MF2101 Machine Design

Credits: 6hp
Grading: ETCS
Level: 2nd cycle
Language: English

Course offered by:
Department of Engineering Design

Examiner: Sergei Glavatskih
(segla@kth.se)

Learning management system: Canvas

The course *Machine Design* aims at deepening the understanding of the competence an engineer needs when developing products that work safely, reliably, and efficiently. Machine design is a complex, innovative, and highly iterative process where the engineer often has to make decisions with too little and/or unreliable information. To be a successful machine designer, the engineer needs knowledge in fundamental subjects (mathematics, mechanics, solid mechanics, materials, and many more) but also skills that can be described as common sense for engineers. In the course, the student will be faced with a number of typical engineering problems. Means for solving such problems will be given in lectures and during supervised exercises.

Intended learning outcomes

After passing the course, the students should be able to:

- design and detail mechanical engineering products based on engineering considerations
- estimate loads for mechanical engineering products and their components
- apply different design principles of load-bearing and load-transferring structures
- choose engineering materials and standardized components in mechanical products
- produce detailed and toleranced manufacturing drawings of mechanical products

Course main content

The course deals with an applied subject, where previously acquired knowledge should be applied and integrated with certain new given theory. The course content can be divided into two main parts:

1. Machine design fundamentals
   - Mechanics
   - Solid mechanics
   - Engineering Materials
2. Detailed design
   - Transmissions
   - Shaft design (stress concentration, fatigue)
   - Bearings and arrangements
   - Shaft-hub connections
   - Joints
   - Tolerances and GD&T
   - Drive units and electronics
   - Documentation and communication

Course Schedule

A detailed course schedule can be found on the course web:
https://www.kth.se/social/course/MF2101/calendar/

Course activities

The course consists of 12 lectures, 1 seminar, 9 individual assignments, and 1 group assignment (to be done in pairs).

- During the lectures (12 x 2 hours), fundamental theories are presented. On these occasions, the assignments are also presented, which means that it is recommended to attend the lectures to be able to follow the course. Lectures will be given on campus at KTH unless otherwise stated.
- The supervision sessions (13 x 2 hours) might include additional theoretical talks but are mainly intended for supervision of the current assignment. These sessions are also at KTH campus only. Students are advised to bring their own personal computers.
- The assignments are handed in via Canvas. Most assignments are automatically graded, and teachers manually grade the others. The assignments have a due date, and before this date, the teachers are available during the supervision sessions to answer questions.
- The seminar session is a 3-hour group work session on concept design.

Obs: ***All assignments must be passed within the course round. If not, you will have to do them again in future course rounds. If not, all assignments have to be redone at a later course round. If you need to revise or complete an assignment after it has been assessed, it shall be handed in no later than 25th October 2023.***

Examination

Final grading requires:

- Passed assignments (INL1; 3 hp), grading scale: P, F.
- Passed the written exam (TEN1; 3 hp), grading scale: A, B, C, D, E, FX, F.

The final grade in the course will be determined by the grade obtained in the written exam.

Recommended course literature

- *Mechanical Engineering Design*, Joseph Edward Shigley.

Teachers

Sergei Glavatskih (SG)	segla@kth.se	Examiner
Akepati Bhaskar Reddy (ABR)	abreddy@kth.se	Teacher
Gabriel Calderon (GC)	gbcs@md.kth.se	Teacher

Course evaluation

In order to develop and improve the course every year, all students will be asked to fill in a course evaluation at the end of the course. We certainly also accept written or oral comments during the course.

Welcome, and all the best!!!