



Advanced CAD/CAM

Instructor: Dr. Mehrdad Kazerooni

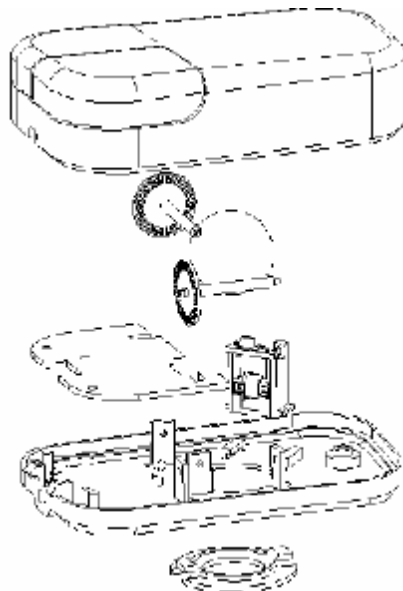
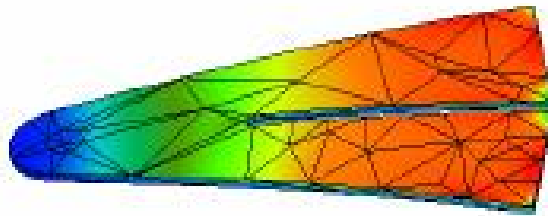
Semester: Spring 1383

Total Credit Hours: 3 credits

Course E-mail: kazerooni@alborz.kntu.ac.ir

Weekly Format: 2 Lectures

Course Code: ME3717 (Master)



COURSE GOALS:

The aim of this course is to develop an understanding of the basic principles underlying computer aided tools used in engineering.

The objective of this course is to develop students' awareness in the application of CAD and CAM systems in the context of developing engineering products.

COURSE OBJECTIVES:

- Learn and apply all of the steps of the computer aided design process in proposing and building models in design projects.
- To provide the students with a foundation in computer aided design.
- To produce knowledgeable users of CAD systems.
- To introduce the students to Finite Element Techniques.
- To widen the exposure of the students to contemporary design tools such as optimization and Rapid Prototyping.
- To make the students aware of the capabilities and limitations of computer design tools for engineers.
- Design and model a mechanical part that meets preset constraints and specifications.
- Provide engineering documents using computer technology.
- Conduct an idea to a computer design and distribute the idea within a team by applying the engineering design process steps and documenting and modeling on each phase.
- Develop and apply drawing and sketching skills to communicate design and engineering information graphically. Apply the principles of orthographic projection in engineering design.
- Learn and practice technical drawing and engineering graphics communication using AutoCAD.
- Learn and practice programming in CAD.
- Develop skills in three dimensional visualization of mechanical components through appropriate sketching exercises.
- Learn about StereoLithoGraphy
- Create and deliver individual and team presentations on CAD projects and topics.
- Generate a report for the design project that reflects work completed in each step of the design process and presents technical drawings that apply to the approved design.

REQUIRED MATERIALS:

1. *Principals of 3D Design using AutoCAD*, M.Kazerooni, A.Kazerooni-Saan Publisher, 1381
2. *Lisp and AutoLISP application in AutoCAD* -1st Edition Jahad-e-Tehran University Press, Tehran, 1376

RECOMMENDED MATERIALS & SOFTWARE USED FOR SKILL

1. Reading: *Introduction to Excel 2002*, D. Kuncicky, Prentice-Hall Publishing Company, NJ (2003).

2. Software: *Microsoft® Excel or Microsoft Office '97, 2000 or XP with Word and Excel.*
3. Software: *AutoCAD® 2002 (or AutoCAD 2000).*

COURSE ASSESSMENTS:

Final course grades will be computed using the following percentages:

10% Seminar

20% Homework and Attendance

10% In-class Design Exams and/or Quizzes

30% Major Design Project: Term Progress - 15%, Technical Report - 10%, Presentation -5%

30% Final Exam- **Open Book and Open Notes.** (Real World)

Students are responsible for **ALL topics** covered in class and **ALL assignment material**. Late assignments are not acceptable.

SEMINAR:

Students are required to present a minimum of 20 minutes presentation of a topic including PowerPoint file.

READING ASSIGNMENTS:

The course follows the textbook with some additional materials. The reading and homework are fundamental to learning the course subjects. I will be assigning reading material that you should read before class. This will help you better understand the material. The homework assignments will help you master the material and has two benefits: (1) credit is obtained for handing in the homework material on time; and (2) familiarity is gained with the types of problems that will be candidates for the final exam.

WRITTEN ASSIGNMENTS:

All homework assignments must be submitted on time and word processed unless otherwise indicated.

You may collaborate with other students, but unless it is work on your team design project, the work submitted must be your own.

All home works should be delivered to Course email box. (See above)

ENGINEERING DESIGN PROJECT:

Your mastering of the course material should be reflected in a **design project** that you will work on as a team (maximum of three people in assigned groups). Your group is expected to work as a team through the various phases of the project. You will be responsible for handing in several phases of the project throughout the semester. At the end of the semester, your group will turn in a technical report on your project and orally present your project. More details will be provided to you in the following weeks.

ETHICAL BEHAVIOR:

No collaboration is allowed on individual assignments under penalty of failure. Plagiarism, cheating, and any form of unauthorized collaboration will not be tolerated and will be handled in accordance with K.N. Toosi University policies.

Although students are encouraged to discuss homework assignments and work together to develop a deeper understanding of the topics presented in this course, submission of others' work, efforts, or ideas as your own is not permitted. Each student is expected to prepare and submit his/her own programs, reports, drawings, and other materials unless otherwise designated as collaborative work. Copying of computer files, documents, spreadsheets, or drawings is not allowed. If two students' work is suspiciously similar, a penalty may be assessed to both students. If a situation arises in which you are uncertain if cooperation with another student would constitute cheating or some other violation of the honor code, please ask the instructor for guidance and clarification of these rules.

EXPECTATIONS:

- (1) I expect that you will successfully learn the course material and that you will earn a good grade. This will require a reasonable amount of work on your part. If you satisfy the remaining expectations, you will be well on your way to success.
- (2) I expect that you will read (not necessarily fully understand) the assigned readings before coming to class. You can read the material provided in my website.
- (3) I expect that you will strive to attend every class, take comprehensive notes and participate (you are not simply a recorder). Sometimes statements or comments not written on the board are important and should be noted. I expect that you will study your notes and the texts.
- (4) If you miss a class, I expect that you will get the notes from a classmate and/or material in course website and review them before the next class.
- (5) I expect that you will do your homework and submit it according to specifications on the date due.
- (6) I expect that you will organize a study group for this course. I know of no better way to overcome hurdles when doing homework or to prepare for an exam.
- (7) I expect you to be an active learner and take responsibility for learning the material - not just surviving homework assignments and exams. Seek help from me or from members of your study group.
- (8) I expect that you will treat other members of the class with respect and not represent the work of others as your own.
- (9) I expect your project team to work together on all aspects of your design project. If there are any conflicts or problems, I expect you will resolve them or bring them to me early in the semester to be resolved. I expect your team to work as professionals to accomplish your goals for your projects.
- (10) I also expect that we will have a **good time** and learn a lot.

Syllabus:

۱. مروری بر مراحل طراحی و تولید
۲. اصول CAD, CAM, CAE
۳. Computer Aided Process Planning
۴. Computer Integrated Manufacturing
۵. StereoLithoGraphy
۶. روش بکارگیری فضای مدل و فضای کاغذ در تنظیم استاندارد نقشه
۷. روش ایجاد جزئیات در فضای کاغذ
۸. Blocks/Attributes/External References
۹. Electronic Transmission
۱۰. Hyperlink
۱۱. طراحی مشارکتی
۱۲. توابع ریاضی در اتوکد
۱۳. روش ایجاد سطوح

• برنامه نویسی در CAD

۱. روش ارتباط AutoCAD با AutoLISP
۲. روش ارتباط AutoCAD با VisualBasic
۳. ایجاد یک برنامه ماکرو با VisualBasic
۴. پایگاه داده در CAD
۵. ارتباط CAD با DATABASE
۶. Database Connectivity

• مدل سازی سه بعدی

۷. ایجاد اجسام سه بعدی ساده
۸. ایجاد اجسام سه بعدی مرکب
۹. برخورد و گسترش اجسام سه بعدی
۱۰. ایجاد مدل های مارپیچی و مدیریت لایه ها برای مدل
۱۱. موضوعات سه بعدی دورانی و اجرای یک پروژه

۱۲. مدل سازی با استفاده از توابع بولی

• استفاده از AutoCAD Mechanical در طراحی و ساخت

۱۳. مدل سازی یک قطعه در Mechanical Desktop

۱۴. طراحی دو بعدی و سه بعدی به صورت پارامتری

۱۵. مونتاژ اجسام سه بعدی

۱۶. آرایه سمینارها

۱۷. ارتباط میان CAD و ماشین های کنترل عددی