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|  | **BSc in Mechanical Engineering Design and Technology****Engineering Design and Technology Specialization****compulsory subject** |

SUBJECT DATA SHEET AND REQUIREMENTS

last modified: 8th May 2014

CAD/CAM APPLICATION

CAD/CAM ALKALMAZÁSOK

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| **1** | Code | Semester Nr.or fall/spring | Contact hours/week(lect.+semin.+lab.) | Requirementsp / e / s | Credit | Language |
|  | **BMEGEGTAG93** | **fall** | **1+0+2** | **p** | **3** | **English** |

2. Subject’s responsible:

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| Name: | Title: | Affiliation (Department): |
| Dr. Tibor Szalay  | Associate professor | Dept. of Manufacturing Science and Engineering |

3. Lecturer:

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| Name: | Title: | Affiliation (Department): |
| Dr. Ferenc Boór  | Senior researcher | Dept. of Manufacturing Science and Engineering |

4. Thematic background of the subject:

Manufacturing

5. Compulsory / suggested prerequisites:

Compulsory: Manufacturing (BMEGEGTAG01)

Suggested: Materials Science and Testing (BMEGEMTAGA1)

**6. Main aims and objectives, learning outcomes of the subject:**

The aim of the subject is to introduce students into computer aided design and manufacturing systems via industry proven tasks, application examples. Out through laboratory works they can learn the main principles of computer aided manufacturing programming techniques, the characteristics, advantages and limits of recent CAD and CAM systems and up to date developments. The focus of the subject is to teach manufacturing oriented computer modelling (preprocessing), applications and programming (post-processing).

7. Method of education:

1 h lectures and 2 h laboratory / week, 1-1 intermediate and practical tests and 1 final theoretical test (altogether 3 events) and 1 homework for the semester.

8. Detailed thematic description of the subject:

**Product and production life cycle**: Product, product workflow (lifecycle), production and manufacture, product design and production planning, modelling (models). **Computer aided automation of process planning (engineering)**: manufacturing process planning and engineering models (CAD/CAM models); object and process oriented, indtegrated planning methods (CIM); manufacturing and manufacturability planning. **CAD or/and CAM systems**: principles of CAD and CAM system application, design for manufacture and assembly, feature based design and manufacturing process planning, manufacturing process oriented (generated) surface models and modelling, technology and quality controlled design and planning. **CAM items and basic workflows**: modelling of parts, assembly, environment (machine, device, tool, control, etc.) and technological process; CAD/CAM systems and elements (modules); CAM work- and dataflows (interfaces, documents); manufacturing dimension; material, tool and technological databases; manufacturinc strategies (roughing and finishing, path generation and combination, etc.); manufacturing levels and boundaries; **2.5-3D tasks**, cycles, options. **>3D manufacturing via CAM systems**: manufacturing planning on lathes, mills and wire EDMs, spatial motion strategies, manufacturing sculptured and composed (combined) surfaces, applications of combined strategies, high speed machining (HSM) and special techniques. **CAM-CNC interfaces, postprocessors**: adaptation and transportation interface drivers (engine, processor), surfaces (HW/SW) and languages (formats), intermediate surfaces, languages, ISO CLDATA, ISO standard and advanced NC program languages, postprocessing (postprocessors and postprocessor generator), DME connections (DMIS) and NC auxiliary functions (in process measure, adaptive feed and/or path optimization, etc.) .**Surveying knowledge: Lecture’s and supplementary labor’s test**

Thematic of *laboratories*: Subject requirements and thematic, 2.5D multiple hollow part modelling, NASA CAD test laboratory, Test1 (CAD labor work), surface and solid modelling of complex surfaces and combined, assembled block, NASA CAM test milling, 2.5D milling of hollow part in EdgeCAM, 3D-s CAM modelling and manufacturing programming, Test2 (CAM labor work), Homwork consulting, check and submission.

9. Requirements and grading

a) in term-period

Fulfilling the compulsory laboratories, homework (up to 14th week) + 2 labor test (on 7th and 14th week) and 1 lecture test passed during the last lecture on 13th or 14th week (each min. 40%) – altogether 41 points achieved

**Exams and Homework**

Conditions for wiining practical mark:

* + - taking part all the labors
		- submission homework at least on the 40% level
		- pass labor and lecture test (40-40%)

Calculation of practical mark:

homework: min 10, max 25 points

Tests: min 31, max 75 points, in which

* lecture test (multiple choice): min 11, max 25 points
* labor test 1 (CAD work) min 10, max 25 points
* labor test 2 (CAM work) min 10, max 25 points

Practical mark by achieved points (calculated with extra points 0-10 proposed by lecturers):

 **41-55: passed (2) 56-70: satisfactory (3) 71-85: good (4) 86-100: excellent**

**b) Disciplinary Measures Against the Application of Unauthorized Means at Mid-Terms, Term-End**

Supplement to 1/2013. (I. 30.) Dean’s Order (Codicil): The following students are subject to disciplinary measures.

(a) Those students who apply unauthorized means (book, lecture notes, etc.), different from those listed in the course requirements and/or adopted by the lecturer in charge of the course assessment, in the written mid-term exams taken, and/or invite/accept any assistance of fellow students, with the exception of borrowing authorized means,

will be disqualified from taking further mid-term exams in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission option. Final term-end results in courses with practical mark will automatically become Fail (1), the ones with exam requirements will be labelled Refused Admission to Exams.

(b) Those students whose homework verifiably proves to be of foreign extraction, or alternatively, evident results or work of a third party, are referred to as their own, will be disqualified from taking further assessment sessions in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), ones with exam requirements will be labelled Refused Admission to Exams.

(c) Those students who apply unauthorized means (books, lecture notes, etc.), different from those listed in the course requirements and/or adopted by the lecturer in charge of the course assessment, in the written term-end exams taken, and/or invite/accept any assistance of fellow students, with the exception of borrowing authorized means, will immediately be disqualified from taking the term-end exam any further as a consequence of their action, and will be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the very same exam period.

(d) Those students who alter, or make an attempt to alter the already corrected, evaluated, and distributed test or exercise/problem,

i.) as a consequence of their action, will be disqualified from further assessments in the respective semester. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), the ones with exam requirements will be labelled Refused Admission to Exams;

ii.) and will immediately be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the very same exam period.

**10. Retake and repeat**

In the last week of the semester the 1 compulsory laboratory may be repeated.

**11. Consulting opportunities:**

Consultation hours: By hanged appointments (on the official education board)

**12. Reference literature (compulsory, recommended):**

* Downloadable materials: [www.manuf.bme.hu](http://www.manuf.bme.hu)

**13. Home study required to pass the subject:**

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| Contact hours | 42 | h/semester |
| Home study for the courses | 14 | h/semester |
| Home study for the mid-semester checks | 24 | h/check |
| Preparation of mid-semester homework | 24 | h/homework |
| Home study of the allotted written notes | 16 | h/semester |
| Home study for the exam | - | h/semester |
| **Totally:** | **=120** | **h/semester** |

14. The data sheet and the requirements are prepared by:

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| Name: | Title: | Affiliation (Department): |
| Dr. Ferenc Boór  | Senior researcher | Dept. of Manufacturing Science and Engineering |