# Assessment and subject description

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| **Óbuda University**<br>Kandó Kálmán Faculty of Electrical Engineering | | Institute of Microelectronics and Technology | | |
| Subject name and code: **Mathematics I KMEMA1AMND** Credits**: 6**<br>**Full-time, Fall Semester** *(2016-2017)* | | | | |
| Course: Technical Management | | | | |
| Responsible: | Dr. Kovács Judit | Teaching staff: | Dr. Kovács Judit | |
| Prerequisites: | --- | | | |
| Contact hours per week: | Lecture: **3** | Class discussion.: **2** | Lab hours: **0** | Tutorial: **0** |
| Assessment and evaluation: | semester mark | | | |

**Subject description**

*Aims*: Emphasis is on basic topics of mathematics. Class discussions help students to solve problems in connection with the topics. This course will promote the development of algebraic and analytic skills as well as conceptual understanding.

*Topics to be covered:* Complex numbers. Linear algebra. Sequences. Real-valued functions of one variable. One-variable calculus. Vector algebra.

| Topics | Week | Lessons |
|---|---|---|
| *Sequences*<br>Concept of sequences. Bounded sequences, monotonicity, limit of sequences, convergence, divergence.<br>*Real-valued functions of one variable I*<br>Concept of functions. Real-valued functions of one variable. Bounded functions, monotonicity, even and odd functions, periodicity, convexity, points of inflection, local extrema. Limits of functions on the real line and involving infinity. One-sided limits. Continuity. | **1.** | **3+2** |
| *Real-valued functions of one variable II*<br>Basic functions (power, exponential, trigonometric functions and inverses).<br>*Differential calculus I*<br>Concept of the differential quotient. Geometric and physical meaning. Derivatives of elementary functions. Rules for finding the derivative (constant rule, sum rule, product rule, quotient rule). Chain rule and rule for finding the derivative of the inverse function. | **2.** | **3+2** |
| *Differential calculus II*<br>Mean value theorems. Higher derivatives. Connection between differentiability and continuity. Discussion of functions by derivative tests. First derivative test. Second derivative test. | **3.** | **3+2** |
| *Differential calculus III*<br>L'Hospital's rule. Discussion of functions. Examples. Optimization problems. Applications for economics. | **4.** | **3+2** |
| *Indefinite integrals I*<br>Concept of primitive functions and antiderivatives. Properties of antiderivatives. Integrals of basic functions. Techniques of integration. $\int f(ax+b)\,dx$. | **5.** | **3+2** |
| *Indefinite integrals II*<br>Integration by substitution. Integration by parts. | **6.** | **3+2** |
| *Test 1* | **7.** | **3+2** |
| *Definite integrals/Riemann-integral, Improper integrals*<br>Concept of definite integrals. Properties. Fundamental theorem of calculus. Applications. Improper integrals. | **8.** | **3+2** |
| *Complex numbers*<br>Concept of complex numbers. Introduction of 3 forms of complex numbers. Representation of complex numbers on Argand diagram / the complex plane. Elementary operations in algebraic form. Elementary operations in trigonometric and exponential forms. | **9.** | **3+2** |

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|---|---|---|
| *Linear algebra I*<br>Concept and characteristics of the determinant. Solution of linear equation systems by Cramer's Rule. | **10.** | **3+2** |
| *Linear algebra II*<br>Concept of matrices. Special matrices. Basic operations of matrices.Applications. | **11.** | **3+2** |
| Vector algebra.<br>Concept of vectors, operations on vectors (sum, difference, scalar-multiple, dot product, cross product. Coordinates of vectors and operations. | **12.** | **3+2** |
| *Test 2* | **13.** | **3+2** |
| *Make-up tests* | **14.** | **3+2** |

**Assessment**

Students are expected to attend every lectures and class meetings. Students overtaking the possible misses according to Policy (TVSZ**) may not be given a semester mark (will be given "disabled")** and there will be **no make-up** allowed under any circumstances.
Students are expected to take all tests as scheduled below. Students need to achieve at least score 50 from the maximum score 100 to obtain semester mark. No electronic devices are allowed to be used during any tests. Code of Student Conduct and Disciplinary Procedures of Óbuda University is the base of judging cheating on writing tests. In case of cheating, the test score is 0 point. In the case of discovery of cheating after the test, during correcting it, the student concerned has the right to write another test at an appointment given by the teacher.

| | **Date** | **Length** | **Max. score** | **Topics** |
|---|---|---|---|---|
| Test 1 | Week 7 | 70 minutes | 50 | Real-valued functions with one variable and differential calculus. |
| Test 2 | Week 13 | 70 minutes | 50 | Integral calculus. Complex numbers. Linear algebra. |
| Make-up tests | Week 14 | 70 (100) minutes | 50(100) | Topics of the missing tests. |

**Make-up tests:**
Make-up tests are available only for students not "disabled".

- Any student not disabled may take an overall make-up test (topics of both test 1 and 2) with duration 100 minutes and max. score 100.
- Any student, who has taken one of the tests and missed the other one for documented reasons, may also take a make-up only for the missing test.
- Any student who has taken both tests may take a make-up for the original test with smaller achieved score. In this case the score of the make-up test will be counted, even if it is smaller than the score of the original test. If the achieved score of both original tests are equal, then the student may decide which make-up test to take.
- Any students not disabled who could not get the semester mark in any ways in the fall semester may take an overall make-up test once on a scheduled date during the first two weeks of the examination term. The overall make-up test of the examination term covers topics of both tests 1 and 2 with duration 100 minutes and max. score 100.

**Evaluation:** semester mark

Semester marks are given only for students not ”disabled”.

Students who did not take any tests or could not achieve at least score 50, will be given the semester mark ”fail” elégtelen (1).

Students who achieved at least score 50 by the original (not overall) tests will be given the semester mark according to the following table:

| Cumulative score | Mark |
|---|---|
| 86 - 100 | ”excellent” jeles (5) |
| 74 - 85 | ”good” jó (4) |
| 62 - 73 | ”fair” közepes (3) |
| 50 - 61 | ”pass” elégséges (2) |
| 0 - 49 | ”fail” elégtelen (1) |

Students who achieved at least score 50 by overall test will be given the semester mark ”pass” elégséges (2).

**Suggested material**


1) O.V Manturov: A Course of Higher Mathematics, Publisher Mir. Hardcover 1989, 461 pages, ISBN 5030002669

2) D. Faddeev, I. Sominski: Problems in Higher Algebra Publisher Mir. Moscow 1968, 316 pages

3) RA Adams, Ch Essex: Calculus: A Complete Course , Publisher: Toronto, Pearson Canada 2009, 973 pages, ISBN 9780321549280

4) Elliott Mendelson: 3000 Solved Problems in Calculus, McGraw-Hill, New-York 2009, 455 pages, ISBN 9780071635349

5) Dr. Baróti Gy. - Kis M. - Schmidt E. - Sréterné dr. Lukács Zs.: Matematika Feladatgyűjtemény, BMF 1190, Bp. 2005


23-08-16 Dr. Kovács Judit