



BME Faculty of Mechanical Engineering

MSc in Mechanical Engineering Modelling  
Compulsory subject

COURSE DESCRIPTION AND INFORMATION SHEET  
2019.09.01.

**Machine Design and Production Technology**

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

**2. Responsible person for the subject:**

Name	Position	Department
Dr. Baka Ernő	assistant professor	Department of Machine and Product Design

**3. Lecturer(s):**

Name	Position	Department
Dr. Baka Ernő	associate professor	Department of Machine and Product Design
Dr. Váncza József	associate professor	Department of Manufacturing Science and Engineering
Dr. Németh István	associate professor	Department of Manufacturing Science and Engineering
Dr. Szalay Tibor	associate professor	Department of Manufacturing Science and Engineering
Dr. Markos Sándor	honorary professor	Department of Manufacturing Science and Engineering
Dr. Boór Ferenc	research fellow	Department of Manufacturing Science and Engineering

The phone numbers, e-mail addresses and office hours of the lecturers from the Department of Machine and Product Design during the semester can be found on the following webpage: <http://gt3.bme.hu/>, under the Staff menu.

The phone numbers, e-mail addresses of the lecturers from the Department of Manufacturing Science and Engineering can be found on the following webpage: [www.manuf.bme.hu](http://www.manuf.bme.hu), under the Staff menu (appointment by e-mail)

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

General knowledge on engineering design and production on Bachelor level.

**5. Course prerequisites and advisories:**

The course is a Masters course, Bachelor degree is required. There are no course prerequisites.

## 6. Aims and objectives:

The goal of the course is to give a theoretical overview on the fields of machine design and production technology, according to the detailed topics below. Some elements of the methodology are covered on the seminars more in depth.

Machine design: Design principles and methods. Modern design techniques. Design process models. Requirements. Conceptual design methods. Evaluation and selection in the design process. Structural behavior and modeling. Design of frame structures. Load transfer between engineering components. Structural optimization (object function, design variables, constraints, shape and size optimization).

Production: Machine tools, robots and other manufacturing equipment, devices and fixtures, machining principles, production procedures and processes, production volume, batches and series. Manufacturability and tooling criteria, preliminary conditions and production analysis, methods of sequencing operations, production planning and scheduling. Production management (TQC and JIT), automated production; cellular manufacturing and manufacturing systems. Product data and technical document management (PDM, TDM), engineering changes and production workflow management (CE, ECM).

## 7. Course calendar

Week	Lectures (R. bd. 109.)	Seminars
1. odd	What is design, what processes do we have in design (Design)	Problem definition and specification. List of requirements, Voice of Customer (Design)
2. even	Design methodology – Problems and processes. (Design)	Problem definition and specification. List of requirements, Voice of Customer (Design)
3. odd	Design methodology – Problems and Solutions. (Design)	Functional analysis, functional structure. (Design)
4. even	Database in Engineering (PLM-PDM)	Functional analysis, functional structure. (Design)
5. odd	Costs in Design	Principle solutions, concept generation. Evaluation and selection. (Design)
6. even		Principle solutions, concept generation. Evaluation and selection. (Design)
7. odd	Manufacturing Systems – Németh I.-	Simulation of Manufacturing Systems
8. even	Bank Holiday-No lecture	
9. odd	Manufacturing demand, fundamentals of manufacturing Markos S.	Simulation of Manufacturing Systems
10. even	Production planning (Production)	Tolerance and SPC (Production)
11. odd	Production and Capacity Planning	Tolerance and SPC (Production)
12. even	University Open Day – No lecture	-
13. odd	Material requirements planning (MRP) (Production)	Production planning (Production)
14. even	Test for Group1	
15 odd	Test for Group2	

## 8. Requirements

- 8.1 Submitting seminar documents prepared throughout the seminar. Each seminar students will be challenged with short tasks to be solved during the given seminar. Teachers provide guidance. Students will work in small groups, prepare required deliverables and submit them signed at the end of the seminar. No mid-term points are collected upon the seminar tasks, however students must contribute to at least 4 out of the 6 tasks in the semester.
- 8.2 Written mid-term test. A mid-term test should be written covering the lecture topics, maximum points of 100. (No minus points for wrong answer.)
- 8.3. During the semester (conditions for signature):
- Number of the absence from the seminars has to be maximum 2.
  - Test should be fulfilled at least 50% (min. 50 points equals pass).
- 8.4 In the exam period (conditions for examination mark)
- Written examination (minimum 50% equals pass).

## 9. Supplementary opportunity

The test can be repeated in the 14<sup>th</sup> week. Seminar tasks should be done in the assigned class primarily, supplementary option is the other class in the same topic. For further information see 7. Course calendar.

## 10. The determination method of the exam mark

1. Pre-Mark. For those who have successfully received a signature, a pre-mark is calculated upon the mid-term test points, accordingly the limits below. The pre-mark is an option for the student to accept it as a final exam mark.

76 – 88	good
89 – 100	excellent
63 – 75	satisfactory

2. Exam. A max. 50 points test exam is obligatory in writing. The result points are added to half of the mid-term test points, or simply multiplied by two (whichever results in higher points) and the sum is evaluated following the limits below.

0 – 49	fail (1)
50 – 62	pass (2)
63 – 75	satisfactory (3)
76 – 88	good (4)
89 – 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. Ullman, D.G.: The mechanical design process, McGraw Hill, 1997.
2. Grabowski, H.: Universal design theory, Shaker Verlag, Aachen, 1998.
3. Dym, C.L.: Engineering design, Cambridge University Press, 1994.
4. Kalpakjian, Schmid: Manufacturing Engineering and Technology, Prentice-Hall Inc. Publ. 2001, ISBN 0-201-36131-0
5. D. J. Williams: Manufacturing Systems – An introduction to the technologies, Second Edition, Kluwer Academic Publishers, 1994, ISBN 0 412 60580 5
6. Nanua Singh, Divakar Rajamani: Cellular Manufacturing Systems – Design, planning and control, Chapman & Hall, London, 1995, ISBN 0 412 55710 X
7. Hopp, W.J.; Spearman, M.L, Factory physics, Foundations of manufacturing management, Irwin/McGraw-Hill, second edition, 2001.

## 13. Working hours required for the subject

42 Contact hours. Preparations for test and exam: 42 hours.

## 14. Responsible person for the topics of the subject

Name	Position	Department
Dr. Baka Ernő	assistant professor	Department of Machine and Product Design
Dr. Peter Zentay	associate professor	Department of Manufacturing Science and Engineering

## 15. Grading

### Hungarian (BME) and ECTS grading scale

<i>Hungarian grade</i>	<i>ECTS equivalent</i>	<i>Explanation for the Hungarian grade</i>
<b>5</b>	<b>A</b>	<b>Excellent</b>
<b>4</b>	<b>B</b>	<b>Good</b>
<b>3</b>	<b>C</b>	<b>Satisfactory</b>
<b>2</b>	<b>D</b>	<b>Pass</b>
<b>1</b>	<b>F</b>	<b>Fail</b>
<b>Nem jelent meg</b>	<b>DNA</b>	<b>Did not attend (no credit)</b>
<b>Nem vizsgázott</b>	<b>I</b>	<b>Incomplete (no credit)</b>
<b>Aláírva</b>	<b>S</b>	<b>Signed (no credit)</b>
<b>Megtagadva</b>	<b>R</b>	<b>Refused (no credit)</b>

## 16. 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/mw01>. Webpage to be accessed after successful registration on the site.