redesign and analysis based on user evaluations
11. Week	Concept and prototype development
12. Week	Concept and prototype development
13. Week	Evaluation of concepts and prototypes
14. Week	Evaluation of concepts and prototypes

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 2 Internet browsing, library work: 2 Designing and implementing materials: 1 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 5 Final Exam and Preparation for Final Exam: 5
Assessment Criteria	

	Numbers	**Total Weighting (%)**
Midterm Exams		
Assignment	2	60
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10
Studies	5	2	10
Material Design and Implementation	7	1	7
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	5	10
Final Exam and Preperation for Final Exam	2	5	10
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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 develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		**x**			

		5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.	**x**				
		6	Ability to work efficiently in intra-disciplinary teams.	**x**				
		7	Ability to work efficiently in multi-disciplinary teams.			**x**		
		8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.		**x**			
		9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.			**x**		
		10	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.					
		11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	**x**				
The Course's Lecturer(s) and Contact Informations			Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	Program Outcome 2	Program Outcome3	Program Outcome4	Program Outcome5	Program Outcome6	Program Outcome7	Program çıktısı 8	Program Outcome9	Program Outcome1 0	Program Outcome11
TOTAL		**1**	**2**	**2**	**1**	**1**	**3**	**2**	**3**		**1**
Learning outcome 1							**1**		**1**		
Learning outcome 2							**1**	**1**	**1**		
Learning outcome 3			**1**	**1**							
Learning outcome 4		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**		**1**

Course DescriptionForm	
Course Code and Name	**ETM331 ERGONOMICS**
Course Semester	5
Catalog Content	Determining the basics of ergonomic design Determining the effects of environmental factors on the user Developing user-centered product design skills Evaluation of ergonomic product designs
Textbook	1. Karwowski, W., Soares, M.M. and Stanton, N.A., Human Factors and Ergonomics in Consumer Product Design: Methods and Techniques, CRC Press, 2011. 2. Babalık, F., Mühendisler İçin Ergonomi - İşbilim, Dora, 3. Bas.,
Supplementary Textbooks	1. Alaettin Sabancı, Sarp Korkut Sümer., Ergonomi, Nobel Akademik Yayıncılık; 3. baskı
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 AttendanceRequirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To have knowledge about the concept and foundations of ergonomics To learn the application of anthropometric properties to design To be able to use ergonomic design elements in the product development process
Course Learning Outcomes	1. Ability to design products taking into account anthropometric data of the target audience 2. Ability to produce creative solutions in engineering problems by taking human-oriented elements into consideration 3. Ability to design complex systems, processes, devices or products under ergonomic conditions 4. Ability to perform research methods such as literature research, data collection, and interpretation of results to examine engineering problems from an ergonomic perspective. 5. Ability to analyze and evaluate designed products and systems from an ergonomic perspective
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction (Ergonomics concept, basics of ergonomics, design examples)
2. Week	Development of ergonomic designs, ergonomic design examples and applications
3. Week	Principles of ergonomic design, ergonomically human and work
4. Week	Environmental factors and their effects on humans
5. Week	Ergonomic workplace organization
6. Week	Human machine contact (interface), sample applications
7. Week	Introducing anthropometric measurement, ergonomic workplace control
8. Week	Load lifting and moment application
9. Week	Designing ergonomic work tools and equipment
10. Week	Ergonomic product design examples
11. Week	Ergonomic product design examples and evaluations
12. Week	Ergonomics compliance check
13. Week	Examples of aesthetic and ergonomic design applications
14. Week	Student project presentation and evaluation

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 3
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	1	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10
Studies	10	2	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation	1	3	3
Presentations	4	2	8
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)	-	-	-
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.		x			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x			

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.							
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.							
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		x					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.							
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr								

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**	**2**				**2**		
Learning outcome 1									**1**		
Learning outcome 2			**1**						**1**		
Learning outcome 3			**1**								
Learning outcome 4				**1**	**1**						
Learning outcome 5					**1**						

Course Description Form	
Course Code and Name	**ETM332 MEDICAL DEVICE DESIGN**
Course Semester	6

Catalog Content	Understanding the basic principles and system components of medical devices To be able to comprehend the medical device design process Gaining multidisciplinary approaches and teamwork skills in medical device design Professional and ethical responsibility Ability to use modern engineering methods in medical device design Gain knowledge and skills in pre-clinical testing to evaluate the safety and efficacy of
Textbook	5. Bronzino, J.D., The Biomedical Engineering HandBook, IEEE Press, 1995 6. Biomedical Engineering Health Care Systems, Technology and Techniques, Suh, S.C., Gurupur, V.P., Tanik, M.M.
Supplementary Textbooks	1. Ogrodnik, P. (2012). Medical Device Design, Innovation from concept to market. Academic Press/Elsevier.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the engineering profession and ethics Understand the medical device design process To gain the ability to produce solutions in medical device design by considering user needs and patient safety To have knowledge of basic design and engineering issues Understand how to use multidisciplinary approaches and teamwork in medical device design
Course Learning Outcomes	1. Understand the basic principles of design of various medical devices such as orthopedic devices, soft tissue implants, artificial organs and dental implants 2. Gain competence in evaluating multidisciplinary approaches and teamwork in medical device design 3. Ability to evaluate the safety and effectiveness of medical devices 4. Gain the ability to consider user needs and patient safety when developing solutions for medical devices 5. Gaining competence in developing innovative medical device designs and following current technological developments
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Basic Principles of Medical Devices and system components **2. Week** Electrical and mechanical device groups used in medicine. **3. Week** Design of devices used in minimally invasive medical interventions **4. Week** Design of devices for bedside diagnostic technologies **5. Week** Design of devices for bedside diagnostic technologies **6. Week** Design of devices for measuring patient radiation dose **7. Week** Sensor, Biosensor technologies **8. Week** Sensor, Biosensor technologies **9. Week** Design of home health and patient monitoring devices **10. Week** Portable diagnostic and therapeutic devices **11. Week** Portable early detection devices **12. Week** Micro-total Analysis Systems **13. Week** Integrated Bio-chips (Lab on a chip) **14. Week** Application

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 3 Internet browsing, library work: 2 Designing and implementing materials: 4 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 2 Final Exam and Preparation for Final Exam: 2 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	6	2	12
Material Design and Implementation	4	4	16
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	2	2
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.				x	
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x			
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.		x					
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.	x						
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**3**	**3**	**5**	**3**	**3**	**4**	**1**			**1**	**1**
Learning outcome 1	**1**	**1**	**1**	**1**		**1**					
Learning outcome 2			**1**								
Learning outcome 3			**1**			**1**					
Learning outcome 4	**1**	**1**	**1**	**1**		**1**	**1**				
Learning outcome 5	**1**	**1**	**1**	**1**		**1**				**1**	**1**

Course Description Form

Course Code and Name	**ETM333 MECHATRONICS SYSTEM DESIGN**
Course Semester	5
Catalog Content	Understanding the design steps of mechatronic systems and the ability to apply them Ability to represent and analyze systems using block diagrams Understanding electrical, mechanical, and fluid systems and the ability to integrate these systems to create mechatronic systems Understanding the working principles of different sensors and transducers and grasping their role in mechatronic systems
Textbook	7. Shetty, D., Kolk R.A., Mechatronics System Design, Cengage Learning, 2011 8. Bradley, D. A., Seward, D., Dawson, D., & Burge, S. (2018). Mechatronics and the design of intelligent machines and systems. Crc Press.
Supplementary Textbooks	8. Pelz, G., & Waddington, R. (2004). Mechatronic systems. J. Wiley.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Gaining the ability to design processes Developing skills in expressing with blocks Acquiring the ability to understand various systems Learning about sensors and transducers
Course Learning Outcomes	1. Gaining the ability to understand and apply the design steps of mechatronic systems. 2. Developing the ability to represent and analyze systems using block diagrams. 3. Acquiring the ability to understand electrical, mechanical, and fluid systems and to create mechatronic systems. 4. Learning the working principles of different sensors and transducers and understanding their role in mechatronic systems.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to Mechatronic System Design
2. Week	Design processes
3. Week	Block diagrams, manipulations, and simulations
4. Week	Electrical, mechanical, and fluid systems, system integration
5. Week	Sensors and transducers
6. Week	Sensor applications
7. Week	Control devices
8. Week	System control - Logic methods
9. Week	Programmable Logic Controllers
10. Week	Signals, Systems, and Controls
11. Week	Laplace transforms
12. Week	Signal conditioning and real-time interface
13. Week	Data conversion process
14. Week	Case studies

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	**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	**x**				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	**x**				

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		**x**			
	6	Ability to work efficiently in intra-disciplinary teams.					
	7	Ability to work efficiently in multi-disciplinary teams.					
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.		**x**			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.		**x**			
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**1**	**1**	**2**			**2**	**2**		
Learning outcome 1	**1**								**1**		
Learning outcome 2		**1**							**1**		
Learning outcome 3			**1**	**1**	**1**			**1**			
Learning outcome 4					**1**			**1**			

Course Description Form	
Course Code and Name	**ETM334 FURNITURE DESIGN**
Course Semester	6
Catalog Content	General approaches in furniture design Concept of furniture connected to indoor and outdoor spaces Furniture-user relationship The trends that determine furniture design and the reflection of technology on design Understanding furniture design elements (materials, details, production methods, etc.) Executing a furniture design process
Textbook	1. Remmele, M. (2007). *Charles and Ray Eames/ Objects and furniture*. New York: Monacelli Yayınevi. 2. Küçükerman, Ö. (1996). *Endüstri için ürün tasarımında yaratıcılık*. İstanbul: Yem Yayınları.
Supplementary Textbooks	1. Habegger, J. (2005). *Sourcebook of modern furniture*. USA: W.W. Norton Yayınevi.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Producing innovative and creative concepts in furniture design, taking into account cultural, social and environmental factors and the needs and wishes of users Creation of a research methodology for furniture design; approaching the definition of the problem related to furniture design from a creative perspective; Developing potential uses of the designed product in line with future needs. Understanding furniture design elements (materials, details, production methods, etc.) Carrying out a user-oriented furniture design process
Course Learning Outcomes	1. Current approach to the discipline of furniture design, ability to master modern and historical examples 2. In the projects developed conceptually, he reaches results on an engineering basis, based on interdisciplinary communication, and is able to use and test materials and manufacturing methods. 3. Ability to manage a user-oriented furniture design process 4. Ability to use economics, marketing, consumer behavior, ergonomics and social psychology knowledge within the framework of sustainability criteria based on product-user relationship during the project development process. 5. Ability to participate in a design project in your field within a team or manage it independently
Instruction Methods	Face to face

Weekly Schedule

1. Week	Scope and general consideration of the concept of furniture
2. Week	Structural classification of furniture
3. Week	Basic features that identify a furniture
4. Week	Systematic shaping in furniture design
5. Week	Form search, Form synthesis
6. Week	Product synthesis and problem analysis
7. Week	Shape research according to general material properties
8. Week	Identity and personality issues of furniture
9. Week	Material conditions in furniture design
10. Week	Examining furniture according to human-element relationship: Body heigh spread in seating elements, spine angles according to human body position Position relationships in seating elements
11. Week	Function and Function dressing in furniture design
12. Week	Unchanging values, changing behaviors in furniture design
13. Week	Furniture – Furniture relations
14. Week	Scope and general consideration of the concept of furniture

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	9	1	9
Material Design and Implementation	10	2	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	2	10
Final Exam and Preperation for Final Exam	4	2	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.			**x**		
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			**x**		

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.		**x**			
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**			
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			**x**		
The Course's Lecturer(s) and Contact Informations		Department Management tasarim@gazi.edu.tr					

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**3**	**1**	**2**	**2**	**3**	**2**	**1**	**2**	**1**	**2**	**3**
Learning outcome 1	**1**				**1**					**1**	**1**
Learning outcome 2	**1**	**1**	**1**	**1**		**1**		**1**			**1**
Learning outcome 3	**1**		**1**	**1**	**1**					**1**	
Learning outcome 4					**1**	**1**	**1**		**1**		
Learning outcome 5								**1**			**1**

Course Description Form	
Course Code and Name	**ETM335 DESIGN FOR MANUFACTURABILITY**
Course Semester	5

<table>
<tr><td>Catalog Content</td><td>Ability to understand and apply production technologies and mechanisms
Evaluating the effect of material selection and material properties on design
Professional and ethical responsibility
Ability to use modern engineering methods
Teamwork and leadership skills
Ability to communicate orally and in writing
Ability to identify, formulate and solve problems
Ability to design, implement and design experiments</td></tr>
<tr><td>Textbook</td><td>9. Anderson, D.M., Design for Manufacturability: How to Use Concurrent Engineering to Rapid Develop Low-Cost, High-Quality Products for Lean Production, CRC Press, USA, 2014.</td></tr>
<tr><td>Supplementary Textbooks</td><td>2. Bralla, J.G., Design for Manufacturability Handbook, Mc-Graw Hill Pub., 1998.</td></tr>
<tr><td>Credit</td><td>3 ECTS</td></tr>
<tr><td>Prerequisites of the Course</td><td>No Prerequisites
Attendance Requirements %70</td></tr>
<tr><td>Type of the Course</td><td>Elective</td></tr>
<tr><td>Instruction Language</td><td>Turkish</td></tr>
<tr><td>Course Objectives</td><td>To be able to determine the criteria of design suitable for manufacturing
To have detailed knowledge about manufacturing methods
Identify limitations and difficulties arising from manufacturing methods in the design process
To understand the relationship between material and manufacturing method</td></tr>
<tr><td>Course Learning Outcomes</td><td>1. Gaining the ability to apply theoretical principles through design examples
2. Developing the ability to understand and apply production technologies and mechanisms
3. Develop teamwork and communication skills in design engineering projects
4. Gaining competence to consider ethical and sustainability principles in design
5. Understanding the relationship between material selection and manufacturing method</td></tr>
<tr><td>Instruction Methods</td><td>Face to face</td></tr>
<tr><td>Weekly Schedule</td><td>
<table>
<tr><td>1. Week</td><td>Introduction</td></tr>
<tr><td>2. Week</td><td>Design of product components.</td></tr>
<tr><td>3. Week</td><td>Examination of product components in terms of mechanical design.</td></tr>
<tr><td>4. Week</td><td>Materials and material selection.</td></tr>
<tr><td>5. Week</td><td>Standard elements and fasteners.</td></tr>
<tr><td>6. Week</td><td>Production technologies.</td></tr>
<tr><td>7. Week</td><td>Mechanical and electro-mechanical mechanisms.</td></tr>
<tr><td>8. Week</td><td>Assembly methods.</td></tr>
<tr><td>9. Week</td><td>Processes of modification of physical and visual properties of components.</td></tr>
<tr><td>10. Week</td><td>Quality control methods.</td></tr>
<tr><td>11. Week</td><td>The effect of the chosen production method and material on the design.</td></tr>
<tr><td>12. Week</td><td>Factors determining production method preferences.</td></tr>
<tr><td>13. Week</td><td>Systems that control design and production methods.</td></tr>
<tr><td>14. Week</td><td>Design examples</td></tr>
</table>
</td></tr>
<tr><td>Teaching and Learning Methods</td><td>Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 4
Internet browsing, library work: 5
Designing and implementing materials: 6
Report preparing: 5
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3
Other:0</td></tr>
</table>

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	4	8
Studies	3	5	15
Material Design and Implementation	2	6	12
Report Preparing	1	6	6
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.					x
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				x	
5	Ability to use research methods, including literature search, designing and conducting			x		

	experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.				x			
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**4**	**3**	**5**	**4**	**3**	**1**	**1**	**1**		**3**	
Learning outcome 1	**1**	**1**	**1**	**1**	**1**					**1**	
Learning outcome 2	**1**	**1**	**1**	**1**	**1**						
Learning outcome 3	**1**		**1**	**1**				**1**			
Learning outcome 4			**1**			**1**	**1**			**1**	
Learning outcome 5	**1**	**1**	**1**	**1**	**1**					**1**	

Course Description Form

Course Code and Name	**ETM336 ECONOMIC DESIGN**
Course Semester	6
Catalog Content	The importance of economics in industrial design and its effects on the economic consequences of design decisions The importance and strategies of cost management in the product development process Basic principles and organizational structure of product development cost accounts Analyzing the factors affecting manufacturing costs and examining the strategies used to reduce costs Management and control of costs in the product development process through the use of target costing and alternative cost techniques

Textbook	1. Parameswaran, M.A., An Introduction to Design Engineering, Alpha Science Pub., Int. Edition, 2004 2. Cross, N., Engineering Design Methods-Strategies for Product Design, John Wiley & Sons, Ltd., New York, 2001. 3. Yaşar, r. Ş yeni ürün geliştirme sürecinde maliyet yönetimi teknikleri, kitapana basim yayin dağitim bilişim izmir – 2016
Supplementary Textbooks	1. Elder, W.E. ve Hosnedl, S., Design Engineering: A Manual for Enhanced Creativity, CRC Press, Int. Edition, 2008.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the importance of cost management in industrial design and developing the ability to think cost-oriented in the design process Gaining the ability to perform cost analysis in the product development process and evaluating design decisions in terms of cost effectiveness Effective management and control of costs by applying strategic cost management principles in the product development process.
Course Learning Outcomes	1. Learning the basic concepts and skills related to cost management in industrial design. 2. Gaining the ability to perform cost analysis in product development phases and learning its applicability. 3. Understanding the importance of strategic cost management principles and relating them to real world applications. 4. Identifying strategies to reduce manufacturing costs and learning their applicability. 5. Developing cost optimization skills through the use of target costing methods and learning their applicability in practice.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction **2. Week** Cost responsibility of product developers **3. Week** Cost management in product development **4. Week** Methods for product development cost management and **5. Week** Impact on life cycle costs **6. Week** Impact on total costs **7. Week** Factors affecting manufacturing costs and processes to reduce costs **8. Week** Cost Management Systems **9. Week** The Importance of Cost Management in New Product Development Process **10. Week** Emergence of Target Costing **11. Week** Theory of Target Costing **12. Week** Basic Principles of Target Costing **13. Week** Target Costing Process **14. Week** Alternative Cost Management Techniques
Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 3 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

		Numbers	**Total Weighting (%)**

Assessment Criteria	Midterm Exams	1	40
	Assignment	1	20
	Application		
	Projects		
	Practice		
	Quiz		
	Percent of In-term Studies (%)		**60**
	Percentage of Final Exam to Total Score (%)		**40**
	Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	4	20
Studies	5	3	15
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	x				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.	x				
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x				
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x		
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x			

The Course's Lecturer(s) and Contact Informations	Dr.Öğr. Üyesi Orhan ERDEN oerden@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**1**	**3**	**1**	**2**		**2**				**5**	**2**
Learning outcome 1	**1**	**1**		**1**						**1**	
Learning outcome 2		**1**		**1**						**1**	
Learning outcome 3										**1**	**1**
Learning outcome 4		**1**	**1**			**1**				**1**	
Learning outcome 5						**1**				**1**	**1**

Course Description Form	
Course Code and Name	**ETM337 COST ANALYSIS IN DESIGN**
Course Semester	5
Catalog Content	Understanding basic cost analysis Understand the analysis of costs allocated to different functions such as production, distribution and administration Analyze the relationship between production quantity, costs and profit and identify strategies to increase profitability
Textbook	1. Gündüz, H.E., Gürdal, K. ve Elmacı, O., Maliyet Analizleri, Anadolu Üniversitesi, 2013. Evans, J. R., Olson, D. L., & 2. Olson, D. L. (2007). Statistics, data analysis, and decision modeling. Pearson/Prentice Hall

Supplementary Textbooks	2. Blank, L., & Tarquin, A. (2005). Engineering economy. McGraw-Hill
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understand and analyze the role of economic factors and market conditions in the design process To gain the ability to solve complex problems and the ability to make logical analysis To gain the ability to create new solutions and designs by bringing together different knowledge and ideas To be able to calculate the costs of new products emerging in the design process and to evaluate these costs in economic terms
Course Learning Outcomes	1. Ability to analyze complex design problems in a rational way and produce logical and effective solutions 2. Ability to evaluate the economic impact of industrial design projects by analyzing economic factors and market conditions 3. Ability to manage industrial design projects and take an active role in decision-making processes 4. Ability to calculate the costs of new design products and optimize these costs 5. The ability to develop innovative design products and evaluate the marketability of these products through creative and synthetic thinking
Instruction Methods	Face to face

Weekly Schedule

1. Week	Definition of Supply and Demand
2. Week	Elasticities of Supply and Demand
3. Week	Temporary, short and long term
4. Week	Individual and market demand, utility theory
5. Week	Introduction to cost theory
6. Week	Total, average and marginal costs
7. Week	fixed and variable costs
8. Week	Economic review in Cost Analysis
9. Week	Cost Analysis in New Product Development Process
10. Week	Technical review in Cost Analysis
11. Week	Determination of capacity utilization rate
12. Week	Financial review in Cost Analysis
13. Week	Product Costing Process
14. Week	Determination of the repayment period

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 3 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		

	Percent of In-term Studies (%)		**60**
	Percentage of Final Exam to Total Score (%)		**40**
	Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	4	20
Studies	5	3	15
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.	x				
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.					

	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.						
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).						
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x				
The Course's Lecturer(s) and Contact Informations	Dr.Öğr. Üyesi Orhan ERDEN oerden@gazi.edu.tr							

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**3**	**1**	**2**				**1**		**3**	**2**
Learning outcome 1	**1**	**1**		**1**						**1**	
Learning outcome 2	**1**	**1**		**1**							
Learning outcome 3								**1**		**1**	**1**
Learning outcome 4		**1**	**1**								
Learning outcome 5										**1**	**1**

Course Description Form	
Course Code and Name	**ETM338 ECOLOGICAL DESIGN**
Course Semester	6
Catalog Content	Professional and ethical responsibility Ability to use modern engineering methods Teamwork and leadership skills. Ability to communicate verbally and in writing Ability to identify, formulate and solve problems Ability to design, implement and design experiments
Textbook	4. White, P., Pierre, L., Belletire and S. Okala, Practitioner: Integrating Ecological Design, Okala Team, 2013 5. Van der Ryn, S., Cowan, S., Ecological Design, Tenth Anniversary Edition, Island Press, 2007.
Supplementary	2. Melnick, R. (2001). Ecology and design: frameworks for learning. Island Press.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70

Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the engineering profession and ethics Understand the field of design engineering activities To learn solution approaches to engineering problems To have knowledge of basic design and engineering issues
Course Learning Outcomes	1. Awareness of social equity and taking these values into account in the design process 2. Develop an understanding of ecological design processes and the ability to manage these processes effectively 3. Gain the ability to learn and apply measurement methods of environmental performance 4. Understand eco design ideologies and develop the ability to design in line with these ideologies 5. Designs can be understood as a holistic system view, encompassing the full spectrum of environmental impacts over the entire life cycle
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to ecological design
2. Week	Product system lifecycle
3. Week	Ecodesign strategy wheel
4. Week	Ecodesign ideologies
5. Week	Evolving strategies
6. Week	Design for recycling
7. Week	Ecological design processes
8. Week	Measuring environmental performance
9. Week	The science of life cycle assessment
10. Week	Assessment of toxicity
11. Week	Design ethics - Biotic and social imperatives
12. Week	Ecology for designers
13. Week	Ensuring social equality
14. Week	Ecological Design Practices

Teaching and Learning Methods

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 5
Designing and implementing materials: 5
Report preparing: 7
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 4
Other:0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	4	2	8
Studies	3	5	15
Material Design and Implementation	2	5	10
Report Preparing	1	7	7
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.					x
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.					x
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x	
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.					x
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					x

	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).						
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).						
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x				
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	x					
The Course's Lecturer(s) and Contact Informations	Prof. Dr. Veysel ÖZDEMİR vozdemir@gazi.edu.tr							

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL			**5**	**5**	**4**	**5**	**5**			**2**	**1**
Learning outcome 1			**1**	**1**	**1**	**1**	**1**			**1**	
Learning outcome 2			**1**	**1**	**1**	**1**	**1**			**1**	
Learning outcome 3			**1**	**1**	**1**	**1**	**1**				
Learning outcome 4			**1**	**1**	**1**	**1**	**1**				
Learning outcome 5			**1**	**1**		**1**	**1**				**1**

Course Description Form	
Course Code and Name	**ETM339 SHEET METAL MOLD DESIGN**
Course Semester	5
Catalog Content	Sheet-metal dies and their importance in industry Factors affecting die operation, Sheet-metal behavior theory, Introduction of punching-cutting and bending dies, Die elements and their tasks, Calculations required for sheet-metal die design, Creation of lane layout plan, Punching-cutting, bending and drawing mold design Errors in molded parts and methods of eliminating errors
Textbook	1. Such, I. (2006). *Handbook of die design*. New York: Mc-Graw Hill Pub. 2. Boljonovic, V. (2005). *Die design fundamentals*. New York: Industrial Press.
Supplementary Textbooks	1. Research in Engineering Design 2. Int. Journal of Design Engineering
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish

Course Objectives	Understanding the importance of sheet metal molds and industry, Learning the factors affecting mold operation, Learning mold elements and their functions, Being able to make the necessary calculations for sheet metal mold design, Learning drilling-cutting, bending, and drawing mold design, Learning the Errors Occurring in Molded Parts and Correction Methods
Course Learning Outcomes	1. Basis of die design is learned. 2. Better sheet-metal die designs based on knowledge of this course can be learned.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Sheet-metal dies: Definition, functions and industrial importance
2. Week	Basic sheet-metal die design
3. Week	Factors affecting die operation
4. Week	The theory of sheet metal behavior
5. Week	Metal cutting/punching dies and their functions
6. Week	Calculations required for cutting and punching dies
7. Week	Strip material placement and efficiency in cutting and punching dies
8. Week	Die elements
9. Week	Cutting and punching mold design
10. Week	Bending molds: Bending process and related calculations
11. Week	Bending die design and bending die examples
12. Week	Drawing dies: Drawing process and related calculations
13. Week	Drawing die design and drawing die examples
14. Week	Faults in molded parts and methods of eliminating faults

Teaching and Learning Methods

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 4
Designing and implementing materials: 5
Report Preparing: 5
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score	1	40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	4	20
Material Design and Implementation	2	5	10
Report Preparing	2	5	10
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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				x	
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		x			

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		x				
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.		x				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.			x			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.				x		
	10	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			
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	x					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail ŞAHİN isahin@gazi.edu.tr						

	Program Outcome 1	Program Outcome2	Program Outcome3	Program Outcome 4	Program Outcome5	Program Outcome6	Program Outcome 7	Program çıktısı 8	Program Outcome 9	Program Outcome10	Program Outcome11
TOTAL	**4**		**4**	**2**	**2**		**2**	**3**	**4**		
Learning outcome 1							**1**		**1**		
Learning outcome 2	**1**		**1**	**1**	**1**				**1**		
Learning outcome 3	**1**		**2**				**1**	**2**			
Learning outcome 4	**1**		**1**	**1**					**1**		
Learning outcome 5	**1**				**1**						
Learning outcome 6								**1**	**1**		

Course Description Form	
Course Code and Name	**ETM341 PSYCHOLOGY IN DESIGN**
Course Semester	5
Catalog Content	Understanding the dynamics behind behavior and decision-making processes General knowledge and skills about User Experience (UX) and User Interface (UI) design Ability in behavior design in the interaction between humans and the environment
Textbook	6. Joe Leech, Psychology for Designers: How to apply psychology to web design and the design process, mrjoe press; 2nd edition, 2017.
Supplementary Textbooks	9. Aarron Walter, Designing For Emotion, A Book Apart, 2020. 10. Sheena Iyengar, The Art Of Choosing: The Decisions We Make Everyday of our Lives, What They Say About Us and How We Can Improve Them, Abacus, 2011.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Gaining competency in understanding the psychological counterparts of the human mind and functions in psychology. Learning fundamental approaches and tools that take into account human behavior to find lasting design solutions to global challenges.

Course Learning Outcomes	5. Understanding of the fundamental psychological processes that govern human behavior, emotions, attitudes, and decision-making. 6. Understanding of the basic aspects of user interface design. 7. Knowledge of basic behavioral and social science methodology and psychometrics, including ethics. 8. Ability to conduct a simple behavioral intervention design.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction to design psychology **2. Week** Understanding human behavior and experience **3. Week** Emotions, attitudes, and decision-making processes **4. Week** Human-technology interaction **5. Week** Psychometrics **6. Week** Introduction to design for behavior change **7. Week** Design methods for behavior change **8. Week** Design ethics **9. Week** Emotion mapping **10. Week** Design for well-being **11. Week** Becoming a savvy consumer of social science **12. Week** User Experience Design (UX) **13. Week** User Interface Design (UI) **14. Week** Application
Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 3 Internet browsing, library work: 2 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 4 Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application	2	20
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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					
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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					
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.						
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.		**x**				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.			**x**			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.		**x**				
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to	**x**					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	**x**					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr						

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL							**2**	**3**	**2**	**1**	**1**
Learning outcome 1							**1**	**1**	**1**		
Learning outcome 2								**1**	**1**		
Learning outcome 3							**1**				
Learning outcome 4								**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM343 MANUFACTURING TECHNOLOGIES 2**
Course Semester	5
Catalog Content	Understanding of machining methods Understanding of work and tool molds Understanding of metal shaping methods Understanding of powder metallurgy Ability to manufacture a simple system using the learned methods
Textbook	1. Degarmo, E.P, Black, J.T. and Kohser, R.A. (1997). *Materials and processes in manufacturing*. USA: Prentice-Hall, Inc, Int. Ed. 2. Boothroyd, G., Knight, W. A. (1989). *Fundamentals of machining and machine cutting.* New York: Mark Dekker Inc. 3. M.P. Groover, *Fundamentals of modern manufacturing*, 3rd ed., 2007, Wiley
Supplementary Textbooks	1. Kalpakjian, S., Schmid, S. R. (2005). *Manufacturing engineering and technology*. Londra: Pearson, 5th Ed. 2. DeGarmo, E. P., Black, J. T. (2007). *Materials and processes in manufacturing.* USA: John Wiley & Sons, 10th Ed.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning machining methods Learning modern manufacturing methods Learning high-speed shaping of metals
Course Learning Outcomes	1. Learning basic operations and practical applications 2. Learning turning methods 3. Learning milling methods 4. Learning grinding methods 5. Learning work and assembly molds
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction and basic concepts
2. Week	Machining: Turning method, tools, fasteners
3. Week	Turning methods and applications
4. Week	Taper turning, screw drawing, spring winding
5. Week	Machining: Milling method tools, fasteners
6. Week	Milling methods and applications
7. Week	Simple division, split division
8. Week	Simple division, split division
9. Week	Slotted partition, Angular partition
10. Week	Machining: Grinding methods (sanding, grinding, honing, lapping, etc.)
11. Week	Plane grinding, Cylindrical grinding, Centerless grinding
12. Week	Tool sharpening and polishing operations
13. Week	Binding business patterns
14. Week	Assembly Molds

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0
Reading Activities: 0

Internet browsing, library work 5
Designing and implementing materials: 5

Report preparing: 0

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 4

Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)	1	60
Percentage of Final Exam to Total Score (%)	1	40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	2	7	14
Material Design and Implementation	5	5	25
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	x				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		x			
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.				x	

	6	Ability to work efficiently in intra-disciplinary teams.		x				
	7	Ability to work efficiently in multi-disciplinary teams.				x		
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.	x					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive				x		
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to			x			
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.		x				
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Adnan AKKURT aakkurt@gazi.edu.tr						

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program Outcome 8	Program Outcome 9	Program Outcome 10	Program Outcome 11
TOTAL	**1**	**2**	**1**	**2**	**4**	**2**	**4**	**1**	**4**	**3**	**2**
Learning outcome 1	**1**	**1**	**1**		**1**		**1**	**1**	**1**		
Learning outcome 2		**1**		**1**	**1**		**1**		**1**		**1**
Learning outcome 3			**1**	**1**	**1**				**1**	**1**	
Learning outcome 4					**1**	**1**	**1**		**1**	**1**	
Learning outcome 5			**1**				**1**			**1**	**1**

Course Description Form	
Course Code and Name	**ETM350 SYSTEMATIC DESIGN 2**
Course Semester	6
Catalog Content	Preparation and project selection, Introduction to Embodiment Design (ED), ED concepts and issues, ED general rules (clarity, simplicity and safety), ED principles (force distribution, separation of services, self-help, stability and bi-stability, flawless design), ST sample (Impact experimental set). ED example (Impulse-loading test rig).

Textbook	1. Börklü, H.R. (Turkish trans.), Mühendislik Tasarımı Sistematik Yaklaşım ('Pahl, G., Beitz, W., Feldhusen, J. ve Grote, K.H, Engineering Design: A Systematic Approach, Springer, 2007'), Hatiboğlu Yayınevi, Ankara, 2010.
Supplementary Textbooks	1. Cross, Nigel. Engineering design methods: strategies for product design. John Wiley & Sons, 2021.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To have knowledge about ED concepts and issues Learning the general rules of ED (clarity, simplicity and safety) Learning the ED Principles Examine and understand ED examples To be able to perform ED of simple systems
Course Learning Outcomes	1. Ability to apply basic principles of forming design 2. Ability to define the components of systems, determine their relationships, and evaluate the interactions between these components 3. Ability to design systems in accordance with engineering standards and methods 4. Ability to understand problems by seeing real-world applications of forming design
Instruction Methods	Face to face

Weekly Schedule

1. Week	Summary and evaluation of Systematic Design 1 course
2. Week	Selection of the term design project
3. Week	Embodiment Design (ED): Introduction, Importance, Application
4. Week	Concepts and issues of ED
5. Week	A checklist for ED, ED General rules: (a) Clarity
6. Week	ED General rules: (b) Simplicity, (c) Safety (general)
7. Week	(c) Safety (direct, indirect and warnings), Data sheets
8. Week	Material selection, Application with the use of ED checklist
9. Week	Principles of ED: (a) Force transmission (Flow lines of force and uniform strength, Direct and short force transmission path, Matched deformations)
10. Week	Balanced forces, (b) Division of tasks (Assignment of Sub-functions, Division of tasks for distinct functions, Division of tasks for identical functions)
11. Week	(c) Self-help (Self-reinforcing solutions, Self-balancing solutions, Self-protecting solutions)
12. Week	(d) Stability and bi-stability, (e) Fault-free design
13. Week	ED example: Impulse-loading test rig
14. Week	Examination of design projects

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 0 Internet browsing, library work: 2 Designing and implementing materials: 2 Report preparing: 0 Preparing a Presentation: 2 Presentations: 1 Preparation of Midterm and Midterm Exam: 2 Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects	1	20
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	2	10
Material Design and Implementation	5	2	10
Report Preparing			
Preparing a Presentation	10	2	20
Presentations	3	1	3
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	2	2
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		**x**			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		**x**			
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		**x**			

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Hüseyin Rıza BÖRKLÜ rborklu@gazi.edu.tr					

	Program Outcome1	Program Outcome2	Program Outcome3	Program Outcome4	Program Outcome5	Program Outcome6	Program Outcome7	Program çıktısı 8	Program Outcome9	Program Outcome10	Program Outcome11
TOTAL	**2**	**2**	**2**	**2**	**2**	**1**					**1**
Learning outcome 1	**1**	**1**	**1**	**1**	**1**						**1**
Learning outcome 2	**1**	**1**									
Learning outcome 3			**1**								
Learning outcome 4				**1**	**1**	**1**					

Course Description Form	
Course Code and Name	**ETM351 AUTOMATIC CONTROL**
Course Semester	5

Catalog Content	Learning the definition, importance and application areas of automatic control, mathematical foundations such as differential equations, Laplace Transform, function transformations, basic control concepts such as feedback control, open and closed loop systems, block diagrams, mathematical modeling of dynamic systems and control strategies of these systems by applying them through examples.
Textbook	1. Özdağ, N., Dinibütün, A.T., Kuzucu, A. (1998). *Otomatik kontrol temelleri*. İstanbul: Birsen Yayıncılık. 2. Kuo, B.J. (1999). *Otomatik kontrol sistemleri.* İstanbul: Literatür Yayıncılık.
Supplementary Textbooks	1. Raven, F. H. (1968). *Automatic control engineering*. McGraw-Hill.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach automatic control subjects and methods. To provide application skills. To give the concept of circuit and system and to be able to apply it. To teach obtaining models of physical systems. To teach how to do system design.
Course Learning Outcomes	1. Ability to explain basic concepts about automatic control 2. Ability to apply Laplace Transform and Inverse Laplace Transform to transform functions from time-domain(t) to frequency-domain(s) (or vice versa) 3. Be able to mathematically model dynamic systems and establish system dynamics 4. Ability to show control systems with block diagrams 5. Ability to use the information learned within the course in solving design problems
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to Automatic Control: System, control and automatic control; output, control, disturbance variables);
2. Week	Control loop and its components; Open-loop control and closed-loop cont disadvantages of open-loop and closed-loop.
3. Week	Gain, transfer function
4. Week	Examine and design the control loop
5. Week	Laplans transform
6. Week	Transfer function and characteristic function
7. Week	Applications
8. Week	Experimental studies
9. Week	System dynamics
10. Week	Electrical and mechanical system elements
11. Week	Transfer function, block diagram and signal flow diagram
12. Week	Applications
13. Week	Controller types
14. Week	Experimental studies, closed loop control

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 1
Designing and implementing materials: 1
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	1	5
Studies	14	1	14
Material Design and Implementation	14	1	14
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	4	2	8
Final Exam and Preperation for Final Exam	3	2	6
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	**x**				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			**x**		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and	**x**				
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				**x**	
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			**x**		

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	**x**				
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		**x**			
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**3**	**1**	**4**	**3**	**1**		**1**	**1**	**2**	**2**
Learning outcome 1	**1**										**1**
Learning outcome 2		**1**		**1**							
Learning outcome 3		**1**	**1**	**1**	**1**	**1**			**1**	**1**	
Learning outcome 4				**1**	**1**						
Learning outcome 5		**1**		**1**	**1**			**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM352 DESIGN FOR ADDITIVE MANUFACTURING**
Course Semester	6

Catalog Content	Additive manufacturing and application areas Materials used in additive manufacturing Additive manufacturing technologies Basic principles of Design for Additive Manufacturing Part consolidation and toptology optimization Part consolidation and generative design Multi-scale structure design
Textbook	1. Leary, Martin. Design for additive manufacturing. Elsevier, 2019. 2. Diegel, Olaf, Axel Nordin, and Damien Motte. A practical guide to design for additive manufacturing. Singapore: Springer Singapore, 2019.
Supplementary Textbooks	1. Ian Gibson, David Rosen, Brent Stucker "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing", Springer, 2014 2. İsmail Şahin, Design for Additive Manufacturing Lecture Notes, 2023
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Explain the industrial application areas of additive manufacturing Evaluate the advantages and limitations of different additive manufacturing technologies Integrating additive manufacturing design and manufacturing processes Developing the ability to work with different materials in additive manufacturing Integrate design for additive manufacturing methods such as topology optimization, generative design and lattice structures into designs Developing innovative solutions to various design and production problems
Course Learning Outcomes	1. To have knowledge about the basic concepts and history of additive manufacturing. 2. Application areas of additive manufacturing and materials used are recognized. 3. Understand metallic and non-metallic additive manufacturing technologies. 4. Capabilities and limitations of additive manufacturing technologies can be assessed. 5. Strategic and functional design principles can be applied to additive manufacturing. 6. Multi-scale and multi-material design approaches can be integrated and applied.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to additive manufacturing: Definitions and history
2. Week	Application areas of additive manufacuring
3. Week	Materials used in additive manufacturing
4. Week	Metal additive manufacturing and technologies
5. Week	Non-metallic additive manufacturing and technologies
6. Week	Additive manufacturing technologies: Capabilities and Limitations
7. Week	Strategic design considerations for Additive manufacturing
8. Week	Basic principles of Design for Additive Manufacturing (DfAM)
9. Week	Methods and tools of the DfAM approach
10. Week	Part consolidation and topology optimization
11. Week	Part consolidation and generative design
12. Week	Multi-scale structure design
13. Week	Multi-material design and part assembly
14. Week	Lattice structures

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 4
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 0
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects	1	20
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Wor
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Internet Studies, library	4	4	16
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations	4	2	8
Midterm Exam and Preperation for Midterm Exam	1	5	5
Final Exam and Preperation for Final Exam	1	5	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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				**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		**x**			
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					**x**

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.			**x**		
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.					
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.				**x**	
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.				**x**	
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.			**x**		
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome 1	**Program Outcome2**	**Program Outcome 3**	**Program Outcome4**	**Program Outcome 5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome 11**
TOTAL	**4**	**3**	**2**	**5**	**3**	**1**		**4**	**4**		**3**
Learning outcome 1				**1**	**1**						
Learning outcome 2	**1**	**1**		**1**				**1**	**1**		**1**
Learning outcome 3	**1**		**1**	**1**							
Learning outcome 4		**1**			**1**	**1**		**1**	**1**		
Learning outcome 5	**1**	**1**	**1**	**1**	**1**			**1**	**1**		**1**
Learning outcome 6	**1**			**1**				**1**	**1**		**1**

Course Description Form	
Course Code and Name	**ETM353 MODELMAKING AND PROTOTYPING**
Course Semester	5
Catalog Content	Basic modeling skills Determination of the techniques used in the process of transforming product designs into physical models Ability to select and use different modeling techniques Creating models with functional properties
Textbook	3. Hallgrimsson, B. (2012). *Prototyping and modelmaking for product design*. China: Laurence King Pub, Int. Ed.
Supplementary Textbooks	1. Direct-Write Technologies for Rapid Prototyping Applications : Sensors, Electronics, and Integrated Power Sources
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To learn basic modeling techniques To have knowledge about transforming design concepts into physical models Learning rapid prototyping techniques
Course Learning Outcomes	1. Gain knowledge of basic modeling techniques to meet current needs for engineering design. 2. Learn the techniques used in the process of transforming complex product designs into physical models under different constraints and conditions. 3. 3Develop the ability to select and use appropriate modeling techniques for engineering design. 4. Gain knowledge about the effects of modeling techniques on health and safety, economy, sustainability and environment.
Instruction Methods	Face to face

Weekly Schedule

1. Week	General information about the aim, content and evaluation methods of the course
2. Week	The role of modeling and prototyping in design engineering
3. Week	Basic modeling tools and materials
4. Week	Introduction to model making: Selection of materials and tools, health and safety rules.
5. Week	Introduction to model making: Model planning and design process, scaling, choosing th scale and assembly technical information.
6. Week	Simple modeling techniques: Cardboard, model cardboard, etc. model making with mat
7. Week	Simple modeling techniques: Model making with cardboard, model cardboard, etc.
8. Week	Simple modeling techniques: Model making with balsa
9. Week	Simple modeling techniques: Model making with balsa
10. Week	Simple modeling techniques: Foam materials, gluing and filling materials
11. Week	Simple modeling techniques: Foam materials, gluing and filling materials
12. Week	Design and construction of models with functional features
13. Week	Use of 3D printers and rapid prototyping techniques
14. Week	Surface treatment and detailing

Teaching and Learning Methods

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 2
Preparation of presentation: 3
Presentation: 2
Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment		
Application		
Projects	1	30
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	8	2	16
Material Design and Implementation			
Report Preparing	5	2	10
Preparing a Presentation	4	3	12
Presentations	1	2	2
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.		x			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	x				

	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x						
	6	Knowledge of the effects of engineering practices on society, health and safety, economy	x						
	7	Acting in accordance with the ethical principles of the engineering profession,							
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.	x						
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							
The Course's Lecturer(s) and Contact Informations		Head of Department tasarim@gazi.edu.tr							

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**	**1**	**1**				**1**	
Learning outcome 1			**1**								
Learning outcome 2			**1**								
Learning outcome 3				**1**	**1**						
Learning outcome 4						**1**				**1**	

Course Description Form	
Course Code and Name	**ETM354 AUTOMOTIVE DESIGN**

Course Semester	6
Catalog Content	History of vehicle architecture in design Gain an overview of the automotive design process Learning about systems and market segments Learning motion transmission systems Basic aerodynamic body design Identify safety and accident regulations
Textbook	Macey, S., Wardle, G., The Fundamentals of Car Design and Packaging, Design Studio Press, 2009
Supplementary Textbooks	Hoadley, F.E., Automobile Design Techniques & Design Modeling: The Men, the Methods & the Materials, T a H Productions, 1999
Credit	**3 AKTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning automotive design processes Basic knowledge for a good automotive design provided Learning product development and conceptual design processes
Course Learning Outcomes	1. Learn how to effectively use computer-aided computing and in-depth knowledge of the automotive industry to solve complex engineering problems. 2. Learn to design complex systems, processes, devices or products under realistic constraints and conditions. 3. To be able to select and use appropriate techniques, resources, and modern engineering and information technology tools for the analysis and solution of complex engineering problems. 4. To be able to work effectively as a team member or leader, both individually and in interdisciplinary teams.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction - History of vehicle architecture in design
2. Week	Overview of the design process
3. Week	Functional objectives, Systems and market segments
4. Week	Size and proportion
5. Week	Interiors and cargo
6. Week	Movement transfer line
7. Week	Wheels and tires
8. Week	Suspension and Chassis
9. Week	Body
10. Week	Aerodynamics
11. Week	Safety and accident regulations
12. Week	Portability
13. Week	Design exercises
14. Week	A general design assignment

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0

Reading Activities: 1

Internet browsing, library work: 4

Designing and implementing materials: 6

Report preparing: 4

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 5

Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	**1**	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	1	5
Studies	3	4	12
Material Design and Implementation	2	6	12
Report Preparing	2	4	8
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	5	5
Final Exam and Preperation for Final Exam	1	5	5
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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	x				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	x				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.					

	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.						
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.	x					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.						
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to						
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.						
The Course's Lecturer(s) and Contact Informations		Assoc. Prof. Dr. Harun Gökçe harungokce@gazi.edu.tr						

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL	**1**		**1**	**1**				**1**			
Learning outcome 1	**1**										
Learning outcome 2			**1**								
Learning outcome 3				**1**							
Learning outcome 4								**1**			

Course Description Form	
Course Code and Name	**ETM232 ENGINEERING MATERIALS**
Course Semester	4
Catalog Content	Classification of engineering materials Steel, cast iron types and uses. Heat treatments of metals and alloys. Non-ferrous metals and their use. Types, properties and manufacturing methods of ceramics, polymers and composite materials. Material selection in engineering design.
Textbook	1. Wadhwa, A. S., Dhaliwal, E. H.S. (2008). *A textbook of engineering material and metallurgy*. India: Firewall Media. 2. Rajput, R. K. (2008). *Engineering material*. New Delhi: S. Chand & Company.
Supplementary Textbooks	1. Callister, W. (2018). *Material science and engineering*. USA: Wiley.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Introducing the basic properties of engineering materials and the material properties of atomic size, Teaching the relationships between physical, metallurgical and mechanical properties of materials, Ensuring understanding of the basic principles in material selection. Contributing to the material selection methodology and correct material selection in the design process of an industrial product.
Course Learning Outcomes	1. Students taking this course will be introduced to the physical and mechanical properties of materials, heat treatment, phase diagrams, etc. learns the subjects. 2. Gains information about the general properties of engineering materials. 3. Can create the function-purpose and constraints cycle in product design and determine the general properties of the required material. 4. Knows the material selection methodology and can select materials using the necessary data sources. 5. Can observe the behavior of the selected material according to the product and environment.
Instruction Method	Face to face

Weekly Schedule

1. Week	Materials and Design, Development of Engineering Materials, Indu and Material Selection
2. Week	Engineering Material Family, Metals, Ceramics, Polym Hybrid Materials, Functional Classification of Material
3. Week	Material Design and Selection, Design Principles and Selection Cri components, Product Function Definition and Loading States.
4. Week	Material Properties and Manufacturing Process Effects, Reverse En Selection and Data Sources
5. Week	Properties of metals and alloys
6. Week	Effect of alloying elements on the properties of steels
7. Week	Usage, types and coding of steel and cast iron.
8. Week	Non-ferrous metal and alloys
9. Week	Ceramic materials, production and applications
10. Week	Polymers production and applications
11. Week	Composite materials production and applications
12. Week	Damage to materials. Damage sources and prevention (fracture, fat
13. Week	Damage in materials, their sources and prevention (oxidation, corro adhesion wear)
14. Week	Case studies on material selection in industrial products

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	7	1	7
Studies	14	2	28
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	3	2	6
Final Exam and Preperation for Final Exam	3	2	6
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			**x**		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and					**x**
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			**x**		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.				**x**	
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**			
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and			**x**		
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations	Bölüm Yönetimi tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL		**3**	**5**	**3**	**1**	**4**	**1**	**2**		**3**	**1**
Learning outcome 1		**1**	**1**	**1**	**1**						
Learning outcome 2		**1**	**1**	**1**		**1**				**1**	
Learning outcome 3			**1**	**1**		**1**				**1**	
Learning outcome 4			**1**			**1**	**1**	**1**			
Learning outcome 5		**1**	**1**			**1**		**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM234 SEMIOLOGY AND SEMANTICS IN DESIGN**
Course Semester	4
Catalog Content	Interpretation skills of the symbolic qualities of design objects. Ability to apply the semiotic analysis process to products. Recognition of basic concepts and understanding the meaning of products. Ability to understand the relationship between the mental representations of products and the real world. Understanding the relationship between the representation and use of products. Ability to understand user and culture relationships. Understanding the cultural role of products. Application skills of design behaviors based on semantics. Ability to analyze different design movements.
Textbook	1. Hjelm, S.I., Semiotics in Product Design, Technical Report, Royal Institute of Technology, Stockhom, Sweden, 2002. 2. Krippendorff, K. (2005). The semantic turn: A new foundation for design. crc Press.
Supplementary Textbooks	1. Silverman, K., The subject of Semiotics, New York: Oxford University Press, 1983
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning about signs and semantics in design, and gaining the ability to apply them. Understanding the impact of signs on users and understanding the methodology of semiotics. Gaining the ability to implement design.
Course Learning Outcomes	1. Developing the ability to understand basic concepts in semantics and perform semiotic analysis. 2. Providing the ability to understand and interpret the interaction between mental processes and the real world. 3. Acquiring the ability to understand and evaluate user behaviors along with cultural interactions. 4. Developing a general understanding of the evolutionary processes of design and different design movements.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction and basic concepts
2. Week	Semiotic nature of design objects
3. Week	Semiotic analysis process of industrial products
4. Week	Conceptual prerequisites for product semiotics
5. Week	Mental-real world relationship in product semiotics and representation of product types
6. Week	Concept of product, product appearance
7. Week	Product image content, information related to the product, product meaning
8. Week	Functional and semantic structure of the human-object-society system
9. Week	Specific contents of information, meaning, and expression terms, product meaning profile
10. Week	Semantic structure of product image, company image, user culture group relationship
11. Week	Expressiveness and expression forms in the design process, product context and categorization
12. Week	Readability and conditions of objects, design behaviors based on product semiotics
13. Week	Semantic resolution of form elements, semantic resolution of product appearance
14. Week	Design behaviors, movements, trends, and styles explained semiotically

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	**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		**x**			
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	**x**				

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		**x**			
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.	**x**				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.					
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**2**	**1**	**2**	**1**	**1**				
Learning outcome 1	**1**				**1**						
Learning outcome 2		**1**	**1**								
Learning outcome 3						**1**	**1**				
Learning outcome 4			**1**	**1**	**1**						

Course Description Form	
Course Code and Name	**ETM236 FORM MATERIAL AND FUNCTION**
Course Semester	4
Catalog Content	To be able to have knowledge about basic issues such as material properties, design function and user needs, factors affecting product design and creative design process To be able to comprehend the relationship between material selection and design process To be able to understand various types of materials, forming techniques, joining methods and application examples
Textbook	1. Grillo, P.J. (2010). Form, function and design. New York: Dover Pub. 2. Ashby, M. and Johnson, K. (2010). *Materials and design – The art and science of materail selection in product design*. USA: B-H Pub.
Supplementary Textbooks	1. Elder, W.E. ve Hosnedl, S., Design Engineering: A Manual for Enhanced Creativity, CRC Press, Int. Edition, 2008.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To be able to analyze the relationship between form, function, material selection and production methods in design Creating composition using formal elements of design Developing ideas and manual skills to solve basic design problems To gain the ability to provide balance in material selection and design process
Course Learning Outcomes	1. To be able to produce creative solutions to design problems by examining sample applications in industrial design 2. To gain a different perspective on the problems encountered in the design process 3. Ability to understand the role of innovative materials in the design process and to encourage innovation in design. 4. Ability to develop harmonious designs by balancing form, material and function in the design process. 5. Understanding how materials and design processes affect each other and the ability to produce innovative solutions using this relationship.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Design engineering profession and professional ethics **2. Week** The meaning and importance of design **3. Week** Historical development of design **4. Week** The place of design in industry and country development **5. Week** Problem solving and communication skills **6. Week** Design methodology and rules **7. Week** Principles of design **8. Week** Beginner design process **9. Week** Analyze simple part designs **10. Week** Part-level design **11. Week** Simple part design applications **12. Week** Analyzing simple system designs **13. Week** System-level design **14. Week** Simple system design applications

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 6 Internet browsing, library work: 4 Designing and implementing materials: 4 Report preparing: 3 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	6	12
Studies	2	4	8
Material Design and Implementation	3	4	12
Report Preparing	2	3	6
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	3	6
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x					
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.								
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.			x					
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).								
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).								
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x						
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x					

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**4**	**5**	**3**		**3**	**1**			**2**	**3**
Learning outcome 1	**1**	**1**	**1**	**1**							**1**
Learning outcome 2	**1**	**1**	**1**			**1**				**1**	**1**
Learning outcome 3		**1**	**1**								
Learning outcome 4		**1**	**1**	**1**		**1**					
Learning outcome 5			**1**	**1**		**1**	**1**			**1**	**1**

Course Description Form	
Course Code and Name	**ETM238 COMPUTER GRAPHICS**
Course Semester	4
Catalog Content	Application areas of computer graphics include line and curve drawing, polygon drawing, polygon painting, transformations (translation, rotation, scaling, reflection, shifting), 2-D view, line clipping, polygon cropping, 3-D view, parallel and perspective projection, 3D clipping, visible surface detection, lighting, ray tracing, parametric curves and surfaces, animation.
Textbook	1. Fleet, D. and Hertzman, A., Computer Graphics Lecture Notes, Computer Science Dept., University of Toronto, Canada, 2006. 2. Shirley, P. and Marschner, S., Fundementals of Computer Graphics, Taylor & Francis Group, Int. Ed., 2010.
Supplementary Textbooks	Journal of Computer Graphics Techniques Computer & Graphics - Journal
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach introductory level the theory and application of computer graphics To gain application skills To be able to design various graphic design applications and finalize them in a computer environment ready for printing
Course Learning Outcomes	1. Knowledge of computer graphics (drawing, transformations, view, lighting, rendering). 2. Ability to design computer graphics software under realistic constraints and conditions, using theoretical and applied knowledge in these fields. 3. Ability to find, select and use modern tools and techniques necessary to design and implement computer graphics environments. 4. Gaining application skills on the practical aspects of the subjects. 5. Ability to work effectively individually and in interdisciplinary teams.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to charting
2. Week	Curves
3. Week	Conversions
4. Week	Coordinate independent geometry
5. Week	3D objects
6. Week	Camera models
7. Week	Basic lighting and reflection
8. Week	Shading
9. Week	Texture overlay
10. Week	Basic ray tracing, ray metering and projection
11. Week	Diffused ray tracing, interpolation
12. Week	Parametric curves and surfaces
13. Week	Animation
14. Week	Animation

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	9	1	9
Material Design and Implementation	10	2	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	2	10
Final Exam and Preperation for Final Exam	4	2	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		**x**			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and			**x**		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			**x**		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).			**x**		
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		**x**			
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		**x**			
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**2**	**1**	**3**	**3**		**1**	**1**	**3**		**2**	**2**
Learning outcome 1	**1**		**1**	**1**			**1**				
Learning outcome 2	**1**	**1**	**1**	**1**				**1**			
Learning outcome 3			**1**	**1**		**1**					
Learning outcome 4								**1**	**1**	**1**	**1**
Learning outcome 5								**1**	**1**	**1**	**1**

Course Description Form	
Course Code and Name	**ETM240 DESIGN CULTURE**
Course Semester	4
Catalog Content	Ability to comprehend the visual language and differences of art and design and aesthetic sensitivity and reflect them on their designs Ability to focus on the cultural relationship between design and consumption Ability to understand and convey the cultural context of design Ability to evaluate consumption products as part of the culture created in society
Textbook	1. Barnard, M., Sanat, Tasarım ve Görsel Kültür, 2002, Ütopya Yayınları
Supplementary Textbooks	1. Julier, G., The Culture of Design, SAGE Publications, 2013.
Credit	**3 AKTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the cultural context of design from past to present To have knowledge about the development of cultural elements To learn the ability to comprehend the visual language and differences of art and design and aesthetic sensitivity and to reflect them on their designs To learn the steps in the development process of culture and design
Course Learning Outcomes	1. Have knowledge about the basic concepts, elements and principles of visual communication design and communication 2. To have knowledge about the visual language and differences of art and design and aesthetic sensitivity and reflection on design. 3. Steps in the development process of culture and design, analysis of production and technical processes are learned. 4. Comprehension of national and universal values; understanding of design from national to universal is learned. 5. To be able to adapt to new and emerging technologies and to have knowledge about the process of questioning thinking about technological changes.
Instruction Methods	Face to face

Weekly Schedule

1. Week	The concept and theory of culture
2. Week	Cultural content, relations and processes, biological evolution
3. Week	Renaissance and enlightenment philosophy
4. Week	Democratization Movements, French Revolution and its effects
5. Week	Traditions and innovations of the early modern period
6. Week	From image to image in the modern period
7. Week	Participation in modern art and design
8. Week	From equality to pluralism in the modern era
9. Week	Modern period spacecraft aesthetics
10. Week	Postmodern era individualism
11. Week	Postmodern design and technology
12. Week	Economic, social, industrial and technological developments
13. Week	The impact of new modes of production on society, art, design and economic relations
14. Week	The contribution of art and design to urban culture and the cultural cycle

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 3
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 2
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment	1	30
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10
Studies	5	3	15
Material Design and			
Report Preparing			
Preparing a Presentation	5	2	10
Presentations	3	2	6
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.	x				

	4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.						
	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x					
	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.						
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.						
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).						
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).			x			
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.						

	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	x								
The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr										

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**1**		**1**				**3**		**1**
Learning outcome 1			**1**						**1**		
Learning outcome 2									**1**		
Learning outcome 3					**1**						
Learning outcome 4									**1**		
Learning outcome 5											**1**

Course Description Form	
Course Code and Name	**ETM242 DESCRIPTIVE GEOMETRY**
Course Semester	4
Catalog Content	Introduction (Introduction and Importance of Descriptive Geometry) Traces - Traces of Lines, Traces of Planes Piercing Points Sections of Planes Parallelism and Perpendicularity Transformations - Reflection, Rotation, Translation Tangents Vector Operations Shading and Shadowing General Applications
Textbook	1. Bayvas, Ş., Dericioğlu, N. ve Özgönül, O., Tasarı Geometri Temel Metot ve Uygulamalar I-II, Ankara, 1969. 2. Hawk, M. C., Schaum's Outline of Theory And Problems Of Descriptive Geometry, 1962 by McGraw-Hill, Inc.
Supplementary Textbooks	1. Smith, J. K. (2020). Mühendislik Çizim ve Tasarımı. Örnek Yayıncılık.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the fundamental concepts of descriptive geometry and how these concepts are applied to geometric modeling. Providing information about projection and explaining projection methods. Drawing developments of three-dimensional geometric shapes such as prisms, pyramids, cylinders, cones, spheres, and creating their sectional views. Generating cross-sectional views of objects formed by cutting them with a plane. Applying the concepts learned in descriptive geometry to examples.
Course Learning Outcomes	1. They will be able to use basic design geometry concepts to model complex systems. 2. They will be able to use projection techniques to analyze and model objects from different perspectives. 3. They will be able to integrate three-dimensional geometric shapes into engineering designs to develop suitable solutions for real-world problems. 4. They will be able to optimize their designs by examining the internal structures of objects. 5. They will be able to plan their projects by applying design geometry principles, considering environmental, economic, and social impacts.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction (Introduction and importance of descriptive Geometry)
2. Week	Traces
3. Week	Traces of lines
4. Week	Traces of planes
5. Week	Piercing points
6. Week	Sections of planes
7. Week	Parallelism and perpendicularity
8. Week	Transformations - Reflection, Rotation
9. Week	Transformations - Translation
10. Week	Tangents
11. Week	Vector operations
12. Week	Inclined projection
13. Week	Shading and shadowing
14. Week	General applications

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 2
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 1

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	2	10
Material Design and Implementation	14	2	28
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	3	2	6
Final Exam and Preperation for Final Exam	3	1	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				**x**	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and			**x**		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**4**	**1**	**3**	**2**	**1**	**1**	**1**				**1**
Learning outcome 1			**1**	**1**			**1**				**1**
Learning outcome 2	**1**	**1**	**1**								
Learning outcome 3	**1**			**1**							
Learning outcome 4	**1**		**1**								
Learning outcome 5	**1**				**1**	**1**					

COURSE DESCRIPTION FORM		
Course Code and Name	**ETM244 DESIGN METHODOLOGIES**	
Course Semester	4	
Catalog Content	Problem solving skills Creativity and innovation skills Design methodology and usage skills Design thinking skills Skills in the use of biomimicry and biomimetic concepts TRIZ method and application skills Skills in the use of contradiction matrix and 40 principles	
Textbook	1. Birkhofer, H., The Future of Design Methodology, Springer, 2021. 2. Karen Gatt, TRIZ for Engineers: Enabling Inventive Problem Solving, Wiley, 2011 3. Yoram Reich Biomimetic Design Method for Innovation and Sustainability, Springer International Publishing, e-Book	
Supplementary Textbooks	1. Blessing, L.T.M and Chakrabarti, A., DRM, a Design Research Methodology, Springer, 2009.	
Credit	**3 ECTS**	
Prerequisites of the Course	No Prerequisites Attendance Requirements %70	
Type of the Course	Elective	
Instruction Language	Turkish	
Course Objectives	Problem solving concept learning Understanding and learning traditional and innovative problem-solving methodologies Learning the concept of design inspired by nature and understanding application examples Learning the theory of innovative and creative problem solving (TRIZ) and understanding application examples	
Course Learning Outcomes	1. Learning the advantages and disadvantages of design methodologies. 2. Learning the ability to systematically follow the design process. 3. Learning to understand engineering design stages and determine appropriate methods to optimize design. 4. Learning to identify fundamental problems in the design process and utilize various problem-solving techniques.	
Instruction Methods	Face to face	
Weekly Schedule	**Week**	**Subjects**
	1	Problem concept
	2	Traditional Problem solving techniques
	3	Traditional Problem solving techniques
	4	Innovative Problem solving techniques
	5	Innovative Problem solving techniques
	6	Innovation and creativity
	7	TRIZ
	8	The contradiction matrix and the 40 principles
	9	Contradiction matrix and application examples in 40 principle design problems

	10	General principles of Bio-inspired Design
	11	General principles of Bio-inspired Design
	12	Use of biomimicry in design and application examples in design problems
	13	Design thinking
	14	Design thinking application examples

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 3 Internet browsing, library work: 4 Designing and implementing materials: 0 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 4 Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	4	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for	1	4	4
Final Exam and Preperation for Final	2	4	8
Other (should be emphasized)	-	-	-
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

No	Program Outcomes	1	2	3	4	5

Contribution Level Between Course Learning Outcomes and Program Outcomes

	Program Outcome1	Program Outcome2	Program Outcome3	Program Outcome4	Program Outcome5	Program Outcome6	Program Outcome7	Program çıktısı 8	Program Outcome9	Program Outcome10	Program Outcome11
TOTAL	**1**	**2**	**3**	**3**	**2**			**1**	**2**	**2**	
Learning outcome 1			**1**							**1**	
Learning outcome 2		**1**	**1**	**1**					**1**		
Learning outcome 3		**1**	**1**	**1**	**1**				**1**	**1**	
Learning outcome 4				**1**	**1**						

1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x		
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x	
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.			x	
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x		
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.				
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.				
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x			
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		x		
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.				
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x		

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

Course Description Form	
Course Code and Name	ETM246 MATERIAL SELECTION IN DESIGN
Course Semester	4
Catalog Content	- The importance of material selection in design AND the basics of material selection are explained - Learning material selection and material selection diagrams in terms of mechanical and physical properties - Selection of materials (metals, polymers, ceramics, composites) in terms of application - Understanding the relationship between material selection and process
Textbook	1. Materials Selection in Mechanical Design, 3E, M.F. ASHBY, Elsevier Butterworth-Heinemann, 2005. 2. Malzeme Seçimi ve Uygulamaları, F. Fındık, Seçkin Yayıncılık, 2018
Supplementary Textbooks	1. Selection and Use of Engineering Materials, Butterworth J.A. Charles, Crane, FAA Heinemann, 1992.
Credit	3
Prerequisites of the Course	There is no prerequisite for the course.
Type of the Course	Selective
Instruction Language	Turkish
Course Objectives	To ensure that they acquire basic knowledge about material selection and design and apply this knowledge to possible situations.
Course Learning Outcomes	1. Can classify materials and knows their advantages and disadvantages. 2. Understands the material selection characteristics in terms of mechanical and physical properties. 3. Knows and applies material selection criteria. 4. It establishes criteria for special applications. 5. Selects suitable materials for design applications, taking into account working conditions.
Instruction Methods	Face to face

Weekly Schedule

1. Week	The importance of material in design
2. Week	The importance of basic factors in material selection and classification of engineering materials
3. Week	Types of metallic materials, chemical and physical properties
4. Week	Mechanical properties of metallic materials
5. Week	Application areas of metallic materials
6. Week	Ceramic material types, properties and application areas
7. Week	Polymer material types, properties and application areas
8. Week	Composite material types, properties and application areas
9. Week	Engineering material types, properties and application areas
10. Week	Material selection based on material properties
11. Week	Ashby diagrams
12. Week	Sample material selection applications
13. Week	Sample material selection applications
14. Week	Assignment presentations

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 1
Designing and implementing materials:
Report preparing: 2
Preparing a Presentation:
Presentations:
Preparation of Midterm and Midterm Exam: 8
Final Exam and Preparation for Final Exam: 14

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	10	1	10
Studies	5	1	5
Material Design and Implementation			
Report Preparing	5	2	10
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	1	8	8
Final Exam and Preparation for Final Exam	1	14	14
Other (should be emphasized)			
Total Workload			
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		x			
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.			x		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for	x				

	the analysis and solution of complex engineering problems, recognising their limitations.								
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x						
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x							
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.								
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).								
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.								
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x					

The Course's Lecturer(s) and Contact Informations	

	Program outcome1	**Program outcome2**	**Program outcome3**	**Program outcome4**	**Program outcome5**	**Program outcome6**	**Program outcome7**	**Program outcome8**	**Program outcome9**	**Program outcome10**	**Program outcome11**
TOTAL	4	2	3	1	2			2			3
Learning outcome 1	1	1	1								
Learning			1		1						1

outcome 2											
Learning outcome 3	1		1					1			
Learning outcome 4	1				1			1			1
Learning outcome 5	1	1		1							1

Course Description Form	
Course Code and Name	**ETM330 USER CENTERED DESIGN**
Course Semester	6
Catalog Content	User-centered design skills Ability to apply scenario-based design approach Understanding and ability to apply human-centered design principles Acquiring knowledge and skills in user experience design Ability to apply iterative user-centered design methodology Ability to identify user requirements and usage scenarios Capability to generate and visualize design ideas based on user needs Ability to analyze user feedback and reshape the design Concept creation and prototyping skills Ability to evaluate created concepts and prototypes
Textbook	1. ChadiaAbras, Diane Maloney-Krichmar, Jenny Preece. (2004). UserCentered Design, InBainbridge, W. Encyclopedia of HumanComputerInteraction. ThousandOaks: Sage Publications. 2. NORMAN, D. A. 1986, Cognitiveengineering. In D. A. Norman and S. W. Draper (eds) User CenteredSystems Design (Hillsdale, NJ: Lawrence ErlbaumAssociatesInc.) 3. Goodman, E., Kuniavsky, M., &Moed, A. (2012). Observingtheuserexperience: A practitioner'sguidetouserresearch. San Francisco, CA: Morgan Kaufman
Supplementary Textbooks	1. Jesse J.G. (2011). TheElements of User Experience: User-Centered Design forthe Web and Beyond, Second Edition, USA.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements***)**	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning the concept of user-centered design. Gaining experience and knowledge in user experience design. Learning research skills to develop usability and user experience concepts. Acquiring the ability to conduct research involving the user perspective.
Course Learning Outcomes	1. Gaining knowledge about user-centered design theory. 2. Learning about the concept of usability and user experience processes. 3. Creating product usage scenarios. 4. Designing a tangible product using the user-centered design method.
Instruction Methods	Face to face

Weekly Schedule

1. Week	History of user-centered design
2. Week	Scenario-based design
3. Week	Human-centered design
4. Week	User experience, usability, usability principles
5. Week	Usability tests (A/B testing, Survey, Field study, Observation)
6. Week	Usability tests (Interview, Focus Group, Experience Logs, 5-Second Test)
7. Week	Iterative user-centered design
8. Week	Identifying user requirements and usage scenarios
9. Week	Visualizing design ideas
10. Week	Redesign and analysis based on user evaluations
11. Week	Concept and prototype development
12. Week	Concept and prototype development
13. Week	Evaluation of concepts and prototypes
14. Week	Evaluation of concepts and prototypes

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 2
Designing and implementing materials: 1
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 5
Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams		
Assignment	2	60
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10
Studies	5	2	10
Material Design and Implementation	7	1	7
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	5	10
Final Exam and Preperation for Final Exam	2	5	10
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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 develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		**x**			
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.	**x**				
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.			**x**		
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.		**x**			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.			**x**		
	10	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.					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	**x**				
The Course's Lecturer(s) and Contact Informations	Prof. Dr. İsmail Şahin isahin@gazi.edu.tr						

	Program Outcome1	Program Outcome 2	Program Outcome3	Program Outcome4	Program Outcome5	Program Outcome6	Program Outcome7	Program çıktısı 8	Program Outcome9	Program Outcome10	Program Outcome11
TOTAL		**1**	**2**	**2**	**1**	**1**	**3**	**2**	**3**		**1**
Learning outcome 1							**1**		**1**		
Learning outcome 2							**1**	**1**	**1**		
Learning outcome 3			**1**	**1**							
Learning outcome 4		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**		**1**

Course DescriptionForm	
Course Code and Name	**ETM331 ERGONOMICS**
Course Semester	5
Catalog Content	Determining the basics of ergonomic design Determining the effects of environmental factors on the user Developing user-centered product design skills Evaluation of ergonomic product designs
Textbook	1. Karwowski, W., Soares, M.M. and Stanton, N.A., Human Factors and Ergonomics in Consumer Product Design: Methods and Techniques, CRC Press, 2011. 2. Babalık, F., Mühendisler İçin Ergonomi - İşbilim, Dora, 3. Bas.,
Supplementary Textbooks	1. Alaettin Sabancı, Sarp Korkut Sümer., Ergonomi, Nobel Akademik Yayıncılık; 3. baskı
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 AttendanceRequirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To have knowledge about the concept and foundations of ergonomics To learn the application of anthropometric properties to design To be able to use ergonomic design elements in the product development process
Course Learning Outcomes	1. Ability to design products taking into account anthropometric data of the target audience 2. Ability to produce creative solutions in engineering problems by taking human-oriented elements into consideration 3. Ability to design complex systems, processes, devices or products under ergonomic conditions 4. Ability to perform research methods such as literature research, data collection, and interpretation of results to examine engineering problems from an ergonomic perspective. 5. Ability to analyze and evaluate designed products and systems from an ergonomic perspective
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction (Ergonomics concept, basics of ergonomics, design examples)
2. Week	Development of ergonomic designs, ergonomic design examples and applications
3. Week	Principles of ergonomic design, ergonomically human and work
4. Week	Environmental factors and their effects on humans
5. Week	Ergonomic workplace organization
6. Week	Human machine contact (interface), sample applications
7. Week	Introducing anthropometric measurement, ergonomic workplace control
8. Week	Load lifting and moment application
9. Week	Designing ergonomic work tools and equipment
10. Week	Ergonomic product design examples
11. Week	Ergonomic product design examples and evaluations
12. Week	Ergonomics compliance check
13. Week	Examples of aesthetic and ergonomic design applications
14. Week	Student project presentation and evaluation

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 3
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	1	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	2	10
Studies	10	2	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation	1	3	3
Presentations	4	2	8
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)	-	-	-
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.		x			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		x			

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.						
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.						
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).						
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		x				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.						
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.						
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr							

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**	**2**				**2**		
Learning outcome 1									**1**		
Learning outcome 2			**1**						**1**		
Learning outcome 3			**1**								
Learning outcome 4				**1**	**1**						
Learning outcome 5					**1**						

Course Description Form	
Course Code and Name	**ETM332 MEDICAL DEVICE DESIGN**
Course Semester	6
Catalog Content	Understanding the basic principles and system components of medical devices To be able to comprehend the medical device design process Gaining multidisciplinary approaches and teamwork skills in medical device design Professional and ethical responsibility Ability to use modern engineering methods in medical device design Gain knowledge and skills in pre-clinical testing to evaluate the safety and efficacy of
Textbook	1. Bronzino, J.D., The Biomedical Engineering HandBook, IEEE Press, 1995 2. Biomedical Engineering Health Care Systems, Technology and Techniques, Suh, S.C., Gurupur, V.P., Tanik, M.M.
Supplementary Textbooks	1. Ogrodnik, P. (2012). Medical Device Design, Innovation from concept to market. Academic Press/Elsevier.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the engineering profession and ethics Understand the medical device design process To gain the ability to produce solutions in medical device design by considering user needs and patient safety To have knowledge of basic design and engineering issues Understand how to use multidisciplinary approaches and teamwork in medical device design
Course Learning Outcomes	1. Understand the basic principles of design of various medical devices such as orthopedic devices, soft tissue implants, artificial organs and dental implants 2. Gain competence in evaluating multidisciplinary approaches and teamwork in medical device design 3. Ability to evaluate the safety and effectiveness of medical devices 4. Gain the ability to consider user needs and patient safety when developing solutions for medical devices 5. Gaining competence in developing innovative medical device designs and following current technological developments
Instruction Methods	Face to face
Weekly Schedule	**1. Week** — Basic Principles of Medical Devices and system components **2. Week** — Electrical and mechanical device groups used in medicine. **3. Week** — Design of devices used in minimally invasive medical interventions **4. Week** — Design of devices for bedside diagnostic technologies **5. Week** — Design of devices for bedside diagnostic technologies **6. Week** — Design of devices for measuring patient radiation dose **7. Week** — Sensor, Biosensor technologies **8. Week** — Sensor, Biosensor technologies **9. Week** — Design of home health and patient monitoring devices **10. Week** — Portable diagnostic and therapeutic devices **11. Week** — Portable early detection devices **12. Week** — Micro-total Analysis Systems **13. Week** — Integrated Bio-chips (Lab on a chip) **14. Week** — Application

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 3 Internet browsing, library work: 2 Designing and implementing materials: 4 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 2 Final Exam and Preparation for Final Exam: 2 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	6	2	12
Material Design and Implementation	4	4	16
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	2	2
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.				x	
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x			
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.		x					
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.	x						
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**3**	**3**	**5**	**3**	**3**	**4**	**1**			**1**	**1**
Learning outcome 1	**1**	**1**	**1**	**1**		**1**					
Learning outcome 2			**1**								
Learning outcome 3			**1**			**1**					
Learning outcome 4	**1**	**1**	**1**	**1**		**1**	**1**				
Learning outcome 5	**1**	**1**	**1**	**1**		**1**				**1**	**1**

Course Description Form	
Course Code and Name	**ETM333 MECHATRONICS SYSTEM DESIGN**
Course Semester	5
Catalog Content	Understanding the design steps of mechatronic systems and the ability to apply them Ability to represent and analyze systems using block diagrams Understanding electrical, mechanical, and fluid systems and the ability to integrate these systems to create mechatronic systems Understanding the working principles of different sensors and transducers and grasping their role in mechatronic systems
Textbook	1. Shetty, D., Kolk R.A., Mechatronics System Design, Cengage Learning, 2011 2. Bradley, D. A., Seward, D., Dawson, D., & Burge, S. (2018). Mechatronics and the design of intelligent machines and systems. Crc Press.
Supplementary Textbooks	1. Pelz, G., & Waddington, R. (2004). Mechatronic systems. J. Wiley.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Gaining the ability to design processes Developing skills in expressing with blocks Acquiring the ability to understand various systems Learning about sensors and transducers
Course Learning Outcomes	1. Gaining the ability to understand and apply the design steps of mechatronic systems. 2. Developing the ability to represent and analyze systems using block diagrams. 3. Acquiring the ability to understand electrical, mechanical, and fluid systems and to create mechatronic systems. 4. Learning the working principles of different sensors and transducers and understanding their role in mechatronic systems.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to Mechatronic System Design
2. Week	Design processes
3. Week	Block diagrams, manipulations, and simulations
4. Week	Electrical, mechanical, and fluid systems, system integration
5. Week	Sensors and transducers
6. Week	Sensor applications
7. Week	Control devices
8. Week	System control - Logic methods
9. Week	Programmable Logic Controllers
10. Week	Signals, Systems, and Controls
11. Week	Laplace transforms
12. Week	Signal conditioning and real-time interface
13. Week	Data conversion process
14. Week	Case studies

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	**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	**x**				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	**x**				

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		**x**			
	6	Ability to work efficiently in intra-disciplinary teams.					
	7	Ability to work efficiently in multi-disciplinary teams.					
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.		**x**			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.		**x**			
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**1**	**1**	**2**			**2**	**2**		
Learning outcome 1	**1**								**1**		
Learning outcome 2		**1**							**1**		
Learning outcome 3			**1**	**1**	**1**			**1**			
Learning outcome 4					**1**			**1**			

Course Description Form	
Course Code and Name	**ETM334 FURNITURE DESIGN**
Course Semester	6
Catalog Content	General approaches in furniture design Concept of furniture connected to indoor and outdoor spaces Furniture-user relationship The trends that determine furniture design and the reflection of technology on design Understanding furniture design elements (materials, details, production methods, etc.) Executing a furniture design process
Textbook	1. Remmele, M. (2007). *Charles and Ray Eames/ Objects and furniture*. New York: Monacelli Yayınevi. 2. Küçükerman, Ö. (1996). *Endüstri için ürün tasarımında yaratıcılık*. İstanbul: Yem Yayınları.
Supplementary Textbooks	1. Habegger, J. (2005). *Sourcebook of modern furniture*. USA: W.W. Norton Yayınevi.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Producing innovative and creative concepts in furniture design, taking into account cultural, social and environmental factors and the needs and wishes of users Creation of a research methodology for furniture design; approaching the definition of the problem related to furniture design from a creative perspective; Developing potential uses of the designed product in line with future needs. Understanding furniture design elements (materials, details, production methods, etc.) Carrying out a user-oriented furniture design process
Course Learning Outcomes	1. Current approach to the discipline of furniture design, ability to master modern and historical examples 2. In the projects developed conceptually, he reaches results on an engineering basis, based on interdisciplinary communication, and is able to use and test materials and manufacturing methods. 3. Ability to manage a user-oriented furniture design process 4. Ability to use economics, marketing, consumer behavior, ergonomics and social psychology knowledge within the framework of sustainability criteria based on product-user relationship during the project development process. 5. Ability to participate in a design project in your field within a team or manage it independently
Instruction Methods	Face to face

Weekly Schedule

1. Week	Scope and general consideration of the concept of furniture
2. Week	Structural classification of furniture
3. Week	Basic features that identify a furniture
4. Week	Systematic shaping in furniture design
5. Week	Form search, Form synthesis
6. Week	Product synthesis and problem analysis
7. Week	Shape research according to general material properties
8. Week	Identity and personality issues of furniture
9. Week	Material conditions in furniture design
10. Week	Examining furniture according to human-element relationship: Body heigl spread in seating elements, spine angles according to human body position Position relationships in seating elements
11. Week	Function and Function dressing in furniture design
12. Week	Unchanging values, changing behaviors in furniture design
13. Week	Furniture – Furniture relations
14. Week	Scope and general consideration of the concept of furniture

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	9	1	9
Material Design and Implementation	10	2	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	2	10
Final Exam and Preperation for Final Exam	4	2	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.			**x**		
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			**x**		

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.		**x**			
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**			
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			**x**		
The Course's Lecturer(s) and Contact Informations		Department Management tasarim@gazi.edu.tr					

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**3**	**1**	**2**	**2**	**3**	**2**	**1**	**2**	**1**	**2**	**3**
Learning outcome 1	**1**				**1**					**1**	**1**
Learning outcome 2	**1**	**1**	**1**	**1**		**1**		**1**			**1**
Learning outcome 3	**1**		**1**	**1**	**1**					**1**	
Learning outcome 4					**1**	**1**	**1**		**1**		
Learning outcome 5								**1**			**1**

Course Description Form	
Course Code and Name	**ETM335 DESIGN FOR MANUFACTURABILITY**
Course Semester	5
Catalog Content	Ability to understand and apply production technologies and mechanisms Evaluating the effect of material selection and material properties on design Professional and ethical responsibility Ability to use modern engineering methods Teamwork and leadership skills Ability to communicate orally and in writing Ability to identify, formulate and solve problems Ability to design, implement and design experiments
Textbook	1. Anderson, D.M., Design for Manufacturability: How to Use Concurrent Engineering to Rapid Develop Low-Cost, High-Quality Products for Lean Production, CRC Press, USA, 2014.
Supplementary Textbooks	1. Bralla, J.G., Design for Manufacturability Handbook, Mc-Graw Hill Pub., 1998.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To be able to determine the criteria of design suitable for manufacturing To have detailed knowledge about manufacturing methods Identify limitations and difficulties arising from manufacturing methods in the design process To understand the relationship between material and manufacturing method
Course Learning Outcomes	1. Gaining the ability to apply theoretical principles through design examples 2. Developing the ability to understand and apply production technologies and mechanisms 3. Develop teamwork and communication skills in design engineering projects 4. Gaining competence to consider ethical and sustainability principles in design 5. Understanding the relationship between material selection and manufacturing method
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction **2. Week** Design of product components. **3. Week** Examination of product components in terms of mechanical design. **4. Week** Materials and material selection. **5. Week** Standard elements and fasteners. **6. Week** Production technologies. **7. Week** Mechanical and electro-mechanical mechanisms. **8. Week** Assembly methods. **9. Week** Processes of modification of physical and visual properties of components. **10. Week** Quality control methods. **11. Week** The effect of the chosen production method and material on the design. **12. Week** Factors determining production method preferences. **13. Week** Systems that control design and production methods. **14. Week** Design examples

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 5 Designing and implementing materials: 6 Report preparing: 5 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	4	8
Studies	3	5	15
Material Design and Implementation	2	6	12
Report Preparing	1	6	6
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				x			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			x				
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x				
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**4**	**3**	**5**	**4**	**3**	**1**	**1**	**1**		**3**	
Learning outcome 1	**1**	**1**	**1**	**1**	**1**					**1**	
Learning outcome 2	**1**	**1**	**1**	**1**	**1**						
Learning outcome 3	**1**		**1**	**1**				**1**			
Learning outcome 4			**1**			**1**	**1**			**1**	
Learning outcome 5	**1**	**1**	**1**	**1**	**1**					**1**	

Course Description Form	
Course Code and Name	**ETM336 ECONOMIC DESIGN**
Course Semester	6
Catalog Content	The importance of economics in industrial design and its effects on the economic consequences of design decisions The importance and strategies of cost management in the product development process Basic principles and organizational structure of product development cost accounts Analyzing the factors affecting manufacturing costs and examining the strategies used to reduce costs Management and control of costs in the product development process through the use of target costing and alternative cost techniques
Textbook	1. Parameswaran, M.A., An Introduction to Design Engineering, Alpha Science Pub., Int. Edition, 2004 2. Cross, N., Engineering Design Methods-Strategies for Product Design, John Wiley & Sons, Ltd., New York, 2001. 3. Yaşar, r. Ş yeni ürün geliştirme sürecinde maliyet yönetimi teknikleri, kitapana basim yayin dağitim bilişim izmir – 2016
Supplementary Textbooks	1. Elder, W.E. ve Hosnedl, S., Design Engineering: A Manual for Enhanced Creativity, CRC Press, Int. Edition, 2008.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the importance of cost management in industrial design and developing the ability to think cost-oriented in the design process Gaining the ability to perform cost analysis in the product development process and evaluating design decisions in terms of cost effectiveness Effective management and control of costs by applying strategic cost management principles in the product development process.
Course Learning Outcomes	1. Learning the basic concepts and skills related to cost management in industrial design. 2. Gaining the ability to perform cost analysis in product development phases and learning its applicability. 3. Understanding the importance of strategic cost management principles and relating them to real world applications. 4. Identifying strategies to reduce manufacturing costs and learning their applicability. 5. Developing cost optimization skills through the use of target costing methods and learning their applicability in practice.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction **2. Week** Cost responsibility of product developers **3. Week** Cost management in product development **4. Week** Methods for product development cost management and **5. Week** Impact on life cycle costs **6. Week** Impact on total costs **7. Week** Factors affecting manufacturing costs and processes to reduce costs **8. Week** Cost Management Systems **9. Week** The Importance of Cost Management in New Product Development Process **10. Week** Emergence of Target Costing **11. Week** Theory of Target Costing **12. Week** Basic Principles of Target Costing **13. Week** Target Costing Process **14. Week** Alternative Cost Management Techniques

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 3 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria		**Numbers**	**Total Weighting (%)**
	Midterm Exams	1	40
	Assignment	1	20
	Application		
	Projects		
	Practice		
	Quiz		
	Percent of In-term Studies (%)		**60**
	Percentage of Final Exam to Total Score (%)		**40**
	Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	4	20
Studies	5	3	15
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	x				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet	x				

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x					
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x				
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x					

The Course's Lecturer(s) and Contact Informations	Dr.Öğr. Üyesi Orhan ERDEN oerden@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**1**	**3**	**1**	**2**		**2**				**5**	**2**
Learning outcome 1	**1**	**1**		**1**						**1**	
Learning outcome 2		**1**		**1**						**1**	
Learning outcome 3										**1**	**1**
Learning outcome 4		**1**	**1**			**1**				**1**	
Learning outcome 5						**1**				**1**	**1**

Course Description Form	
Course Code and Name	**ETM337 COST ANALYSIS IN DESIGN**
Course Semester	5
Catalog Content	Understanding basic cost analysis Understand the analysis of costs allocated to different functions such as production, distribution and administration Analyze the relationship between production quantity, costs and profit and identify strategies to increase profitability
Textbook	1. Gündüz, H.E., Gürdal, K. ve Elmacı, O., Maliyet Analizleri, Anadolu Üniversitesi, 2013. Evans, J. R., Olson, D. L., & 2. Olson, D. L. (2007). Statistics, data analysis, and decision modeling. Pearson/Prentice Hall
Supplementary Textbooks	1. Blank, L., & Tarquin, A. (2005). Engineering economy. McGraw-Hill
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understand and analyze the role of economic factors and market conditions in the design process To gain the ability to solve complex problems and the ability to make logical analysis To gain the ability to create new solutions and designs by bringing together different knowledge and ideas To be able to calculate the costs of new products emerging in the design process and to evaluate these costs in economic terms
Course Learning Outcomes	1. Ability to analyze complex design problems in a rational way and produce logical and effective solutions 2. Ability to evaluate the economic impact of industrial design projects by analyzing economic factors and market conditions 3. Ability to manage industrial design projects and take an active role in decision-making processes 4. Ability to calculate the costs of new design products and optimize these costs 5. The ability to develop innovative design products and evaluate the marketability of these products through creative and synthetic thinking
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Definition of Supply and Demand **2. Week** Elasticities of Supply and Demand **3. Week** Temporary, short and long term **4. Week** Individual and market demand, utility theory **5. Week** Introduction to cost theory **6. Week** Total, average and marginal costs **7. Week** fixed and variable costs **8. Week** Economic review in Cost Analysis **9. Week** Cost Analysis in New Product Development Process **10. Week** Technical review in Cost Analysis **11. Week** Determination of capacity utilization rate **12. Week** Financial review in Cost Analysis **13. Week** Product Costing Process **14. Week** Determination of the repayment period

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 3 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria		**Numbers**	**Total Weighting (%)**
	Midterm Exams	1	40
	Assignment	1	20
	Application		
	Projects		
	Practice		
	Quiz		
	Percent of In-term Studies (%)		**60**
	Percentage of Final Exam to Total Score (%)		**40**
	Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	4	20
Studies	5	3	15
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet	x				

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x					
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.							
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x				
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x					

The Course's Lecturer(s) and Contact Informations	Dr.Öğr. Üyesi Orhan ERDEN oerden@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**3**	**1**	**2**				**1**		**3**	**2**
Learning outcome 1	**1**	**1**		**1**						**1**	
Learning outcome 2	**1**	**1**		**1**							
Learning outcome 3								**1**		**1**	**1**
Learning outcome 4		**1**	**1**								
Learning outcome 5										**1**	**1**

Course Description Form	
Course Code and Name	**ETM338 ECOLOGICAL DESIGN**
Course Semester	6
Catalog Content	Professional and ethical responsibility Ability to use modern engineering methods Teamwork and leadership skills. Ability to communicate verbally and in writing Ability to identify, formulate and solve problems Ability to design, implement and design experiments
Textbook	1. White, P., Pierre, L., Belletire and S. Okala, Practitioner: Integrating Ecological Design, Okala Team, 2013 2. Van der Ryn, S., Cowan, S., Ecological Design, Tenth Anniversary Edition, Island Press, 2007.
Supplementary	1. Melnick, R. (2001). Ecology and design: frameworks for learning. Island Press.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the engineering profession and ethics Understand the field of design engineering activities To learn solution approaches to engineering problems To have knowledge of basic design and engineering issues
Course Learning Outcomes	1. Awareness of social equity and taking these values into account in the design process 2. Develop an understanding of ecological design processes and the ability to manage these processes effectively 3. Gain the ability to learn and apply measurement methods of environmental performance 4. Understand eco design ideologies and develop the ability to design in line with these ideologies 5. Designs can be understood as a holistic system view, encompassing the full spectrum of environmental impacts over the entire life cycle
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction to ecological design **2. Week** Product system lifecycle **3. Week** Ecodesign strategy wheel **4. Week** Ecodesign ideologies **5. Week** Evolving strategies **6. Week** Design for recycling **7. Week** Ecological design processes **8. Week** Measuring environmental performance **9. Week** The science of life cycle assessment **10. Week** Assessment of toxicity **11. Week** Design ethics - Biotic and social imperatives **12. Week** Ecology for designers **13. Week** Ensuring social equality **14. Week** Ecological Design Practices

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 2 Internet browsing, library work: 5 Designing and implementing materials: 5 Report preparing: 7 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 4 Other:0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	4	2	8
Studies	3	5	15
Material Design and Implementation	2	5	10
Report Preparing	1	7	7
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to					x

		complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.						
	4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.					x	
	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x		
	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.					x	
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					x	
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).						
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).						
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x				
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	x					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Veysel ÖZDEMİR vozdemir@gazi.edu.tr						

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL			**5**	**5**	**4**	**5**	**5**			**2**	**1**
Learning outcome 1			**1**	**1**	**1**	**1**	**1**			**1**	
Learning outcome 2			**1**	**1**	**1**	**1**	**1**			**1**	
Learning outcome 3			**1**	**1**	**1**	**1**	**1**				
Learning outcome 4			**1**	**1**	**1**	**1**	**1**				
Learning outcome 5			**1**	**1**		**1**	**1**				**1**

Course Description Form	
Course Code and Name	**ETM339 SHEET METAL MOLD DESIGN**
Course Semester	5
Catalog Content	Sheet-metal dies and their importance in industry Factors affecting die operation, Sheet-metal behavior theory, Introduction of punching-cutting and bending dies, Die elements and their tasks, Calculations required for sheet-metal die design, Creation of lane layout plan, Punching-cutting, bending and drawing mold design Errors in molded parts and methods of eliminating errors
Textbook	1. Such, I. (2006). *Handbook of die design*. New York: Mc-Graw Hill Pub. 2. Boljonovic, V. (2005). *Die design fundamentals*. New York: Industrial Press.
Supplementary Textbooks	1. Research in Engineering Design 2. Int. Journal of Design Engineering
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the importance of sheet metal molds and industry, Learning the factors affecting mold operation, Learning mold elements and their functions, Being able to make the necessary calculations for sheet metal mold design, Learning drilling-cutting, bending, and drawing mold design, Learning the Errors Occurring in Molded Parts and Correction Methods
Course Learning Outcomes	1. Basis of die design is learned. 2. Better sheet-metal die designs based on knowledge of this course can be learned.
Instruction Methods	Face to face

Weekly Schedule	**1. Week**	Sheet-metal dies: Definition, functions and industrial importance
	2. Week	Basic sheet-metal die design
	3. Week	Factors affecting die operation
	4. Week	The theory of sheet metal behavior
	5. Week	Metal cutting/punching dies and their functions
	6. Week	Calculations required for cutting and punching dies
	7. Week	Strip material placement and efficiency in cutting and punching dies
	8. Week	Die elements
	9. Week	Cutting and punching mold design
	10. Week	Bending molds: Bending process and related calculations
	11. Week	Bending die design and bending die examples
	12. Week	Drawing dies: Drawing process and related calculations
	13. Week	Drawing die design and drawing die examples
	14. Week	Faults in molded parts and methods of eliminating faults

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 0 Internet browsing, library work: 4 Designing and implementing materials: 5 Report Preparing: 5 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 4

Assessment Criteria		**Numbers**	**Total Weighting (%)**
	Midterm Exams	1	40
	Assignment	1	20
	Application		
	Projects		
	Practice		
	Quiz		
	Percent of In-term Studies (%)		60
	Percentage of Final Exam to Total Score	1	40
	Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	4	20
Material Design and Implementation	2	5	10
Report Preparing	2	5	10
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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				x	
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		x			

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		x				
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.		x				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.			x			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.				x		
	10	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			
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	x					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail ŞAHİN isahin@gazi.edu.tr						

	Program Outcome 1	Program Outcome2	Program Outcome3	Program Outcome 4	Program Outcome5	Program Outcome6	Program Outcome 7	Program çıktısı 8	Program Outcome 9	Program Outcome10	Program Outcome11
TOTAL	**4**		**4**	**2**	**2**		**2**	**3**	**4**		
Learning outcome 1							**1**		**1**		
Learning outcome 2	**1**		**1**	**1**	**1**				**1**		
Learning outcome 3	**1**		**2**				**1**	**2**			
Learning outcome 4	**1**		**1**	**1**					**1**		
Learning outcome 5	**1**				**1**						
Learning outcome 6								**1**	**1**		

Course Description Form	
Course Code and Name	**ETM341 PSYCHOLOGY IN DESIGN**
Course Semester	5
Catalog Content	Understanding the dynamics behind behavior and decision-making processes General knowledge and skills about User Experience (UX) and User Interface (UI) design Ability in behavior design in the interaction between humans and the environment
Textbook	1. Joe Leech, Psychology for Designers: How to apply psychology to web design and the design process, mrjoe press; 2nd edition, 2017.
Supplementary Textbooks	1. Aarron Walter, Designing For Emotion, A Book Apart, 2020. 2. Sheena Iyengar, The Art Of Choosing: The Decisions We Make Everyday of our Lives, What They Say About Us and How We Can Improve Them, Abacus, 2011.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Gaining competency in understanding the psychological counterparts of the human mind and functions in psychology. Learning fundamental approaches and tools that take into account human behavior to find lasting design solutions to global challenges.
Course Learning Outcomes	1. Understanding of the fundamental psychological processes that govern human behavior, emotions, attitudes, and decision-making. 2. Understanding of the basic aspects of user interface design. 3. Knowledge of basic behavioral and social science methodology and psychometrics, including ethics. 4. Ability to conduct a simple behavioral intervention design.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to design psychology
2. Week	Understanding human behavior and experience
3. Week	Emotions, attitudes, and decision-making processes
4. Week	Human-technology interaction
5. Week	Psychometrics
6. Week	Introduction to design for behavior change
7. Week	Design methods for behavior change
8. Week	Design ethics
9. Week	Emotion mapping
10. Week	Design for well-being
11. Week	Becoming a savvy consumer of social science
12. Week	User Experience Design (UX)
13. Week	User Interface Design (UI)
14. Week	Application

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application	2	20
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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					
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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					
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.						
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.		**x**				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.			**x**			
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.		**x**				
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to	**x**					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.	**x**					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr						

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL							**2**	**3**	**2**	**1**	**1**
Learning outcome 1							**1**	**1**	**1**		
Learning outcome 2								**1**	**1**		
Learning outcome 3							**1**				
Learning outcome 4								**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM343 MANUFACTURING TECHNOLOGIES 2**
Course Semester	5
Catalog Content	Understanding of machining methods Understanding of work and tool molds Understanding of metal shaping methods Understanding of powder metallurgy Ability to manufacture a simple system using the learned methods
Textbook	1. Degarmo, E.P, Black, J.T. and Kohser, R.A. (1997). *Materials and processes in manufacturing*. USA: Prentice-Hall, Inc, Int. Ed. 2. Boothroyd, G., Knight, W. A. (1989). *Fundamentals of machining and machine cutting.* New York: Mark Dekker Inc. 3. M.P. Groover, *Fundamentals of modern manufacturing*, 3rd ed., 2007, Wiley
Supplementary Textbooks	1. Kalpakjian, S., Schmid, S. R. (2005). *Manufacturing engineering and technology*. Londra: Pearson, 5th Ed. 2. DeGarmo, E. P., Black, J. T. (2007). *Materials and processes in manufacturing.* USA: John Wiley & Sons, 10th Ed.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning machining methods Learning modern manufacturing methods Learning high-speed shaping of metals
Course Learning Outcomes	1. Learning basic operations and practical applications 2. Learning turning methods 3. Learning milling methods 4. Learning grinding methods 5. Learning work and assembly molds
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction and basic concepts
2. Week	Machining: Turning method, tools, fasteners
3. Week	Turning methods and applications
4. Week	Taper turning, screw drawing, spring winding
5. Week	Machining: Milling method tools, fasteners
6. Week	Milling methods and applications
7. Week	Simple division, split division
8. Week	Simple division, split division
9. Week	Slotted partition, Angular partition
10. Week	Machining: Grinding methods (sanding, grinding, honing, lapping, etc.)
11. Week	Plane grinding, Cylindrical grinding, Centerless grinding
12. Week	Tool sharpening and polishing operations
13. Week	Binding business patterns
14. Week	Assembly Molds

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0
Reading Activities: 0

Internet browsing, library work 5
Designing and implementing materials: 5

Report preparing: 0

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 4

Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)	1	60
Percentage of Final Exam to Total Score (%)	1	40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	2	7	14
Material Design and Implementation	5	5	25
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	x				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		x			
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.				x	

	6	Ability to work efficiently in intra-disciplinary teams.		x				
	7	Ability to work efficiently in multi-disciplinary teams.				x		
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.	x					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive				x		
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to			x			
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.		x				
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Adnan AKKURT aakkurt@gazi.edu.tr						

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program Outcome 8	Program Outcome 9	Program Outcome 10	Program Outcome 11
TOTAL	**1**	**2**	**1**	**2**	**4**	**2**	**4**	**1**	**4**	**3**	**2**
Learning outcome 1	**1**	**1**	**1**		**1**		**1**	**1**	**1**		
Learning outcome 2		**1**		**1**	**1**		**1**		**1**		**1**
Learning outcome 3			**1**	**1**	**1**				**1**	**1**	
Learning outcome 4					**1**	**1**	**1**		**1**	**1**	
Learning outcome 5			**1**				**1**			**1**	**1**

Course Description Form	
Course Code and Name	**ETM350 SYSTEMATIC DESIGN 2**
Course Semester	6
Catalog Content	Preparation and project selection, Introduction to Embodiment Design (ED), ED concepts and issues, ED general rules (clarity, simplicity and safety), ED principles (force distribution, separation of services, self-help, stability and bi-stability, flawless design), ST sample (Impact experimental set). ED example (Impulse-loading test rig).
Textbook	1. Börklü, H.R. (Turkish trans.), Mühendislik Tasarımı Sistematik Yaklaşım ('Pahl, G., Beitz, W., Feldhusen, J. ve Grote, K.H, Engineering Design: A Systematic Approach, Springer, 2007'), Hatiboğlu Yayınevi, Ankara, 2010.
Supplementary Textbooks	1. Cross, Nigel. Engineering design methods: strategies for product design. John Wiley & Sons, 2021.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To have knowledge about ED concepts and issues Learning the general rules of ED (clarity, simplicity and safety) Learning the ED Principles Examine and understand ED examples To be able to perform ED of simple systems
Course Learning Outcomes	1. Ability to apply basic principles of forming design 2. Ability to define the components of systems, determine their relationships, and evaluate the interactions between these components 3. Ability to design systems in accordance with engineering standards and methods 4. Ability to understand problems by seeing real-world applications of forming design
Instruction Methods	Face to face

Weekly Schedule

1. Week	Summary and evaluation of Systematic Design 1 course
2. Week	Selection of the term design project
3. Week	Embodiment Design (ED): Introduction, Importance, Application
4. Week	Concepts and issues of ED
5. Week	A checklist for ED, ED General rules: (a) Clarity
6. Week	ED General rules: (b) Simplicity, (c) Safety (general)
7. Week	(c) Safety (direct, indirect and warnings), Data sheets
8. Week	Material selection, Application with the use of ED checklist
9. Week	Principles of ED: (a) Force transmission (Flow lines of force and uniform strength, Direct and short force transmission path, Matched deformations)
10. Week	Balanced forces, (b) Division of tasks (Assignment of Sub-functions, Division of tasks for distinct functions, Division of tasks for identical functions)
11. Week	(c) Self-help (Self-reinforcing solutions, Self-balancing solutions, Self-protecting solutions)
12. Week	(d) Stability and bi-stability, (e) Fault-free design
13. Week	ED example: Impulse-loading test rig
14. Week	Examination of design projects

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 2
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 2
Presentations: 1
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects	1	20
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	5	2	10
Material Design and Implementation	5	2	10
Report Preparing			
Preparing a Presentation	10	2	20
Presentations	3	1	3
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	2	2
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		**x**			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		**x**			
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		**x**			

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**				
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Hüseyin Rıza BÖRKLÜ rborklu@gazi.edu.tr					

	Program Outcome1	Program Outcome2	Program Outcome3	Program Outcome4	Program Outcome5	Program Outcome6	Program Outcome7	Program çıktısı 8	Program Outcome9	Program Outcome10	Program Outcome11
TOTAL	**2**	**2**	**2**	**2**	**2**	**1**					**1**
Learning outcome 1	**1**	**1**	**1**	**1**	**1**						**1**
Learning outcome 2	**1**	**1**									
Learning outcome 3			**1**								
Learning outcome 4				**1**	**1**	**1**					

Course Description Form	
Course Code and Name	**ETM351 AUTOMATIC CONTROL**
Course Semester	5
Catalog Content	Learning the definition, importance and application areas of automatic control, mathematical foundations such as differential equations, Laplace Transform, function transformations, basic control concepts such as feedback control, open and closed loop systems, block diagrams, mathematical modeling of dynamic systems and control strategies of these systems by applying them through examples.
Textbook	1. Özdağ, N., Dinibütün, A.T., Kuzucu, A. (1998). *Otomatik kontrol temelleri*. İstanbul: Birsen Yayıncılık. 2. Kuo, B.J. (1999). *Otomatik kontrol sistemleri.* İstanbul: Literatür Yayıncılık.
Supplementary Textbooks	1. Raven, F. H. (1968). *Automatic control engineering*. McGraw-Hill.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach automatic control subjects and methods. To provide application skills. To give the concept of circuit and system and to be able to apply it. To teach obtaining models of physical systems. To teach how to do system design.
Course Learning Outcomes	1. Ability to explain basic concepts about automatic control 2. Ability to apply Laplace Transform and Inverse Laplace Transform to transform functions from time-domain(t) to frequency-domain(s) (or vice versa) 3. Be able to mathematically model dynamic systems and establish system dynamics 4. Ability to show control systems with block diagrams 5. Ability to use the information learned within the course in solving design problems
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to Automatic Control: System, control and automatic control output, control, disturbance variables);
2. Week	Control loop and its components; Open-loop control and closed-loop cont disadvantages of open-loop and closed-loop.
3. Week	Gain, transfer function
4. Week	Examine and design the control loop
5. Week	Laplans transform
6. Week	Transfer function and characteristic function
7. Week	Applications
8. Week	Experimental studies
9. Week	System dynamics
10. Week	Electrical and mechanical system elements
11. Week	Transfer function, block diagram and signal flow diagram
12. Week	Applications
13. Week	Controller types
14. Week	Experimental studies, closed loop control

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 1
Designing and implementing materials: 1
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	1	5
Studies	14	1	14
Material Design and Implementation	14	1	14
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	4	2	8
Final Exam and Preperation for Final Exam	3	2	6
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	**x**				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			**x**		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and	**x**				
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				**x**	
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			**x**		

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	**x**				
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**				
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		**x**			
The Course's Lecturer(s) and Contact Informations		Department Management tasarim@gazi.edu.tr					

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**3**	**1**	**4**	**3**	**1**		**1**	**1**	**2**	**2**
Learning outcome 1	**1**										**1**
Learning outcome 2		**1**		**1**							
Learning outcome 3		**1**	**1**	**1**	**1**	**1**			**1**	**1**	
Learning outcome 4				**1**	**1**						
Learning outcome 5		**1**		**1**	**1**			**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM352 DESIGN FOR ADDITIVE MANUFACTURING**
Course Semester	6
Catalog Content	Additive manufacturing and application areas Materials used in additive manufacturing Additive manufacturing technologies Basic principles of Design for Additive Manufacturing Part consolidation and toptology optimization Part consolidation and generative design Multi-scale structure design
Textbook	1. Leary, Martin. Design for additive manufacturing. Elsevier, 2019. 2. Diegel, Olaf, Axel Nordin, and Damien Motte. A practical guide to design for additive manufacturing. Singapore: Springer Singapore, 2019.
Supplementary Textbooks	1. Ian Gibson, David Rosen, Brent Stucker "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing", Springer, 2014 2. İsmail Şahin, Design for Additive Manufacturing Lecture Notes, 2023
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Explain the industrial application areas of additive manufacturing Evaluate the advantages and limitations of different additive manufacturing technologies Integrating additive manufacturing design and manufacturing processes Developing the ability to work with different materials in additive manufacturing Integrate design for additive manufacturing methods such as topology optimization, generative design and lattice structures into designs Developing innovative solutions to various design and production problems
Course Learning Outcomes	1. To have knowledge about the basic concepts and history of additive manufacturing. 2. Application areas of additive manufacturing and materials used are recognized. 3. Understand metallic and non-metallic additive manufacturing technologies. 4. Capabilities and limitations of additive manufacturing technologies can be assessed. 5. Strategic and functional design principles can be applied to additive manufacturing. 6. Multi-scale and multi-material design approaches can be integrated and applied.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to additive manufacturing: Definitions and history
2. Week	Application areas of additive manufacuring
3. Week	Materials used in additive manufacturing
4. Week	Metal additive manufacturing and technologies
5. Week	Non-metallic additive manufacturing and technologies
6. Week	Additive manufacturing technologies: Capabilities and Limitations
7. Week	Strategic design considerations for Additive manufacturing
8. Week	Basic principles of Design for Additive Manufacturing (DfAM)
9. Week	Methods and tools of the DfAM approach
10. Week	Part consolidation and topology optimization
11. Week	Part consolidation and generative design
12. Week	Multi-scale structure design
13. Week	Multi-material design and part assembly
14. Week	Lattice structures

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 4
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation: 0
Presentations: 2
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects	1	20
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Wor
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Internet Studies, library	4	4	16
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations	4	2	8
Midterm Exam and Preperation for Midterm Exam	1	5	5
Final Exam and Preperation for Final Exam	1	5	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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				**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		**x**			
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					**x**

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.			**x**		
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.					
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.				**x**	
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.				**x**	
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.			**x**		
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome 1	**Program Outcome2**	**Program Outcome 3**	**Program Outcome4**	**Program Outcome 5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome 11**
TOTAL	**4**	**3**	**2**	**5**	**3**	**1**		**4**	**4**		**3**
Learning outcome 1				**1**	**1**						
Learning outcome 2	**1**	**1**		**1**				**1**	**1**		**1**
Learning outcome 3	**1**		**1**	**1**							
Learning outcome 4		**1**			**1**	**1**		**1**	**1**		
Learning outcome 5	**1**	**1**	**1**	**1**	**1**			**1**	**1**		**1**
Learning outcome 6	**1**			**1**				**1**	**1**		**1**

Course Description Form	
Course Code and Name	**ETM353 MODELMAKING AND PROTOTYPING**
Course Semester	5
Catalog Content	Basic modeling skills Determination of the techniques used in the process of transforming product designs into physical models Ability to select and use different modeling techniques Creating models with functional properties
Textbook	1. Hallgrimsson, B. (2012). *Prototyping and modelmaking for product design*. China: Laurence King Pub, Int. Ed.
Supplementary Textbooks	1. Direct-Write Technologies for Rapid Prototyping Applications : Sensors, Electronics, and Integrated Power Sources
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To learn basic modeling techniques To have knowledge about transforming design concepts into physical models Learning rapid prototyping techniques
Course Learning Outcomes	1. Gain knowledge of basic modeling techniques to meet current needs for engineering design. 2. Learn the techniques used in the process of transforming complex product designs into physical models under different constraints and conditions. 3. 3Develop the ability to select and use appropriate modeling techniques for engineering design. 4. Gain knowledge about the effects of modeling techniques on health and safety, economy, sustainability and environment.
Instruction Methods	Face to face

Weekly Schedule

1. Week	General information about the aim, content and evaluation methods of the course
2. Week	The role of modeling and prototyping in design engineering
3. Week	Basic modeling tools and materials
4. Week	Introduction to model making: Selection of materials and tools, health and safety rules.
5. Week	Introduction to model making: Model planning and design process, scaling, choosing the scale and assembly technical information.
6. Week	Simple modeling techniques: Cardboard, model cardboard, etc. model making with mate
7. Week	Simple modeling techniques: Model making with cardboard, model cardboard, etc.
8. Week	Simple modeling techniques: Model making with balsa
9. Week	Simple modeling techniques: Model making with balsa
10. Week	Simple modeling techniques: Foam materials, gluing and filling materials
11. Week	Simple modeling techniques: Foam materials, gluing and filling materials
12. Week	Design and construction of models with functional features
13. Week	Use of 3D printers and rapid prototyping techniques
14. Week	Surface treatment and detailing

Teaching and Learning Methods

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 2
Designing and implementing materials: 0
Report preparing: 2
Preparation of presentation: 3
Presentation: 2
Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment		
Application		
Projects	1	30
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	8	2	16
Material Design and Implementation			
Report Preparing	5	2	10
Preparing a Presentation	4	3	12
Presentations	1	2	2
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.					
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.		x			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	x				

	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x						
	6	Knowledge of the effects of engineering practices on society, health and safety, economy	x						
	7	Acting in accordance with the ethical principles of the engineering profession,							
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.	x						
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							
The Course's Lecturer(s) and Contact Informations		Head of Department tasarim@gazi.edu.tr							

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**	**1**	**1**				**1**	
Learning outcome 1			**1**								
Learning outcome 2			**1**								
Learning outcome 3				**1**	**1**						
Learning outcome 4						**1**				**1**	

Course Description Form	
Course Code and Name	**ETM354 AUTOMOTIVE DESIGN**
Course Semester	6
Catalog Content	History of vehicle architecture in design Gain an overview of the automotive design process Learning about systems and market segments Learning motion transmission systems Basic aerodynamic body design Identify safety and accident regulations
Textbook	Macey, S., Wardle, G., The Fundamentals of Car Design and Packaging, Design Studio Press, 2009
Supplementary Textbooks	Hoadley, F.E., Automobile Design Techniques & Design Modeling: The Men, the Methods & the Materials, T a H Productions, 1999
Credit	**3 AKTS**
Prerequisites of the Course	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning automotive design processes Basic knowledge for a good automotive design provided Learning product development and conceptual design processes
Course Learning Outcomes	1. Learn how to effectively use computer-aided computing and in-depth knowledge of the automotive industry to solve complex engineering problems. 2. Learn to design complex systems, processes, devices or products under realistic constraints and conditions. 3. To be able to select and use appropriate techniques, resources, and modern engineering and information technology tools for the analysis and solution of complex engineering problems. 4. To be able to work effectively as a team member or leader, both individually and in interdisciplinary teams.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction - History of vehicle architecture in design
2. Week	Overview of the design process
3. Week	Functional objectives, Systems and market segments
4. Week	Size and proportion
5. Week	Interiors and cargo
6. Week	Movement transfer line
7. Week	Wheels and tires
8. Week	Suspension and Chassis
9. Week	Body
10. Week	Aerodynamics
11. Week	Safety and accident regulations
12. Week	Portability
13. Week	Design exercises
14. Week	A general design assignment

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0

Reading Activities: 1

Internet browsing, library work: 4

Designing and implementing materials: 6

Report preparing: 4

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 5

Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	**1**	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	1	5
Studies	3	4	12
Material Design and Implementation	2	6	12
Report Preparing	2	4	8
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	5	5
Final Exam and Preperation for Final Exam	1	5	5
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
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	x				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	x				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.					

	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.						
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.	x					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.						
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to						
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.						
The Course's Lecturer(s) and Contact Informations		Assoc. Prof. Dr. Harun Gökçe harungokce@gazi.edu.tr						

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL	**1**		**1**	**1**				**1**			
Learning outcome 1	**1**										
Learning outcome 2			**1**								
Learning outcome 3				**1**							
Learning outcome 4								**1**			

Course Description Form	
Course Code and Name	**ETM355 PLASTICS MATERIALS AND TECHNOLOGY**
Course Semester	5
Catalog Content	Investigation of general properties of plastics. Basic principles of design with plastics and the use of design data for plastics Introduction of joining methods of plastics and learning of application areas
Textbook	1. Strong, A. B., Plastics: Materials and Processing, Englewood Cliffs: New Jersey, Prentice-Hall, Inc., 2nd Ed., 2000. 2. Harper, C.A. and Petrie, E.M. Plastics Materials and Processes: A Concise Encyclopedia, John Wiley & Sons Pub. USA, 2003.
Supplementary Textbooks	1. Callister, W. D., & Rethwisch, D. G. Materials science and engineering: an introduction (Vol. 7, pp. 665-715). New York: John wiley & sons, 2007.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To provide an understanding and recognition of the molecular structure, properties and important plastic groups of polymer materials To understand the processing and shaping methods of plastics and to provide an understanding of different processing processes To contribute to the development of skills in the use of plastics in design, strengthening methods and plastic joining techniques
Course Learning Outcomes	1. Develop a comprehensive understanding of the molecular structure and properties of polymer materials 2. To understand the processing and shaping methods of plastics and to comprehend the applicability of these methods. 3. Recognize different types of reinforced plastics and identify their application areas. 4. To develop skills in the design of plastics and to learn effective design strategies. 5. Understanding the applicability of different plastic joining techniques and the role of these techniques in the design process.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** — Introduction **2. Week** — Polymer Materials, Molecular Structure and Blends. **3. Week** — Introduction of Important Plastic Groups. **4. Week** — General Properties of Plastics: Strength, Toughness, Fatigue, Hardness, Temperature Effect Flammability, Chemical Effect and Electrical Properties. **5. Week** — Reinforced Plastics and Reinforcement Types. **6. Week** — Design with Plastics, Design Data for Plastics. **7. Week** — Reinforced Plastic Designs. **8. Week** — Injection Process. **9. Week** — Extrusion, Pressure and Transfer Molding, Blow Molding **10. Week** — Heat Forming, Rolling, Casting, Foaming. **11. Week** — Joining Methods. **12. Week** — Design examples **13. Week** — Design examples **14. Week** — Design examples

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 3 Designing and implementing materials: 3 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	4	20
Studies	5	3	15
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload			75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	x				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet	x				

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x						
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.								
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x							
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).								
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x					
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x						

The Course's Lecturer(s) and Contact Informations	Dr.Öğr. Üyesi Orhan ERDEN oerden@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**1**	**3**	**1**	**2**		**1**	**1**	**1**		**3**	**2**
Learning outcome 1	**1**	**1**		**1**						**1**	
Learning outcome 2		**1**		**1**							
Learning outcome 3										**1**	**1**
Learning outcome 4		**1**	**1**			**1**					
Learning outcome 5							**1**	**1**		**1**	**1**

Course Description Form	
Course Code and Name	**ETM356 Plastic Mold Design**
Course Semester	6
Catalog Content	Recognition and understanding of industrial plastic materials and their properties Learning different shaping methods for plastic and metal materials, such as injection molding, extrusion, blow molding, rotational molding, thermoforming Learning compression molding technologies for thermoplastics and thermoset plastics Acquiring knowledge about mold manufacturing for plastic parts, such as forging molds, volume mold production, and mold materials
Textbook	1. **Donald V. Rosato** Plastics Technology Handbook, Vol. 2, Momentum Press, 2011 2. **Donald** V. Rosato, Marlene G. Rosato Injection Molding Handbook - 2 Volume Set, Springer, 2000 3. D.J. Ramazzotti, "How to Plan a Rota- tional Molding Facility", Plastics Tech- nology, Vol. 18, No. 1, January 1972
Supplementary Textbooks	Plastics manufacturing system engineering, D. Kazmer, Hanser Publications, 2009.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning the knowledge and skills to make volume molds suitable for the technique Learning volume mold techniques Learning volume mold production methods Learning volume mold design
Course Learning Outcomes	1. Plastic material properties are learned. 2. Machine properties for volume molds are learned. 3. Errors, causes, and solutions of plastic injection molds are learned; material properties used in volume mold production are learned. 4. General properties of metal injection molds are learned; blow molding and extrusion mold parameters are learned. 5. Mold component drawings and productions are learned; mold material analysis and cost analysis are conducted.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Plastic material properties
2. Week	Plastic material properties
3. Week	Considerations in the Design of Plastic Injection Mould Highlights
4. Week	Multiple Should Be Opened Moulds, Moulds Pit and given to Match Angles
5. Week	Distributor Channel type, Input type, Gating Sign
6. Week	Runner Pull Pin, Push Pin Back And Ejector Pins, Cam Systems and Operating Specifications
7. Week	Hot Runner Systems and User's Goals, air ducts
8. Week	Conversion Seals, Brands,
9. Week	Recruitment Available Material Selection
10. Week	The materials used in metal injection molding
11. Week	Comparison of metal injection molding and plastic
12. Week	The general acteristics of blow molding
13. Week	The general acteristics of extrusion mold
14. Week	Implementation of the Right Mold Heating and Cooling Techniques

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing:
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)	1	40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	x				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		x			
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.				x	

	6	Ability to work efficiently in intra-disciplinary teams.		x				
	7	Ability to work efficiently in multi-disciplinary teams.				x		
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.	x					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive				x		
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to			x			
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.		x				
The Course's Lecturer(s) and Contact Informations		Prof. Dr. Adnan AKKURT aakkurt@gazi.edu.tr						

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program Outcome 8	Program Outcome 9	Program Outcome 10	Program Outcome 11
TOTAL	**1**	**3**	**1**	**2**	**4**	**2**	**4**	**1**	**4**	**3**	**3**
Learning outcome 1	**1**	**1**	**1**		**1**	**1**	**1**	**1**	**1**		
Learning outcome 2		**1**		**1**	**1**		**1**		**1**		**1**
Learning outcome 3			**1**	**1**	**1**				**1**	**1**	**1**
Learning outcome 4		**1**			**1**	**1**	**1**		**1**	**1**	
Learning outcome 5			**1**				**1**			**1**	**1**

Course Description Form	
Course Code and Name	**ETM357 GEOMETRIC DIMENSIONING AND TOLERANCING**
Course Semester	5
Catalog Content	Advanced dimensioning policies Tolerances and precision dimensioning fundamentals Part measurement techniques regarding geometric dimensioning and tolerancing Tolerance control with graphic analysis
Textbook	1. Çuvalcı O. Geometrik Toleranslar ve Uygulamaları. NobelAkademik Yayıncılık, 2021. 2. Meadows, James D. Geometric dimensioning and tolerancing: applications and techniques for use in design, Manufacturing and Inspection. Routledge, 2017.
Supplementary Textbooks	1. Henzold, Georg. Geometrical dimensioning and tolerancing for design, manufacturing and inspection: a handbook for geometrical product specification using ISO and ASME standards. Elsevier, 2006.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding advanced dimensioning principles Understanding the principles of geometric dimensioning and tolerancing, including tolerances and precise dimensioning applications. Learning part measurement techniques regarding geometric dimensioning and tolerancing Analysis of measurements Display of dimensioning and tolerances on the application
Course Learning Outcomes	1. Understand the definition, types and application areas of geometric tolerances and be able to evaluate the importance of geometric tolerances. 2. Ability to read and interpret engineering drawings and apply knowledge of geometric tolerances 3. Ability to interpret tolerance symbols correctly and apply measurement techniques 4. Ability to use different geometric measurement methods and tolerancing techniques in practical applications 5. Ability to understand and apply quality control and quality assurance principles related to geometric tolerancing
Instruction Methods	Face to face

Weekly Schedule

1. Week	General concepts
2. Week	Dimensions and measurement tolerances
3. Week	Basic concepts in geometric dimensioning and tolerancing
4. Week	Geometric tolerance symbols and frames
5. Week	Material conditions and rules
6. Week	Reference and reference planes
7. Week	Shape and profile tolerances
8. Week	Example applications
9. Week	Orientation tolerances
10. Week	Position tolerances
11. Week	Tolerances of fastener holes
12. Week	Runout tolerances
13. Week	Tolerancing practices
14. Week	Tolerance control with graphic analysis

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 1
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 1

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	1	5
Studies	5	1	5
Material Design and Implementation	14	2	28
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	3	2	6
Final Exam and Preperation for Final Exam	3	1	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.	**x**				
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and			**x**		
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	**x**				

	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**					
	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**					
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	**x**					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and		**x**				
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		**x**				
The Course's Lecturer(s) and Contact Informations		Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**
Learning outcome 1	**1**	**1**									**1**
Learning outcome 2			**1**		**1**				**1**		
Learning outcome 3			**1**	**1**				**1**		**1**	**1**
Learning outcome 4			**1**							**1**	
Learning outcome						**1**	**1**				

5											

Course Description Form	
Course Code and Name	**ETM358 ENERGY SYSTEMS DESIGN**
Course Semester	6
Catalog Content	Understanding the importance and basic concepts of thermal and fluid systems Understanding the optimization of the design of thermal and fluid systems Professional and ethical responsibility Ability to communicate orally and in writing Ability to use modern engineering methods Ability to identify, formulate and solve problems Ability to design, implement and design experiments
Textbook	1. Hodge, B.K. and Taylor, R.P., Analysis and Design of Energy Systems, Prentice Hall Pub., 1999
Supplementary Textbooks	1. Tostevin, G.M., Energy Systems Design and Operations: A Unified Method, Prentice Hall Pub., 2011.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To develop the ability to analyze and evaluate system performance using computer-aided simulations To gain the ability to evaluate the efficiency and economic effectiveness of the designed systems Ability to design system components such as pipelines, heat exchangers and power generators Developing teamwork and communication skills
Course Learning Outcomes	1. Gain the ability to apply the design of thermal and fluid systems. 2. Ability to design better and in accordance with scientific/engineering fundamentals. 3. Develop teamwork and communication skills in Design Engineering applications. 4. Gain competence in performing computer-aided simulations of thermal and fluid systems. 5. To be able to evaluate the performance of designed systems and analyze their efficiency
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Pipelines **2. Week** Applications **3. Week** Heat exchangers-I (exchangers) **4. Week** Applications **5. Week** Heat exchangers-II **6. Week** Applications **7. Week** Power generators **8. Week** System simulation **9. Week** Analysis and modeling of thermal and fluid systems **10. Week** Evaluate system performance **11. Week** Considering system economics **12. Week** System design optimization **13. Week** An example of a generic design **14. Week** Pipelines

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 2 Internet browsing, library work: 4 Designing and implementing materials: 5 Report preparing: 2 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 4 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	7	2	14
Studies	3	4	12
Material Design and Implementation	2	5	10
Report Preparing	2	2	4
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.				x	
3	Ability to generate creative solutions to complex engineering problems to meet			x		

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x						
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.			x					
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x							
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	x							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.								
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.								

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**4**	**4**	**3**	**2**	**4**	**1**	**1**		**1**		
Learning outcome 1	**1**	**1**	**1**	**1**	**1**						
Learning outcome 2	**1**	**1**	**1**		**1**						
Learning outcome 3								**1**	**1**		
Learning outcome 4	**1**	**1**		**1**	**1**		**1**				
Learning outcome 5		**1**			**1**	**1**					

Course Description Form	
Course Code and Name	**ETM359 COMPUTER AIDED DESIGN 2**
Course Semester	5
Catalog Content	Design 2D and 3D parts Ability to use computer software Defining problems and creating solution suggestions Adapting to new technologies
Textbook	1. Kodlab, Solidworks & Solidcam & 3D Quickpress & 3D Quickmold, 2023 2. Tatar, H. Catia, Pusula Yay., Ankara 2023.
Supplementary Textbooks	1. Say, SM., Şehri M. Bilgisayar Destekli Tasarımın Temelleri Ve Uygulamalar, Karahan Kitabevi, Ankara, 2013.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites- %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach students the basic principles of computer-aided design and 2D drawing techniques. To provide students with practical skills in solid and surface modeling by improving their 3D modeling skills. Realizing the design of complex products and systems To provide knowledge and application skills on sheet metal design and processing techniques in a computer-aided design environment. Creating construction pictures of a product and/or system
Course Learning Outcomes	1. Students can accurately and effectively create 2D drawings and 3D models using computer-aided design tools 2. Can design functional assemblies by combining different parts 3. Can create technical documents in accordance with engineering standards
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction and Fundamentals of Computer Aided Design **2. Week** 2D Drawing Fundamentals and Tools **3. Week** Advanced 2D Drawing Techniques and applications **4. Week** 3D Modeling Fundamentals **5. Week** 3D Part Modeling Techniques **6. Week** 3D Part Modeling and Application **7. Week** 3D Part modeling and Editing **8. Week** Introduction to Assembly Design **9. Week** Assembly Design and Analysis **10. Week** Assembly and Motion Simulations **11. Week** Part-level Drawing and Documentation **12. Week** Technical Drawing and Documentation at assembly level **13. Week** Surface modeling Design and Modeling **14. Week** Surface modeling Application

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 0 Internet browsing, library work: 4 Designing and implementing materials: 6 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam:4 Final Exam and Preparation for Final Exam: 5

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	2	4	8
Material Design and Implementation	5	6	30
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	5	5
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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			**x**			
	4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.		**x**				
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.						
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.						
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.						
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.	**x**					
	10	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**					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.			**x**			

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program Outcome 1	**Program Outcome 2**	**Program Outcome 3**	**Program Outcome 4**	**Program Outcome 5**	**Program Outcome 6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome 10**	**Program Outcome 11**
TOTAL	**1**	**2**	**3**	**2**					**1**	**1**	**3**
Learning outcome 1	**1**	**1**	**1**	**1**							**1**
Learning outcome 2		**1**	**1**	**1**						**1**	**1**
Learning outcome 3			**1**						**1**		**1**
Learning outcome 4											
Learning outcome 5											

Course Description Form	
Course Code and Name	**ETM360 DESIGN FOR BEHAVIOUR CHANGE**
Course Semester	6
Catalog Content	Ability to analyze human behaviors Ability to conduct user research and interpret data Ability to recognize and forecast trends and patterns Understanding and applying user-centered design principles Ability to create and analyze behavioral models Ability to develop continuous improvement and optimization strategies Ability to collaborate and communicate effectively within a team Ability to listen to user feedback and guide it for product or service improvement
Textbook	1. Kristina Niedderer, Stephen Clune, Geke Ludden, Design for Behaviour Change - Theories and Practices of Designing for Change, Routledge; 1st edition, 2017.
Supplementary Textbooks	1. Stephen Wendel, Designing for Behavior Change, 2nd Edition, O'Reilly Media, Inc., 2020
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning behavior dynamics Improving product-human and human-human interaction Implementing effective designs focused on problems and goals Designing for behavior change
Course Learning Outcomes	1. Learning strategies to help change people's behaviors. 2. Identifying desired behaviors to change in the target audience and the barriers that stand in the way. 3. Developing enjoyable, effective designs. 4. Ensuring the measurement and improvement of the product's impact. 5. Learning to synthesize behavioral science with data science to identify problems and test potential solutions.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction: Design for behavior change, Relationship and challenges of change in the 21st century
2. Week	Introduction to models, methods, and tools for behavior change design
3. Week	Design interventions for sustainable behavior
4. Week	Design, behavior change, and design with intent toolkit
5. Week	Application
6. Week	Improving interaction by understanding the user
7. Week	Design for healthy behavior
8. Week	Facilitating behavior change through mindful design
9. Week	Application-focused design
10. Week	The hidden impact of design
11. Week	Design for behavior change and sustainability, health and well-being
12. Week	Design for social behavior change
13. Week	Application examples
14. Week	Application

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application	2	20
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	**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	**x**				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	**x**				

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.		**x**			
	6	Ability to work efficiently in intra-disciplinary teams.					
	7	Ability to work efficiently in multi-disciplinary teams.					
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.					
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**1**	**1**	**1**	**1**	**2**						
Learning outcome 1					**1**						
Learning outcome 2					**1**						
Learning outcome 3			**1**								
Learning outcome 4				**1**							

Learning outcome 5	**1**										

Course Description Form	
Course Code and Name	**ETM416 COMPUTER AIDED MANUFACTURING**
Course Semester	7-8
Catalog Content	Using computer-aided manufacturing tools Planning sustainable manufacturing processes Using modern engineering tools Ability to communicate verbally and in writing Ability to identify, formulate and solve problems
Textbook	1. M., Gülesin, A., Güllü, Ö., Avcı, G., Akdoğan, CNC Torna ve Freze Tezgahlarının Programlanması, Asil Yay., Ankara, 2005. 2. Gülesin, M., Güllü, A., Avcı, Ö, SINUMERIK Kontrol Sistemi İle Torna ve Frezelerin Programlanması, Asil Yay., An, 2007.
Supplementary Textbooks	1. Mattson M., CNC Programming: Principles and Applications, Delmar Publishers, USA, 1998. 2. Smid, P., CNC Programming Handbook, Second Edition, ISBN: (0-8311-) 3134-9 2003
Credit	**3 AKTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding modern production processes Planning sustainable and economical engineering processes Learning solution approaches to engineering problems Having knowledge about production and engineering issues Gaining interdisciplinary communication skills
Course Learning Outcomes	1. Can write the necessary codes to process parts on CNC lathe and milling machines 2. Gain knowledge about modern manufacturing processes 3. Can design engineering components suitable for manufacturing
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction to computer aided manufacturing **2. Week** Coordinate systems **3. Week** Basic components of CNC machines **4. Week** Cutting Tools and Cutting Parameters **5. Week** Design suitable for manufacturing **6. Week** Introduction to CAM software **7. Week** CNC Programming Fundamentals **8. Week** Programming Simple Workpieces **9. Week** Programming the CNC Milling machine **10. Week** Part machining with CNC milling machine **11. Week** Programming the CNC lathe **12. Week** Part machining with CNC lathe **13. Week** Processing of 3D parts on CNC machines **14. Week** Debugging and Optimization in CNC Machines

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 3 Internet browsing, library work: 2 Designing and implementing materials: 4 Report preparing: 0 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 2 Final Exam and Preparation for Final Exam: 2 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment		
Application	1	20
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	6	2	12
Material Design and Implementation	4	4	16
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	2	2
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		x			
3	Ability to generate creative solutions to complex engineering problems to meet	x				

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.	x						
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x						
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		x					
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x					
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x				

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**2**	**1**	**1**	**1**	**2**		**2**		**2**	**3**
Learning outcome 1	**1**		**1**	**1**	**1**			**1**		**1**	**1**
Learning outcome 2		**1**				**1**					**1**
Learning outcome 3	**1**	**1**						**1**		**1**	**1**
Learning outcome 4											
Learning outcome 5											

Course Description Form	
Course Code and Name	**ETM432 ROBOTICS**
Course Semester	7-8
Catalog Content	Understanding basic robotics concepts Ability to use modern engineering methods Classify robotic systems Ability to identify, formulate and solve problems Classifying the types of robotic systems and analyzing their structures Understanding the process of setting up a robot and gaining the ability to realize this process with practical applications
Textbook	1. Koren, Y. (1985). Robotics for engineers. New York: McGraw-Hill Pub., Int. Ed. 2. Niku, S.B. (2010). Introduction to robotics: analysis, control, applications. USA: John Wiley & Sons Pub.
Supplementary Textbooks	1. Craig, J. J. (2009). *Introduction to robotics: mechanics and control*, *3/E*. India: Pearson Education.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understand the basic principles of robotic systems by understanding basic robotic concepts Having knowledge about sensors and intelligent robots and learning how to use them in robotic systems To be able to design and develop robot mechanisms
Course Learning Outcomes	1. Understand basic concepts of robotics and describe the structure of robotic systems. 2. Examine different robotic applications and develop robotic solutions to be used in various industrial, medical or service sectors. 3. Developing programming skills and gaining the ability to develop software for different robotic applications 4. Gain the ability to evaluate the ethical and social impacts of robotic systems and apply sustainability principles 5. To be able to work as a team in multidisciplinary projects
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction **2. Week** Basic concepts of robotics **3. Week** Classification and structure of robotic systems **4. Week** Drive and control systems **5. Week** Applications **6. Week** Kinematic analysis and coordinate transformations **7. Week** Applications **8. Week** Route interpolator **9. Week** Robot applications **10. Week** Programming **11. Week** Applications **12. Week** Sensors and intelligent robots **13. Week** Setting up a robot **14. Week** Applications

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 5 Designing and implementing materials: 6 Report preparing: 5 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	4	8
Studies	3	5	15
Material Design and Implementation	2	6	12
Report Preparing	1	5	5
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet				x	

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				x				
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x							
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		x						
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).								
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x					
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.		x						

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**3**	**4**	**4**	**1**	**1**	**1**	**1**		**3**	**2**
Learning outcome 1	**1**	**1**	**1**	**1**	**1**						
Learning outcome 2	**1**	**1**	**1**	**1**						**1**	**1**
Learning outcome 3		**1**	**1**	**1**		**1**				**1**	**1**
Learning outcome 4			**1**	**1**			**1**			**1**	
Learning outcome 5								**1**			

Course Description Form	
Course Code and Name	**ETM434 MEASUREMENT TECHNIC**
Course Semester	7-8
Catalog Content	Conducting experiments, taking data, processing data, analyzing the results Examining the theoretical foundations of practical application on subjects related to some theoretically explained courses in engineering education
Textbook	1. Osman Genceli "Ölçme Tekniği" Birsen Publishing, İstanbul, 1995.
Supplementary Textbooks	1. Tezcan Şekercioğlu "Ölçme Tekniği" Birsen Publishing, İstanbul, 2009. 2. Hasan Önal "Ölçme Tekniği" İstanbul Technical University, Lecture Notes, 1993. 3. R.J. Sweeney "Measurement Techniques in Mechanical Engineering" John Wiley, 1953.
Credit	**3 AKTS**
Prerequisites of the Course	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To gain knowledge about measurement systems and processing of measurement values used in materials and mechanics, fluid mechanics and heat transfer applications
Course Learning Outcomes	1. Measurement and measurement systems are defined. 2. Information about barometers is given, and liquid column pressure measuring devices, as well as well type manometers, are discussed. 3. Basic principles of flow measurement with cross-sectional narrowing in closed channels are explained. 4. The basic principles of temperature measurement with meters are defined, along with thermal radiation with infrared beam cameras and liquid crystal temperature. 5. Uncertainty analysis is conducted with experimental error types and causes.
Instruction Methods	Face to face Practical training

Weekly Schedule

1. Week	Basic Principles of Measurement Technique
2. Week	Basic Definitions of Measurement Techniques
3. Week	Generalization of Measurement Systems
4. Week	Pressure Measurements
5. Week	Liquid Column Pressure Measuring Devices
6. Week	Well Tire Manometer, Barometer
7. Week	Flow Measurements
8. Week	Flow Measurement with Cross Section Reduction in Closed Channels
9. Week	Temperature Measurement with Thermal Radiation and Infrared Ray Cameras
10. Week	Liquid Crystal Temperature Meters
11. Week	Experimental Error Types and Causes
12. Week	Uncertainty Analysis
13. Week	Gaussian or Normal Error Distribution
14. Week	General Review of Topics

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 2
Internet browsing, library work: 3
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 7
Final Exam and Preparation for Final Exam: 8

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	7	2	14
Studies	3	3	9
Material Design and Implementation	3	3	9
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	1	7	7
Final Exam and Preparation for Final Exam	1	8	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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.					

	4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				x		
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.			x			
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.						
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.						
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.						
	10	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.						
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.						
The Course's Lecturer(s) and Contact Informations		Assoc. Prof. Dr. Harun GÖKÇE harungokce@gazi.edu.tr						

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL				4	3						
Learning outcome 1				1							
Learning outcome 2					1						
Learning outcome 3				1	1						
Learning outcome 4				1							

Learning outcome 5				1	1						

Course Description Form	
Course Code and Name	**ETM436 ADVANCED MATERIAL TECHNOLOGIES**
Course Semester	7-8
Catalog Content	Understanding the basic properties and behavior of materials To have knowledge about special material types and applications Understanding the importance of material selection in the design process Learning industrial and technological applications of advanced materials
Textbook	1. Baykara, T. 'İleri Malzeme Teknolojileri', PPT, MSB-ArGe, Aralık 2009. 2. İstanbul Ticaret Odası, "İleri Malzeme Teknolojileri Sektör Raporu", Mert Özcömert, Ekim 2005. 3. Eker, A. A., 'İleri Teknoloji Malzemeleri' , PPT, YTÜ, 2004. 4. Rahaman M.N., Ceramic Processing and Sintering, 2003.
Supplementary Textbooks	1. Craig, J. J. (2009). *Introduction to robotics: mechanics and control*, *3/E*. India: Pearson Education.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach the properties, structures and manufacturing processes of advanced technology materials and to understand the effects of their strong interrelationships on material performance To understand the importance of material selection and design by using material science knowledge Recognize advanced technology materials used in defense, aerospace, micro-electronics, communications, medical and automotive sectors Understanding the engineering profession and ethics
Course Learning Outcomes	1. To gain basic knowledge and skills in material selection, design and application 2. Design better and in accordance with scientific/engineering fundamentals. 3. Develop the ability to develop sustainable solutions by evaluating the environmental and economic impacts of various material technologies. 4. Gaining awareness about sustainable material choices and applications 5. Understand the role of materials applications in industrial and scientific fields
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction- Classification of materials according to their basic properties, **2. Week** Advanced metallic materials (super alloys) **3. Week** Advanced ceramics (engineering ceramics) **4. Week** Advanced Polymers **5. Week** Advanced Glass technologies **6. Week** Boron Technologies **7. Week** Composites (polymer, metal or ceramic matrix-carbon, glass, aramid, boron **8. Week** Composites (polymer, metal or ceramic matrix-carbon, glass, aramid, boron **9. Week** Functional grade materials **10. Week** Superconductors / Semiconductors **11. Week** Magnetic, electronic and opto-electronic materials **12. Week** Biomaterials **13. Week** Nanomaterials and application areas **14. Week** The state of advanced materials in Turkey and the world

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 4 Internet browsing, library work: 5 Designing and implementing materials: 6 Report preparing: 5 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 3 Other:0

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	4	8
Studies	3	5	15
Material Design and Implementation	2	6	12
Report Preparing	1	5	5
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet					x

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x					
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	x							
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.			x					
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).								
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).								
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x					
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	x							

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL		**3**	**5**	**3**	**1**	**3**	**1**			**3**	**1**
Learning outcome 1		**1**	**1**	**1**	**1**						
Learning outcome 2		**1**	**1**	**1**		**1**				**1**	
Learning outcome 3			**1**	**1**		**1**				**1**	
Learning outcome 4			**1**			**1**	**1**				
Learning outcome 5		**1**	**1**							**1**	**1**

Course Description Form	
Course Code and Name	**ETM438 ADVANCED MATERIAL TECHNOLOGIES**
Course Semester	7-8
Catalog Content	Ability to design in accordance with innovative materials and manufacturing methods used in engineering Determination of manufacturing methods suitable for smart and functional material technologies Creation of advanced knowledge and understanding in traditional manufacturing methods Establishing basic knowledge and understanding of non-traditional manufacturing methods
Textbook	1. Baykara, T. 'İleri Malzeme Teknolojileri', PPT, MSB-ArGe, Aralık 2009. 2. İstanbul Ticaret Odası, "İleri Malzeme Teknolojileri Sektör Raporu", Mert Özcömert, Ekim 2005. 3. Eker, A. A., 'İleri Teknoloji Malzemeleri'. PPT, YTÜ, 2004.
Supplementary Textbooks	1. Rahaman M.N., Ceramic Processing and Sintering,2003. 2. Saxl, O., Opportunities for Industry in the Application of Nanotechnology, London Office of S&T, 2000.
Credit	**3 ECTS**
Prerequisites of	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To teach the properties, structures and production processes of advanced technology materials and to explain the effects of the strong relationships between them on material performance, to understand the importance of material selection and design by using material science knowledge. To introduce advanced technology materials used in defence, aerospace, micro-electronics, communication, medical and automotive sectors.
Course Learning Outcomes	1. To understand the superior qualities and high technical performances of advanced technology materials in terms of mechanical, thermal, electrical, electrical, magnetic, optical, chemical, biological etc. functions and to teach their application areas. 2. To have knowledge about advanced technology materials used in defence, aerospace, micro-electronics, communication, medical and automotive sectors 3. Ability to design in accordance with innovative materials and manufacturing methods used in engineering
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction - Classification of materials according to their b morphology and function
2. Week	Advanced metallic materials (superalloys)
3. Week	Advanced ceramics (engineering ceramics)
4. Week	Advanced Polymers
5. Week	Advanced glass technologies
6. Week	Boron Technologies
7. Week	Composites (polymer, metal or ceramic matrix - combinations of carbon, ceramic fibres)
8. Week	Functional grade materials
9. Week	Superconductors / Semiconductors
10. Week	Magnetic, electronic and opto-electronic materials
11. Week	Biomaterials
12. Week	Nanomaterials and application areas
13. Week	Status of advanced materials in Turkiye and the world
14. Week	Applications and uses of advanced materials

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 4
Report preparing: 3
Preparing a Presentation: 3
Presentations: 3
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	1	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	3	3	9
Studies	3	2	6
Material Design and Implementation	2	4	8
Report Preparing	2	3	6
Preparing a Presentation	2	3	6
Presentations	2	3	6
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	x				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.					
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x		

	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					
	6	Knowledge of the effects of engineering practices on society, health and safety, economy					
	7	Acting in accordance with the ethical principles of the engineering profession,					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.		x			
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x		
The Course's Lecturer(s) and Contact Informations		Assoc. Prof. Dr. Hüseyin Kürşad SEZER kursadsezer@gazi.edu.tr					

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program Outcome 8	Program Outcome 9	Program Outcome10	Program Outcome11
TOTAL		**1**		**3**						**2**	**3**
Learning outcome 1		**1**		**1**							**1**
Learning outcome 2				**1**						**1**	**1**
Learning outcome 3				**1**						**1**	**1**

Course Description Form	
Course Code and Name	**ETM440 HEAT AND MASS TRANSFER**
Course Semester	7-8
Catalog Content	To have knowledge about the basic concepts of heat and mass transfer To have basic knowledge about the use of heat transfer in engineering applications Professional and ethical responsibility Ability to use modern engineering methods Ability to identify, formulate and solve problems
Textbook	1. Frank P. Incropera, David P. DeWitt, Isı ve Kütle Geçişinin Temelleri, Literatür Yayıncılık, 2001. 1. Isı ve Kütle Transferi. Pratik Yaklaşım. Yunus A. Çengel. 3. Baskı Güven Bilimsel (2011)
Supplementary Textbooks	1. Altınışık, K., 'Uygulamalarla ısı transferi', Nobel Yay., Ank, 2003 2. Atagündüz, G., Isı Transferi, Ege Üniversitesi, İzmir, 1983 1. Bayazıtoğlu, Y., Elements of Heat Transfer, McGraw Hill, 1988
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To introduce the basic concepts of heat transfer, To provide many real engineering examples of how heat transfer can be used in engineering applications, Develop an intuitive understanding of heat transfer with an emphasis on scientific evidence, To provide an understanding of the physical mechanism of concentration and mass transfer and mass transfer by diffusion and convection
Course Learning Outcomes	1. To develop skills in approaching and finding solutions to engineering problems related to heat transfer 2. To be able to understand and analyze heat and mass transfer mechanisms 3. To be able to analyze different thermal systems 4. Understand how heat transfer can be used in engineering applications 5. To gain awareness about the causes of important issues such as global warming and climate change
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction to Heat Transfer and Basic Concepts **2. Week** Heat Conduction Equation **3. Week** Continuous Heat Conduction **4. Week** Time Dependent Heat Conduction **5. Week** Numerical Methods in Heat Conduction **6. Week** Fundamentals of Heat Transport **7. Week** External Forced Heat Transport **8. Week** Internal Forced Heat Transport **9. Week** Boiling and Condensation **10. Week** Heat Exchangers **11. Week** Fundamentals of Radiative Heat Transfer **12. Week** Radiative Heat Transfer **13. Week** Mass Transfer **14. Week** Mass Transfer - Sample application

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 5 Internet browsing, library work: 5 Designing and implementing materials: 5 Report preparing: 4 Preparing a Presentation: 0 Presentations: 0 Preparation of Midterm and Midterm Exam: 4 Final Exam and Preparation for Final Exam: 5 Other:0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**40**
Percentage of Final Exam to Total Score (%)	1	**60**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	2	5	10
Studies	2	5	10
Material Design and Implementation	2	5	10
Report Preparing	2	4	8
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	5	5
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.				x	
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.				x	
3	Ability to generate creative solutions to				x	

	complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.							
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.							
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x			
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.							
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.							

The Course's Lecturer(s) and Contact Informations	Prof. Dr. Veysel ÖZDEMİR vozdemir@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**4**	**4**	**4**	**3**	**4**	**1**	**1**				
Learning outcome 1	**1**	**1**	**1**	**1**	**1**						
Learning outcome 2	**1**	**1**	**1**	**1**	**1**						
Learning outcome 3	**1**	**1**	**1**		**1**						
Learning outcome 4	**1**	**1**	**1**	**1**	**1**						
Learning outcome 5						**1**	**1**				

Course Description Form	
Course Code and Name	**ETM442 DESIGN OF HYDRAULICS AND PNEUMATICS SYSTEMS**
Course Semester	7-8
Catalog Content	Understanding the basic principles of hydraulic and pneumatic systems, and the ability to comprehend how these systems work Learning how hydraulic and pneumatic circuits are designed and implemented, and understanding their various industrial applications Skills in diagnosing and troubleshooting faults in systems Basic knowledge and skills for industrial automation
Textbook	1. Karacan, İ., Pnömatik Kontrol, Bizim Büro Yay., Ankara, 1991.
Supplementary Textbooks	1. Parr, Andrew. Hydraulics and pneumatics: a technician's and engineer's guide. Elsevier, 2011.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understanding the basic principles and components of hydraulic and pneumatic systems Learning hydraulic and pneumatic system design Learning how to diagnose faults, perform repairs, integrate, and automate systems Developing safety awareness in complex systems
Course Learning Outcomes	1. By understanding the functions of basic components used in hydraulic and pneumatic systems, complex engineering problems can be identified, formulated, and analyzed effectively, enabling effective use in solving complex engineering problems. 2. Learning the design process of hydraulic and pneumatic systems enables the generation of creative solutions to solve complex engineering problems. 3. Ensuring the safe and effective operation of systems. 4. Learning to consider the impact of engineering applications on society, health, safety, and the environment. 5. Acquiring the necessary competencies to be competitive in industrial applications.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to hydraulics, basic principles in hydraulics.
2. Week	Standard symbols, hydraulic pipes, and hoses.
3. Week	Hydraulic pumps, motors, and cylinders.
4. Week	Sealing elements, hydraulic valves.
5. Week	Oil reservoirs, filters, hydraulic accumulators, hydraulic fluids.
6. Week	Electro-hydraulic systems, faults and diagnostics in hydraulic systems.
7. Week	Hydraulic circuits. Applications of hydraulics in industry.
8. Week	Hydraulic circuit design and applications.
9. Week	Introduction to pneumatics. Physical principles in pneumatics.
10. Week	Generation, maintenance, and distribution of compressed air.
11. Week	Standard symbols in pneumatics, cylinders, sealing
12. Week	Pneumatic motors, valves, pneumatic circuits, and
13. Week	Hydro-pneumatics. Applications of pneumatic systems.
14. Week	Fault finding. Electro-pneumatics. System design and installation.

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 3
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 4
Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	5	3	15
Studies	5	2	10
Material Design and Implementation	2	3	6
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	2	4	8
Final Exam and Preperation for Final Exam	2	4	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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					
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	**x**				
4	Ability to develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.			**x**		

	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.	**x**				
	6	Ability to work efficiently in intra-disciplinary teams.	**x**				
	7	Ability to work efficiently in multi-disciplinary teams.	**x**				
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.					
	10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to					
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail Şahin isahin@gazi.edu.tr					

	Program Outcome1	**Program Outcome2**	**Program Outcome3**	**Program Outcome4**	**Program Outcome5**	**Program Outcome 6**	**Program Outcome7**	**Program çıktısı 8**	**Program Outcome9**	**Program Outcome10**	**Program Outcome11**
TOTAL		**1**	**1**	**3**	**1**	**1**	**1**				
Learning outcome 1		**1**		**1**							
Learning outcome 2				**1**							
Learning outcome 3			**1**								
Learning outcome 4				**1**			**1**				

Learning outcome 5					**1**	**1**					

Course Description Form	
Course Code and Name	**ETM444 REVERSE ENGINEERING DESIGN**
Course Semester	7-8
Catalog Content	To be able to use modern engineering methods Ability to use reverse engineering hardware and software To understand the relationship between reverse engineering and rapid prototyping Ability to perform sector-based reverse engineering applications
Textbook	1. Raja, V. and Fernandes, K.J., Reverse Engineering - An Industrial Perspective, Springer Pub., 2008. 2. Wang, W. Reverse engineering: Technology of reinvention. Crc Press, (2010).
Supplementary Textbooks	1. Gibson, I., Rosen, D., Stucker, B., Khorasani, M., Rosen, D., Stucker, B., & Khorasani, M. (2021). Additive manufacturing technologies (Vol. 17). Cham, Switzerland: Springer.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Learning Reverse Engineering design steps, comprehension of usage areas and purposes, use of 3D scanner and gaining the ability to apply it on a sample problem
Course Learning Outcomes	1. To be able to comprehend reverse engineering method and ethical values in engineering design 2. Adopting reverse engineering approaches in the product development process 3. To gain the ability to use reverse engineering hardware and software 4. Ability to apply the reverse engineering process on a sample case
Instruction Methods	Face to face

Weekly Schedule

1. Week	Overview of reverse engineering approach
2. Week	Reverse engineering methodologies and techniques
3. Week	Reverse engineering hardware and software
4. Week	Selection criteria for reverse engineering systems
5. Week	Product development process with reverse engineering
6. Week	Reverse engineering applications in automotive and aerospace industry
7. Week	Factors preventing the use of reverse engineering and legal a
8. Week	Reverse engineering application with 3D Optical Scanner
9. Week	Point cloud processing and data optimisation
10. Week	Computer-aided surface modelling with 3D scan data
11. Week	Computer-aided solid modelling with 3D scan data
12. Week	Use of 3D scan data in quality control applications
13. Week	Introduction to rapid prototyping
14. Week	The relationship between reverse engineering and rapid prototyping

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 3
Internet browsing, library work: 2
Designing and implementing materials: 4
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment	1	10
Application		
Projects	1	20
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	4	3	12
Studies	7	2	14
Material Design and	4	4	16
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final	1	3	3
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their			**x**		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.					

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).					
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about			x		
The Course's Lecturer(s) and Contact Informations	Assist. Prof. Dr. Oğulcan EREN ogulcaneren@gazi.edu.tr						

	Program Outcome 1	**Program Outcome2**	**Program Outcome3**	**Program Outcome 4**	**Program Outcome5**	**Program Outcome6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL		**1**	**3**	**4**		**1**	**1**				**3**
Learning outcome 1			**1**	**1**		**1**	**1**				
Learning outcome 2		**1**	**1**	**1**							**1**
Learning outcome 3			**1**	**1**							**1**
Learning outcome 4				**1**							**1**

Course Description Form	
Course Code and Name	**ETM446 ENTREPRENEUR SHIP**
Course Semester	7-8
Catalog Content	Skill in identifying individual skills and competencies Skill in career planning and goal setting Skill in business idea development and creativity Skill in understanding the concept and elements of a business plan (market research, marketing plan, production plan, management plan, financial plan) Skill in considering key points in writing and presenting a business plan Skill in workshop activities Skill in supporting modules for educational programs
Textbook	1. Gerber, M.E, Girişimcilik Tutkusu, Sistem Yayıncılık, 2011. 2. Kolektif, Girişimcilik, Beta Basım Yayım, 2013.
Supplementary Textbooks	Atasoy, T., Kendinizin Patronu Olmak: Girişimcilik, ODTÜ Geliştirme Vakfı Yayınları, 2009.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 AttendanceRequirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To have entrepreneurship awareness To recognize that potential problems could be business ideas To encourage entrepreneurship and ensure the idea is turned into a plan and implemented
Course Learning Outcomes	1. Individual skills and competencies are identified. 2. Career plan and goals are established. 3. Ability to develop business ideas. 4. Ability to prepare and present a business plan. 5. Work can be done on e-commerce, logistics, and foreign trade topics.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Basic concepts of entrepreneurship, the importance of entrepreneurship
2. Week	Determination of Individual's Skills - Competencies and Career Plan
3. Week	Business Idea Development and Creativity
4. Week	Business Plan Concept and Elements
5. Week	Market Research
6. Week	Marketing Plan, Production Plan
7. Week	Management Plan
8. Week	Financial Plan
9. Week	Points to Consider in Writing and Presenting a Business Plan
10. Week	General characteristics of managers in Turkey, generating business ideas
11. Week	Marketing, trade, tourism, education and freelance business ideas that can produce services
12. Week	Newly developing entrepreneurial areas
13. Week	Competition in entrepreneurship and increasing competitiveness
14. Week	Entrepreneurship and business problems and solution suggestions

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 0
Designing and implementing materials: 0
Report preparing: 0
Preparing a Presentation:45
Presentations: 0
Preparation of Midterm and Midterm Exam: 0
Final Exam and Preparation for Final Exam: 0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)	1	**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	4	3	12
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	3	15
Final Exam and Preperation for Final Exam	5	4	20
Other (should be emphasized)	-	-	-
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.			x		
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.				x	
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.			x		
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.				x	

6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.			x			
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.					x	
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		x				
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).				x		
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x			
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			x			

The Course's Lecturer(s) and Contact Informations	Prof. Dr. Adnan AKKURT aakkurt@gazi.edu.tr

	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4	Program Outcome 5	Program Outcome 6	Program Outcome 7	Program Outcome 8	Program Outcome 9	Program Outcome 10	Program Outcome 11
TOTAL	**2**	**3**	**4**	**3**	**4**	**4**	**5**	**2**	**4**	**3**	**3**
Learning outcome 1	**1**	**1**	**1**	**1**	**1**		**1**				
Learning outcome 2	**1**	**1**		**1**	**1**	**1**	**1**	**1**	**1**		**1**
Learning outcome 3			**1**	**1**	**1**	**1**	**1**		**1**	**1**	
Learning outcome 4			**1**		**1**	**1**	**1**		**1**	**1**	**1**
Learning outcome 5		**1**	**1**			**1**	**1**	**1**	**1**	**1**	**1**

Course Description Form	
Course Code and Name	**ETM450 COMPUTER AIDED DESIGN 3**
Course Semester	7-8
Catalog Content	Learning basic design methods Preparation of computer-aided 2D draft drawings Learning how to build computer-aided 3D models Learning the concepts of wireframe, solid modeling and surface modeling
Textbook	1. Encarnacao, J. L., Lindner, R., & Schlechtendahl, E. G. (2012). Computer aided design: fundamentals and system architectures. Springer Science & Business Media.
Supplementary Textbooks	1. Cozzens, R., Catia V5 Workbook R19, SDC Pub., USA, 2009. 2. Tickoo, S., Catia V5R20 for Designers, CADCIM Technologies, USA, 2010.
Credit	**3 ECTS**
Prerequisites of the Course (*Attendance Requirements*)	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Understand the fundamentals of element-based computer-aided design Create integration, bills of materials and technical drawings To learn the representation of manufacturing information on technical drawing To create analysis and simulations
Course Learning Outcomes	1. Creative solutions to complex engineering problems are to be produced in a way that meets current and future needs. 2. Knowledge about designing industrial models under realistic constraints and conditions is to be acquired. 3. Appropriate three-dimensional modeling techniques are to be selected and used.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Learning the interface of Computer Aided Design software
2. Week	Working with basic wireframe tools
3. Week	Working with surfaces-I
4. Week	Working with surfaces-II
5. Week	Smoothing surfaces
6. Week	Advanced surface modeling tools-I
7. Week	Correction tools-I
8. Week	Correction tools-II
9. Week	Advanced surface modeling tools-II
10. Week	Advanced modeling and correction tools
11. Week	Advanced correction tools
12. Week	Basics of plastering (thinning)
13. Week	Surface evaluation and painting
14. Week	Drawing (drafting) tools, student project

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0

Reading Activities: 2

Internet browsing, library work: 3

Designing and implementing materials: 4

Report preparing: 0

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 2

Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)	1	40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	3	2	6
Studies	5	3	15
Material Design and Implementation	5	4	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	2	2
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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.					
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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 develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	x					
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.						
	6	Ability to work efficiently in intra-disciplinary teams.						
	7	Ability to work efficiently in multi-disciplinary teams.						
	8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.						
	9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.						
	10	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.						
	11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.						
The Course's Lecturer(s) and Contact Informations		Assoc. Prof. Dr. Harun Gökçe harungokce@gazi.edu.tr						

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**							
Learning outcome 1			**1**								
Learning outcome 2			**1**								
Learning outcome 3				**1**							

Course Description Form	
Course Code and Name	**ETM452 ANIMATION APPLICATION IN DESIGN**
Course Semester	7-8
Catalog Content	Three-dimensional modeling of products in computer environment Producing photorealistic images of the product and the place where it is located, taking into account the material, color, texture and environmental light. Creating materials, lights, lighting and scenes in the virtual environment. Transferring the usage phases of the products and presenting them effectively in the digital environment. Creating animations of 3D modeled products
Textbook	1. Williams, R. (2009). The Animator's Survival Kit. Faber & Faber. 2. Avgerakis, G. (2008). Digital Animation Bible: Creating Professional Animation with 3ds Max, Lightwave, and Maya. Wiley.
Supplementary Textbooks	1. Johnston, O., & Thomas, F. (1995). The Illusion of Life: Disney Animation. Disney Editions.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	1. Ability to perform computer-aided 3D modeling 2. Ability to create photorealistic images 3. Ability to effectively create product usage phases in a digital environment 4. Ability to use visualization and animation actively
Course Learning Outcomes	1. Ability to model complex objects in a computer environment using various 3D modeling techniques and tools. 2. Ability to produce photorealistic images using factors such as materials, color, texture, camera and light settings 3. Ability to visualize different usage phases of products in a detailed and effective way in digital environment 4. Ability to create dynamic and attractive visual presentations by effectively using visualization and animation techniques 5. Ability to use different 3D modeling and visualization software
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction and installation of 3D modeling programs
2. Week	Installing model visualization utilities
3. Week	Transferring 3D Models to Other Programs 3D Model Formats: 3ds, dxf, i
4. Week	Material concept in virtual environment
5. Week	Creation of virtual materials
6. Week	Light and Shadow in the Virtual Environment Light Types
7. Week	HDR Concept, Scene design in virtual environment
8. Week	Visualization settings
9. Week	Postproduction
10. Week	Camera - depth concept and settings
11. Week	Motion and Virtual physics in animation
12. Week	Visualization processes
13. Week	Adding special effects
14. Week	Using dynamic animation systems

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 2
Final Exam and Preparation for Final Exam: 2

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	9	1	9
Material Design and Implementation	10	2	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	5	2	10
Final Exam and Preperation for Final Exam	4	2	8
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					**x**
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		**x**			
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.				**x**	
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.		**x**			

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**					
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**					
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**				
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	**x**					
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and	**x**					
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.	**x**					
The Course's Lecturer(s) and Contact Informations		Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome 2**	**Program Outcome 3**	**Program Outcome 4**	**Program Outcome 5**	**Program Outcome 6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**5**	**2**	**2**	**4**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
Learning outcome 1	**1**			**1**				**1**			
Learning outcome 2	**1**	**1**	**1**	**1**		**1**					
Learning outcome 3	**1**	**1**	**1**		**1**		**1**				
Learning outcome 4	**1**			**1**				**1**	**1**		
Learning outcome 5	**1**			**1**	**1**					**1**	**1**

Course Description Form		
Course Code and Name	**ETM454 OPTIMIZATION**	
Course Semester	7-8	
Catalog Content	Mathematical modeling of linear and nonlinear problems Learning optimization theory and common techniques Learning parametric design, intuitive optimization theory Ability to use shape and topology-based optimization theories, lattice structures, and generative design methods	
Textbook	1. Fred Glover, Gary Kochenberger (2003) Handbook of Metaheuristics, Springer Book. 2. Martin P. Brendsoe, Ole Sigmund (2004) Topology Optimization Theory, Methods and Applications, Springer Book.	
Supplementary Textbooks	1. Zbigniev Michalewicz, David Fogel, How to Solve It: Modern Heuristics.	
Credit	**3 ECTS**	
Prerequisites of the Course (*Attendance Requirements***)**	No Prerequisites - %70 Attendance Requirements	
Type of the Course	Elective	
Instruction Language	Turkish	
Course Objectives	To learn the basic concepts of optimization methods and optimization in design Solving optimization problems in mechanical systems using various techniques To have knowledge on how to apply optimization techniques in different design processes	
Course Learning Outcomes	1. Computer-aided computing and knowledge of specific engineering areas are learned to be effectively used in solving complex engineering problems. 2. Creative solutions to engineering problems are gained to meet design constraints. 3. Optimization of industrial products or components under realistic constraints and conditions is acquired. 4. Selection and use of appropriate techniques for the analysis and solution of engineering problems are learned.	
Instruction Methods	Face to face	
	1. Week	Introduction
	2. Week	Optimization Techniques and General Approaches,
	3. Week	Heuristic Optimization Technics
	4. Week	Heuristic Optimization Technics (Cont.)
	5. Week	Shape Based Optimization Theory
	6. Week	Topology Optimization Processes
	7. Week	Topology Optimization Processes (Cont.)
	8. Week	Preferred Manufacturing Technologies in Topology
	9. Week	Lattice Structures
	10. Week	Lattice Structures (Cont.)

	11. Week	Preferred Manufacturing Technologies in Lattice Structure
	12. Week	Sensitivity analysis with Finite Element Analysis method
	13. Week	Sensitivity analysis with Finite Element Analysis method
	14. Week	Application

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2

Weekly tutorial hours: 0

Reading Activities: 2

Internet browsing, library work: 3

Designing and implementing materials: 4

Report preparing: 0

Preparing a Presentation: 0

Presentations: 0

Preparation of Midterm and Midterm Exam: 2

Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting(%)**
Midterm Exams	1	30
Assignment		
Application		
Projects	1	30
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	3	2	6
Studies	5	3	15
Material Design and implementation	5	4	20
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	1	2	2
Final Exam and Preparation for Final Exam	1	4	4

	Other (should be emphasized)			
	Total Workload	-	-	75
	Total Workload / 25			75/25
	Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program 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	x				
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					
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 develop, select and use modern techniques and tools necessary for analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	x				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for examination of engineering problems or discipline-specific research topics.					
6	Ability to work efficiently in intra-disciplinary teams.					
7	Ability to work efficiently in multi-disciplinary teams.					
8	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.					
9	Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and to receive.					
10	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate					
11	Conformity to ethical principles, professional and ethical responsibility; Information on standards used in engineering applications.					

The Course's Lecturer(s) and Contact Informations	Assoc. Prof. Dr. Harun Gökçe harungokce@gazi.edu.tr

	Program outcome1	Program outcome2	Program outcome3	Program outcome4	Program outcome5	Program outcome6	Program outcome7	Program outcome8	Program outcome9	Program outcome10	Program outcome11
TOTAL			**2**	**1**							
Learning outcome 1			**1**								
Learning outcome 2			**1**								
Learning outcome 3				**1**							
Learning outcome 4											

Course Description Form	
Course Code and Name	**ETM456 VIRTUAL REALITY IN DESIGN**
Course Semester	7-8
Catalog Content	Virtual reality and applications 3D concept and 3D interactive design VR software used in design Product design and modeling with VR Working with controls Design with basic objects Concurrent design environment Develop virtual prototypes Interaction with other apps
Textbook	1. Jerald, J. (2015). *The VR book: Human-centered design for virtual reality*. Morgan & Claypool. 2. Warwick, K., Gray, J., & Roberts, D. (1993). Virtual reality in engineering.
Supplementary Textbooks	1. Mihelj, M., Novak, D., & Beguš, S. (2014). Virtual reality technology and applications.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites - %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	To learn the basics of virtual reality technology, to recognize various VR applications and to examine usage examples in different fields. To learn the working principles of virtual reality glasses, to develop the ability to think in 3D space and to understand the basics of 3D interactive design. To learn various VR software tools, to work effectively in these tools and to apply interface and motion control techniques in virtual environment. 3D modeling with basic objects, designing products with VR and creating realistic prototypes. Working in concurrent design environments, developing projects with team collaboration, Learning virtual prototype development and working with virtual prototypes.
Course Learning Outcomes	1. The basic principles of virtual reality technology are learned, and various virtual reality applications and examples of the use of this technology in different fields are explored. 2. The working principles of virtual reality glasses are understood. 3. The ability to think in three-dimensional (3D) space is developed, and the basics of 3D interactive design are taught. 4. Various VR software tools used in design processes can be utilized. 5. 3D modeling and product design can be performed in the VR environment, and realistic virtual prototypes can be created. 6. Collaboration with teammates on projects in real-time and interaction with virtual prototypes can be facilitated.
Instruction Methods	Face to face

Weekly Schedule

1. Week	Introduction to Virtual Reality
2. Week	Virtual reality applications
3. Week	Virtual reality headset and their use
4. Week	3D concept and 3D interactive design
5. Week	VR software used in design
6. Week	Movement in the interface
7. Week	Working with controls
8. Week	Design with basic objects
9. Week	3D modeling with VR
10. Week	Product design with VR
11. Week	Concurrent design environment
12. Week	Virtual Prototyping
13. Week	Working with Virtual Prototypes
14. Week	Interaction with other aplications
15. Week	Final Exam

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

2 hours of theoretical lessons per week

Weekly applied lesson 0 hours

Reading activities 8 hours

Internet browsing, library work 6 hours

Material design, application 25 hours

Report preparation 0 hours

Presentation preparation 0 hours

Presentation 0 hours

Preparation of Midterm and Midterm Exam: 4

Final Exam and Preparation for Final Exam: 4

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application	1	20
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hours)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks	4	2	8
Studies	3	2	6
Material Design and Implementation	5	5	25
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	4	4
Final Exam and Preperation for Final Exam	1	4	4
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.					
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	x				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.				x	
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.					x

	5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.							
	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	x						
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x						
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).			x				
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).							
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.							
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.				x			
The Course's Lecturer(s) and Contact Informations		Prof. Dr. İsmail ŞAHİN isahin@gazi.edu.tr							

	Program Outcome 1	Program Outcome2	Program Outcome3	Program Outcome 4	Program Outcome5	Program Outcome6	Program Outcome 7	Program çıktısı 8	Program Outcome 9	Program Outcome10	Program Outcome11
TOTAL		**1**	**4**	**5**		**1**	**1**	**3**			**4**
Learning outcome 1				**1**		**1**					
Learning outcome 2			**1**								
Learning outcome			**1**	**1**							**1**

3											
Learning outcome 4			**1**	**1**		**1**					**1**
Learning outcome 5		**1**	**1**	**1**			**1**				**1**
Learning outcome 6				**1**				**3**			**1**

Course Description Form	
Course Code and Name	**ETM-458 ARTIFICIAL INTELLIGENCE IN DESIGN**
Course Semester	7-8
Catalog Content	Artificial Intelligence models and areas of use Using artificial intelligence in design problems Artificial Intelligence understanding of professional and ethical responsibility Ability to use modern engineering methods Problem analysis and synthesis Ability to design and apply experiments and design
Textbook	1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3. edition, Prentice-Hall, 2010
Supplementary Textbooks	1. Crai Vasif Nabiyev, Yapay Zeka: İnsan Makine Etkileşimi, 3. baskı, Seçkin Yayınevi, İstanbul, 2010. 2. Toshinori Munakata, Fundamentals of the New Artificial Intelligence: Neural, Evolutionary, Fuzzy and More (Texts in Computer Science), 2nd edition, Springer, 2008.
Credit	**3 ECTS**
Prerequisites of the Course	No Prerequisites Attendance Requirements %70
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Having knowledge about new technologies Learning about artificial intelligence and design ethics Learning solution approaches to engineering problems Using modern methods in design processes Improving teamwork ability
Course Learning Outcomes	1. Gains the ability to effectively use artificial intelligence techniques and algorithms in the processes of defining, formulating and solving engineering problems. 2. Gains the ability to develop innovative and effective design concepts under realistic constraints by using artificial intelligence-supported design tools. 3. Develops the ability to analyze complex problems encountered in engineering applications and produce solutions to these problems by using artificial intelligence technologies. 4. Gain the skills to write effective reports, make presentations and collaborate in interdisciplinary teams in the process of developing ideas and concepts inspired by artificial intelligence.
Instruction Methods	Face to face
Weekly Schedule	**1. Week** Introduction to artificial intelligence **2. Week** The history of artificial intelligence **3. Week** Artificial intelligence Scope and methods, **4. Week** Fuzzy logic **5. Week** Expert systems **6. Week** Genetic algorithms **7. Week** Evolutionary algorithms **8. Week** Machine learning **9. Week** Deep learning **10. Week** Creating inspiration with artificial intelligence **11. Week** Generating ideas and concepts with artificial intelligence **12. Week** Evaluation of ideas and concepts with artificial intelligence **13. Week** Design optimization with artificial intelligence **14. Week** 2D/3D concept design generation with artificial intelligence

Teaching and Learning Methods	Weekly theoretical course hours: 2 Weekly tutorial hours: 0 Reading Activities: 0 Internet browsing, library work: 5 Designing and implementing materials: 5 Report preparing: 0 Preparing a Presentation: 1 Presentations: 1 Preparation of Midterm and Midterm Exam: 3 Final Exam and Preparation for Final Exam: 4 Other:0

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment		
Application		
Projects	1	30
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	1	5	5
Material Design and Implementation	2	5	10
Report Preparing			
Preparing a Presentation	7	1	7
Presentations	7	1	7
Midterm Exam and Preperation for Midterm Exam	2	3	6
Final Exam and Preperation for Final Exam	3	4	12
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		x			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.		x			
3	Ability to generate creative solutions to complex engineering problems to meet	x				

	current and future needs; design complex systems, processes, devices or products under realistic constraints and conditions.								
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		x						
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.								
6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.								
7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	x							
8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).	x							
9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).	x							
10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.								
11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.								

The Course's Lecturer(s) and Contact Informations	Head of Department tasarim@gazi.edu.tr

	Program outcome 1	Program outcome 2	Program outcome 3	Program outcome 4	Program outcome 5	Program outcome 6	Program outcome 7	Program outcome 8	Program outcome 9	Program outcome 10	Program outcome 11
TOTAL	**2**	**2**	**1**	**2**			**1**	**1**	**1**		
Learning outcome 1	**1**	**1**									
Learning outcome 2	**1**		**1**	**1**							
Learning outcome 3		**1**		**1**			**1**	**1**	**1**		
Learning outcome 4											
Learning outcome 5											

Course Description Form	
Course Code and Name	**ETM460 INTERACTIVE PORTFOLIO DESIGN**
Course Semester	7-8
Catalog Content	Definition, purpose and importance of portfolio Components of a good portfolio Evaluation of suitable platforms and tools for the portfolio Portfolio design and layout Presentation of projects Content writing and explanations Portfolio review and feedback Portfolio presentation and next steps
Textbook	1. Lefteri, C. (2010). Making It: Manufacturing Techniques for Product Design. Laurence King Publishing. 2. Rowe, R. (2012). Graphic Design Portfolio Strategies for Print and Digital Media. Fairchild Books.
Supplementary Textbooks	1. Cuffaro, D., & Zaksenberg, I. (2016). The Industrial Design Reference & Specification Book: Everything Industrial Designers Need to Know Every Day. Rockport Publishers.
Credit	**3 ECTS**
Prerequisites of the Course (	No Prerequisites %70 Attendance Requirements
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Associating the knowledge and skills students have acquired in their academic lives with their professional life and preparing a portfolio Having knowledge and competence in creating digital illustrations Acquiring skills for designing and implementing a portfolio in which developed products, personal working approaches and project processes can be summarized
Course Learning Outcomes	1. Expressing the product idea developed with visual, written and verbal presentation skills, including 2- and 3-dimensional visualization techniques 2. To have the motivation and learning skills necessary for personal and professional development by evaluating the knowledge and skills in the field with a critical and dialectical approach (capable of producing critical, counter-thesis and synthesis) 3. Identifying learning needs, making and implementing plans for this 4. Using computer software and digital technologies required by the field interactively 5. Ability to communicate effectively verbally and in writing on technical issues; Ability to work effectively as a team member or leader within interdisciplinary teams
Instruction Methods	Face to face

Weekly Schedule

1. Week	What is a portfolio and why is it important?
2. Week	Initial design of personal identity, CV preparation
3. Week	Components of a good portfolio
4. Week	Portfolio design and layout
5. Week	Portfolio in different media
6. Week	Presentation of projects
7. Week	Content writing and explanations
8. Week	Printed portfolio concept sketches
9. Week	Deciding on material, tools and portfolio type.
10. Week	Preparation of the portfolio in detail. Preliminary preparation for the prese
11. Week	Editing portfolio content
12. Week	Portfolio presentations and corrections
13. Week	Portfolio presentations and corrections
14. Week	Portfolio presentation and next steps

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 2
Weekly tutorial hours: 0
Reading Activities: 0
Internet browsing, library work: 1
Designing and implementing materials: 2
Report preparing: 0
Preparing a Presentation: 0
Presentations: 0
Preparation of Midterm and Midterm Exam: 3
Final Exam and Preparation for Final Exam: 3

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	20
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		**60**
Percentage of Final Exam to Total Score (%)		**40**
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	2	28
Weekly Tutorial Hours			
Reading Tasks			
Studies	14	1	14
Material Design and Implementation	12	2	24
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preperation for Midterm Exam	1	3	3
Final Exam and Preperation for Final Exam	2	3	6
Other (should be emphasized)			
Total Workload	-	-	75
Total Workload / 25			75/25
Course Credit (ECTS)			3

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	In-depth knowledge of mathematics, science, basic engineering concepts, computer-aided computing and specific engineering areas; ability to use this knowledge effectively in solving complex engineering problems.		**x**			
2	Ability to identify, formulate and analyse complex engineering problems using knowledge of basic science, mathematics and engineering, and taking into account the UN Sustainable Development Goals.	**x**				
3	Ability to generate creative solutions to complex engineering problems to meet current and future needs; design complex systems, processes, devices or products under realistic constraints and		**x**			
4	Ability to select and use appropriate techniques, resources and modern engineering and information technology tools, including estimation and modelling, for the analysis and solution of complex engineering problems, recognising their limitations.		**x**			
5	Ability to use research methods, including literature search, designing and conducting experiments, collecting data, analysing and interpreting results, to investigate complex engineering problems.	**x**				

	6	Knowledge of the effects of engineering practices on society, health and safety, economy, sustainability and environment within the framework of the UN Sustainable Development Goals; awareness of the legal consequences of engineering solutions.	**x**				
	7	Acting in accordance with the ethical principles of the engineering profession, awareness of ethical responsibilities; awareness of non-discrimination, impartiality and embracing diversity.	**x**				
	8	Ability to work effectively as a team member or leader both individually and within interdisciplinary teams (face-to-face, distance or hybrid).		**x**			
	9	Ability to communicate effectively on technical issues, both orally and in writing, taking into account the various differences of the target audience (e.g. education, language, profession).		**x**			
	10	Knowledge of business life practices such as project management and economic feasibility analysis; awareness of entrepreneurship and	**x**				
	11	Ability to learn independently and continuously, to adapt to new and emerging technologies and to think inquisitively about technological changes.			**x**		
The Course's Lecturer(s) and Contact Informations	Department Management tasarim@gazi.edu.tr						

	Program Outcome 1	**Program Outcome 2**	**Program Outcome 3**	**Program Outcome 4**	**Program Outcome 5**	**Program Outcome 6**	**Program Outcome 7**	**Program çıktısı 8**	**Program Outcome 9**	**Program Outcome10**	**Program Outcome11**
TOTAL	**2**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**1**	**3**
Learning outcome 1	**1**		**1**		**1**			**1**	**1**		**1**
Learning outcome 2		**1**		**1**							**1**
Learning outcome 3					**1**	**1**					**1**
Learning outcome 4				**1**						**1**	
Learning outcome 5	**1**		**1**				**1**	**1**	**1**		