

**Öğretim Üyesi - Lecturer:**

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office hours: Mon.10:30-13:30, Tue 10:30-13:30; 15:30-16:30, Thu.12:30-13:30; 14:30-16:30

**Araş.Gör. – Research Assistant : - - - - -**

**Ders Saatleri-Lectures:**

Salı.-Tue. 13:30-15:30 (D361A), Perş.-Thu. 13:30-14:30 (D361A)

**Ön Koşul Dersleri-Prerequisite Courses**

MAK 341, MAK342, MAK 351 (MAK 351E) veya MAK 353 (MAK353E)

**Dersin İçeriği-Course Description**

Overview of existing CAE systems; architecture of high-performance graphic displays in engineering workstations; orthographic and perspective display transformations; Parametric representation of curves and surfaces; elementary differential geometry; bicubic surface paths; image generation; solid modeling; Rapid Prototyping Methods, Automation in Manufacturing, NC tool paths; Automatic Programming, Robots, Reverse Engineering.

The product development process is covered from problem identification through detail design and evaluation. The Scope of Design, The Necessity for Systematic Design, Fundamentals of Systematic Approach; Fundamentals of Technical Systems; Process of Planning and Designing; General methods for Finding and Evaluating Solutions; Steps of Conceptual Design, Steps of Embodiment Design; Principles of Embodiment Design; Developing Size Ranges and Modular Products; Design for Quality; Design for Minimum Cost.

**Ders Kitabı (Notu)- Textbook**

Computer Aided Engineering Design, Anupam Saxena, Birendra Sahay, Springer, 2005

Engineering Design A Systematic Approach, G. Pahl, W. Beitz, Springer-Verlag, 2007

**Diğer Kaynaklar-Other References**

CAD/CAM Theory and Practice, Ibrahim Zeid, McGraw Hill, 1991

3D CAD Principles and Applications, H. Toriya, H. Chiyokura, Springer-Verlag, 1991

Computer and Geometric Modeling for Engineers, V. B. Anand, John Wiley & Sons, 1993

The NURBS Book, Les Piegl, Wayne Tiller, Springer-Verlag, 1997

Engineering Design a Project-based Introduction, G. L. Dym, Wiley, 4ed, 2014

Engineering Design Methods, N. Cross, John Wiley & Sons, 1989

Engineering Design Principles, Ken Hurst, Elsevier Science & Technology Books, 1999

Case Studies in Engineering Design, Clifford Matthews, John Wiley & Sons, Inc., 1998

**Dersin Amacı-Objectives**

The aim of the course is to present a comprehensive, consistent and clear approach to systematic engineering design and CAD tools.

**Dersin Kazandıracağı Bilgi ve Beceriler-Outcomes**

The students should come away from the course with:

- 1.An understanding of and an appreciation for using a structured design methodology
- 2.A better understanding of the wide range of aspects that must be effectively dealt with in designing successful products.
- 3.Some product design specific knowledge such as material selection, design for assembly, design for manufacturability, quality issues, etc.

Week	Topics
1	<b>Introduction:</b> The Scope of Design, The Necessity for Systematic Design Project Proposal Preparation and Project Management.
2	Overview of existing CAE systems, Interactive graphics
3	Architecture of high-performance graphic displays, Elementary differential geometry
4	Orthographic and perspective display transformations
5	Parametric representation of curves and surfaces
6	Bicubic surface paths, Solid modeling
7	Automation in Design and Manufacturing, NC tool paths, Rapid Prototyping Methods
8	Advanced research topics - <b>Midterm Exam (November 15, 2016, Tuesday)</b>
9	<b>Fundamentals:</b> Fundamentals of Technical Systems,. Fundamentals of Systematic Approach. <b>Process of Planning and Designing:</b> General Problem-Solving Process, Flow of work During the Process of Planning and Designing.
10	<b>General methods for Finding and Evaluating Solutions:</b> Solution Finding Methods, Selection and Evaluation Methods.
11	<b>Product Planning and Clarifying the Task:</b> Product Planning, Clarifying the Task.
12	<b>Conceptual Design:</b> Steps of Conceptual Design, Abstracting to Identify the Essential Problems, Establishing Function Structures, Developing Working Structures, Developing Concepts, Examples of Conceptual Design
13	<b>Embodiment Design:</b> Steps of Embodiment Design, Checklist for Embodiment Design, Basic Rules of Embodiment Design. <b>Design for X:</b> Design for Manufacturing, Design for Quality, Design for Recovery
14	<b>Project Presentations</b>

#### Başarı Değerlendirme - Assessment Criteria :

Midterm (Vize)	1	% 20
Homework (Ödev)	2	% 10
Term project	1	% 30
Final Exam	1	% 40

#### Grading Rules:

1. Late homeworks will not be evaluated. Repeating the assignments is not possible.
2. **It is compulsory to ATTEND at least 70 % of the class** and 80 % of the practice according to university final exam regulations.
3. **80%** grade is required at least for **AA** Final letter Grading.
4. A student Grade under **45%** absolutely deserve **FF** for Final letter Grading.

#### Diğer – Others :

Additional announcements on the course will be provided in the web sites: [www.ninova.itu.edu.tr](http://www.ninova.itu.edu.tr)  
Dersle ilgili tüm duyurular [www.ninova.itu.edu.tr](http://www.ninova.itu.edu.tr) internet sayfalarından yapılacaktır.