

COURSE DESCRIPTION AND DATASHEET

2013.02.15.

Structural Analysis

1.	Subject code	Semester	Lec/Sem/Lab/reqs	Credit	Language
	BMEGEGIMGSA	4	1+0+2/p	4	English

2. Responsible person for the subject:

Name	Position	Department
Dr. Goda Tibor	Associate professor	Department of Machine and Product Design

3. Lecturer(s):

Name	Position	Department
Dr. Goda Tibor	Associate professor	Department of Machine and Product Design

4. The subject builds on knowledge of the following topics:

Statics, Strength of Materials

5. Course prerequisites and advisories:

There are no course prerequisites.

6. Aims and objectives:

The goal of the course is (a) to show students how CAD/CAE softwares can be used in the design process and how they operate, (b) to provide students a deeper understanding on the integrated CAD-FEM systems, and (c) to improve students' skill in the solution of real life problems by using FEM-based CAE software.

Topics discussed through the semester: Fundamentals of finite element analysis (FEA). Integrated CAD/FEM systems. Main steps of FEM. Basic element types. The linear triangular element. Modelling questions. Heat conduction problems. Dynamic and non-linear analysis.

7. Schedule of the subject

Week	Lectures	Laboratory
1.	Fundamentals of FEA. Integrated CAD/FEM systems.	Main steps of creating FE model
2.		Case studies
3.	Steps of FEM. Basic element types.	Stress analysis of solid bodies.

4.		Stress analysis of sheet metal parts. Adaptive methods.
5.	The linear triangular element.	Stress analysis of assemblies.
6.		Contact problems.
7.	Modeling questions. Heat conduction problems.	Test 1
8.		Definition of the project problem
9.	Dynamic/non-linear analysis.	Consultation. Preliminary analysis
10.		CAD model and mesh generation. Boundary conditions
11.	Holiday (There is no lecture)	Analysis of the computational results.
12.		Revision and improvement of the FE model.
13.	Test 2	Conclusions
14.	Make-up Test (if necessary, <i>time and place to be negotiated with tutor</i>)	Project Final Deadline, Presentation
Make-Up Week		Make-up handing-in (<i>time and place to be negotiated with tutor</i>)

8. Requirements

8.1 Submitting project report. During the semester one project problem should be solved, the project documentation should be submitted in the 14th week.

A maximum of 60 points for mid-term activity. Maximum of 30 points for the design project report and maximum of 10 points for a presentation to be held.

8.2 Written mid-term test (Test 2). A mid-term test (Test 2) should be written covering the lecture topics, maximum points of 40.

8.3. During the semester:

- Number of the absence from the laboratories has to be less than 5.
- Tests (Test 1 and 2) should be fulfilled at least 40%.
- The project should be submitted by the end of the semester on acceptable level (minimum 40%).

9. Supplementary opportunity

The test can be repeated in the 14th week.

The project documentation can be supplemented in the 15th week.

10. The determination method of the semester mark

1. Semester mark. For those who have successfully fulfilled the requirements, a semester mark is calculated by summing the mid-term points, following the limits below.

0 – 39	fail (1)
40 – 54	pass (2)
55 – 69	satisfactory (3)
70 – 84	good (4)
85 – 100	excellent (5)

11. Consultation opportunity

Each and every lecturer/tutor involved in the course has open office hours, please check the websites of their departments. Occasionally appointments at other times are possible upon previous arrangement.

12. Recommended literature

1. R.D. Cook, D.S. Malkus, M.E. Plesha, R.J. Witt: Concepts and applications of finite element analysis, 4th ed, John Wiley & Sons, Inc., New York, 2002.
2. Zienkiewicz, O. C., Taylor, R. L. : The finite element method – the basis, Butterworth-Heinemann, 2000.
3. Akin, J. E.: Finite Elements and Design, Academic Press, 1995.
4. T.R. Chandrupatla, A.D. Belegundu: Introduction to finite elements in engineering, 3rd ed, Prectice Hall, 2002.

13. Working hours required for the subject

42 Contact hours. Homework: project work 28 hours. Preparations for test: 14 hours.

14. Responsible person for the topics of the subject

Name	Position	Department
Dr. Goda Tibor	associate professor	Department of Machine and Product Design

15. Others

Unless otherwise stated the regulations of the Code of Studies and Exams are governing.

The official webpage of the course is <http://gt3.bme.hu/mw05>.