Assessment and subject description

Óbuda University Kandó Kálmán Faculty of Electrical Engineering		Institute of Microelectronics and Technology		
Subject name and code: **Mathematics I NMXAN1EBNE** Credits**: 6** **Full time, Autumn Semester** (2018-2019)				
Course: Electrical engineering, Technical Management				
Responsible: Dr. Galántai, Aurél		Teaching staff: Dr. Kovács, Judit		
Prerequisites: ---				
Contact hours per week:	Lecture: **3**	Class discussion.: **3**	Lab hours: **0**	Tutorial: **0**
Assessment and evaluation: written examination				

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. Provided by the Institute, there will also be an opportunity to get to know the basics of MatLab in extra time.

Topics to be covered: Sets, sets of numbers, operations. Complex numbers. Vectors. Linear algebra. Sequences. Real-valued functions of one variable. One-variable calculus.

Topics	Week	Lessons
Lecture:11/09 *Sets, sets of numbers I.* Sets, operations on sets. Natural numbers, primes. Integers, rational and irrational numbers. Real numbers. The *n*-th power, identities. The *n*-th root, identities. Algebraic expressions, identities. Equations, inequalities.	**1.**	**3+3**
Lecture:18/09 *Sets, sets of numbers II.* Basic trigonometry. Concept and representation of complex numbers. Introduction of 3 forms of complex numbers. Elementary operations in different forms. Quadratic equations. Polynomials, factorization of polynomials.	**2.**	**3+3**
Lecture:25/09 *Vectors.* Concept of vectors, components. Operations on vectors. Geometric applications. *Linear algebra.* Concept of matrices. Basic operations on matrices. Determinants. Calculation of 2-nd order and 3-rd order determinants.	**3.**	**3+3**
Lecture:02/10 *Real-valued functions of one variable I.* Relations, real-valued functions of one variable. Domain, range, intercepts. Linear functions, quadratic functions. Power functions. The logarithm, identities. Exponential and logarithm functions. Equations.	**4.**	**3+3**
Lecture:09/10 *Real-valued functions of one variable II.* Operation on functions. Composite functions, inverse functions. Monotonicity, local extrema. Convexity. Even and odd functions, periodicity. Linear transformation of functions. Elementary functions. Trigonometric, inverse trigonometric functions.	**5.**	**3+3**
Lecture:16/10 *Test 1.*	**6.**	**3+3**
Lecture:23/10 *Holiday*	**7.**	**0+0**

Lecture:30/10 *Sequences.* Concept of sequences. Bounded sequences, monotonicity, limit of sequences, convergence, divergence. Types of sequences.*Real-valued functions of one variable III.* Limits of functions at finite points and involving infinity. One-sided limits. Continuity. Limits of extra interest**.**	**8.**	**3+3**
Lecture:06/11 *Differential calculus I.* Concept of the differential quotient. Geometric and physical meaning. Derivatives of elementary functions. Rules for finding the derivative. Higher derivatives. Mean value theorems. L'Hospital's rule.	**9.**	**3+3**
Lecture:13/11 *Differential calculus II.* Discussion of functions by using derivatives. Examples. Optimization problems. Linear approximation of functions. Numeric solution of equations by the Newton-method.	**10.**	**3+3**
Lecture:20/11 *Indefinite integrals I.* Concept of primitive functions and indefinite integrals Properties. Integrals of basic functions. Techniques of integration: basic rules, integration by parts, integration by substitution.	**11.**	**3+3**
Lecture:27/11 *Definite integrals.* Concept of definite integrals. Properties. Newton-Leibniz-rule. Applications. Numeric integration. Improper integrals. Integrals of rational functions. Partial fractions in integration.	**12.**	**0+3**
Lecture:04/12 *Test 2.*	**13.**	**3+3**
Lecture:11/12 *Make-up tests*	**14.**	**3+3**

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 signature (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 and at least score 15 from the maximum score 50 at each tests to obtain signature. 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 the case of cheating, the test score is 0 point.

	Date	**Length**	**Max. score**	**Topics**
Test 1	Week 6	60 minutes	50	Sets of numbers. Complex numbers. Vectors. Linear algebra. Real functions of one variable.
Test 2	Week 13	60 minutes	50	Differential calculus of real-valued functions with one variable Indefinite integrals.
Make-up tests	Week 14	60-60 minutes	50-50	Topics of the corresponding tests.

Make-up tests:
Make-up tests are available only for students not ”disabled”. There are (differently scheduled) make-up tests for both tests as follows:

- Any student who missed one test for documented reasons, may take a make-up for the missing test.
- Any student who has taken one or both test(s) not achieving the minimum score(s), may take a make-up for one test.
- Any student who has taken both tests achieving the minimum scores 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 pass in the fall semester may take an overall make-up test once on a scheduled date at the beginning of the examination term. The overall make-up test of the examination term covers topics of both tests 1 and 2 with duration 75 minutes and max. score 100.

Evaluation: written examination
Any student may set for the exam **only after obtaining the signature** for the semester. Exam tests contain problem solving (score 50, duration 60 minutes) and theoretical questions (score 20, duration 15 minutes). During the exam, **calculators** and other electronic devices **must not be used.** Any students achieving less than score 21 will fail. Any students achieving at least score 21 will be given a cumulative score. If the student has not taken an overall test then the cumulative score is counted by the score of the exam plus 30 % of the sum of the scores of the tests of the semester. If the student has taken an overall test then the cumulative score is counted by the score of the exam plus score 15. According to the cumulative score the mark of the exam is the following:

Cumulative score	Mark
88 - 100	”excellent” jeles (5)
75 - 87	”good” jó (4)
63 - 74	”fair” közepes (3)
50 - 62	”pass” elégséges (2)
0 - 49	”fail” elégtelen (1)

Recommended reference resources

1. Kovács, J., Schmidt, E., Szabó, L.A.: Mathematics, ÓE KVK 2103, Budapest, 2013

2. Kovács, J., Schmidt, E.: Mathematics. Problem Solving, E-learning

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

03-09-2018 Dr. Kovács Judit (lecturer)