ME 453  MACHINE DESIGN II  Fall 2018
COURSE OUTLINE

Instructor:  Dr. Judah Ari-Gur, Room F-246
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Catalog Description:  3 cr-hr (2-3)
The application of mechanical engineering concepts to the mechanical synthesis process.  
Computer-aided design, computer modeling, and optimization applied to the synthesis of a system.
Prerequisites:  ME 3650.

OBJECTIVES

The primary objective is to involve the student in a complete modern preliminary design process from concept through computer-aided-analysis, trade studies, product development and prototype testing to optimal proposal. The course will stimulate creativity, enhance communication skills and reward for successful integration of advanced computer-aided-engineering, ergonomics, safety, marketing and environmental considerations in the engineering design process and product development.

DESCRIPTION

The class will meet in lectures and in laboratory sessions. Lecture topics introduce aspects of project development. Laboratory meetings are for guided computer work, project progress reports and consultation about projects and assignments. There will be two computer assignments, covering optimization and reliability.

Two design projects will be assigned. The need, together with environmental conditions and constraints, will be described by the course instructor, who plays also the role of the customer. The solution, including a clear definition of the problem, should be developed by the students. As in the work-place, it is the responsibility of the engineer to seek, acquire and study the necessary information and knowledge which are needed to complete the projects. Careful preparation is essential for successful accomplishment.

Both projects will be assigned at the beginning of the semester, so that the students will have ample time to study the relevant background, contact potential suppliers and manufacturers and obtain information about components that may be needed for the projects. The first project (due before the middle of the semester) emphasizes the use of FEA (Finite Element Analysis) for design analysis and does not require prototype construction. The second project (due before the end of the semester) is a complete detailed design, including testing of a demonstration prototype. Both projects require the use of computer aided engineering.

For both projects, the class will be divided into teams (of 2 students) who compete on marketing their proposals. They will, therefore, work independently and keep the secrecy of their ideas and progress from other teams. Mutual discussions, sharing the work load and assigning
areas of individual responsibilities among the team members are requisites to efficient planning. Scheduled meetings between each team and the instructor/customer will be held during the laboratory hours to discuss progress and problems. In every scheduled meeting, one-page progress reports will be submitted by each member of every team. The progress reports must reflect the tasks, assignments and accomplishments of the individual team member and the contributions to the team plan.

On the due date for each project a bound professional-style technical report will be submitted. The report should use high quality graphics. Then brief oral presentations of the proposed products will be given (where active participation of every student is required). For quality communication, written reports and oral presentations should be clearly outlined, rich in graphics and concise in language.

TOPICS
Review of Finite Element Modelling.
Project development. Disciplined creativity.
Written and oral reports. Specifications.
Optimization.
Detailed design -- case studies.

GRADING ( !!! 2018 Due Dates !!! )
CAE assignments - 20% (Mon., 15 Oct.; Mon., 3 Dec.)
Optimization exam - 15% (Mon., 15 Oct.)
First project - 25% (Fri., 2 Nov.)
Second project - 25% (Fri., 7 Dec.)
Reliability exam - 15% (Thur., 13 Dec., 2:45-4:45 p.m.)

Each project grade is based on the following:
* Final report and design quality - 75% (project #1)
  - 65% (project #2)
* Progress - 10% (project #2)
* Presentation (class grading) - 20%
* Comments and evaluation sheet - 5%

Failure to submit any of the above means failure ("E") in the course.
A=90%- ; BA=85%- ; B=80%- ; CB=75%- ; C=70%- ; DC=65%- ; D=60%-.

Remember: You have to earn your grades. Consistent effort is essential, but grades are assigned for the level of accomplishment, not the degree of hard work.