YMM3731 Mathematical analysis I
autumn semester of 2016/17 academic year

5 credits 4 2-0-2 E A
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Following items are the subsections in theoretical material but also the questions in colloquiums and examination.

1. Function and representation of the functions

2. Classification of the functions (even and odd functions, periodic functions, increasing and decreasing functions)

3. Inverse function

4. Composite function

5. Limit of sequence

6. Limit of function

7. One-sided limits

8. Infinite quantities and infinitesimals

9. Limit theorems

10. The limit $\lim\limits_{x \to 0} \dfrac{\sin x}{x}$

11. Real number e

12. Comparison of infinitesimals

13. Continuity of function. Necessary and sufficient condition for continuity

14. Continuity of elementary function

15. Points of discontinuity

40. Asymptotes of the graph of function

41. Antiderivative and indefinite integral

42. Table of integrals

43. Properties of indefinite integral

44. Integration by change of variable

45. Integration by parts

46. Partial fractions and integration of partial fractions

47. Decomposition of rational fraction

48. Integration of some classes of trigonometric functions

49. Integration of irrational functions

50. Definite integral

51. Properties of definite integral

52. Evaluation of definite integral. Newton-Leibnitz formula

53. Change of variable in definite integral

54. Integration by parts (for definite integral)

55. Improper integral with infinite limits

56. Improper integral of unbounded functions

57. Approximate evaluation of definite integral. Trapezoidal formula

58. Determination of area in Cartesian coordinates

59. Polar coordinates. Areas enclosed by polar curves

60. Length of the arc of the curve

Autumn term lasts 16 weeks. Every week there are 2 academic hours lectures and 2 academic hours practical lessons. In lectures will be given theoretical material and examples. In practical lessons the theory will be applied to solve exercises.

The lectures by chapters and the exercises are on the web-side www.staff.ttu/∼lpallas

To get the credits one has to pass the examination. The examination variant consists of five items: three theoretical questions and two exercises.

Prerequisites for sitting the examination: the student has to write two tests on exercises. The first test takes place during the practical lesson in the 8th week end the second test in the 15th week.

Standard exercises for tests as well as for examination are also on the web-side www.staff.ttu.ee/~lpallas

The exercises tests will be assessed in 100-points system. To pass the test one has to get at least 51 points.

If the student has got for test at least 80 points, he/she has not to solve the corresponding exercise on the examination.

The theory can be written during the semester in three parts (colloquiums). The first colloquium in week 7, the second in week 12 and third in week 16. The colloquiums are not compulsory and will take place during consultation hours.

The maximal amount of points for the first and second colloquium is 17 and for the third colloquium 16. Thus, for theory one can get in total 50 points. For the exercises the maximal amount of points is also 100:4+100:4=50.

The colloquiums will be in writing and does not contain the exercises, only theory and examples. The colloquium will be passed when one gets at least 7 points. If the student is content oneself with the amount of points obtained and does not want to improve the result, he/she can skip on the examination the items of theory involved.

Example. Suppose that a student has got 5 points for the first colloquium, 10 points for the second colloquium and has not written the third colloquium. For the first exercises test this student has got 68 points and for the second exercises test 83 points.

The student in our example comes to the examination and announces that he is going to write the first and the third colloquium and the first exercise. Suppose that she/he will get for the first colloquium 12 points and for the third colloquium 9 points and she/he will solve the exercise correctly which gives 25 points. For the theory this student has 12+10+9=31 points and for exercises 25+(83:4≈21)=46 points. In total this student has for semester 77 points. Students will be graded according to the following scale.

91 ... 100 points "5" excellent
81 ... 90 points "4" very good
71 ... 80 points "3" good
61 ... 70 points "2" satisfactory
51 ... 60 points "1" poor
... 50 points "0" failed

So, the student in our example will be graded with "3" good.