| Subject code | ECTS credits |
|:---:|:---:|
| MAT1002 | 6 |

**Course title in Lithuanian**

MATEMATINĖ ANALIZĖ 1

**Course title in English**

MATHEMATICAL ANALYSIS 1

**Short course annotation in Lithuanian (up to 500 characters)**

Įgyjamos esminės matematinės analizės žinios, susipažįstama su skaičių aibėmis ir jų veiksmais, aibių rėžiais, skaičių seka ir jos ribos skaičiavimu, svarbiausiomis funkcijų klasėmis, atvirkštine funkcija, funkcijų superpozicija, funkcijos ribos skaičiavimu, funkcijos tolydumo tyrimu, funkcijos išvestinės ir diferencialo skaičiavimu, aukštesnių eilių išvestinių skaičiavimu, Lopitalio taisyklės taikymu, Teiloro formule, ekstremumų uždavinių sprendimu, funkcijos tyrimu.

**Short course annotation in English (up to 500 characters)**

Acquired fundamental knowledge of basic concepts of mathematical analysis: set of real numbers and set operations; bounds for sets of real numbers, sequences of numbers and their limits; main classes of functions inverse function, function superposition principle, limit of a function, continuous functions, derivatives and differential of a function, higher-order derivatives, L'Hôpital's rule, Taylor formula, extrema of a function and function graphing.

**Prerequisites for entering the course**

High school mathematics knowledge.

**Course aim**

Course aim is to provide knowledge of basic concepts of mathematical analysis.

**Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment**

| No | Course outcomes | Criteria of learning achievement evaluation | Study methods | Methods of learning achievement assessment |
|:---:|---|---|---|---|
| 1 | Knowledge and understanding of limits of the sequences of numbers | Student demonstrates the ability to solve given limit of the sequences of numbers. | Lectures, practical works, individual work, consulting | Mid-term exam, assessment of practical works |
| 2 | Knowledge and understanding of limit of a function | Student demonstrates the ability to solve limit of a particular function. | Lectures, practical works, individual work, consulting | Mid-term exam, assessment of practical works |
| 3 | Provide knowledge on differentiation of functions | Student recognizes differentiation rules and can differentiate a particular function. | Lectures, practical works, individual work, consulting | Final exam, assessment of practical works |
| 4 | Perform full research of function and sketch the graph of function | Student performs full research of particular function and sketches the graph. | Lectures, practical works, individual work, consulting | Final exam, assessment of practical works |

**Links between study programme outcomes and course outcomes**

| Study programme outcomes | Running number of course outcome |
|:---:|:---:|
| | |

|  | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Know and comprehend concepts and propositions of fundamental mathematical subjects, recognize and apply them solving practical/theoretical tasks | + | + | + | + |
| Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies | + | + | + | + |
| Operating with formal mathematical symbols and terms, determine mathematical connections between various mathematical quantities; conceive mathematical propositions and logical proofs, construct and prove new statements | + | + | + | |
| Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions | + | + | + | |

**Content**

| No | Content (topics) |
|---|---|
| 1. | Set of real numbers, set operations. |
| 2. | Bounds for sets of real numbers. |
| 3. | Main classes of functions. Inverse function. Function superposition principle. |
| 4. | Sequence. Limit of a sequence. |
| 5. | Limit of a function. |
| 6. | Continuous functions. |
| 7. | Derivative and differential of a function. |
| 8. | Higher-order derivatives. |
| 9. | L'Hôpital's rule. |
| 10. | Taylor formula. |
| 11. | Extrema of a function. |
| 12. | Function graphing. |

**Distribution of workload for students (contact and independent work hours)**

| Lectures | 45 hours |
|---|---|
| **Practical work** | **30 hours** |
| **Individual students work** | **85 hours** |
| **Total:** | **160 hours** |

**Structure of cumulative score and value of its constituent parts**

Final written exam (50%), mid-term written exam (25%), assessment of practical work (25%).

**Recommended reference materials**

| No | Publication year | Authors of publication and title | Publishing house | Number of copies in | | |
|---|---|---|---|---|---|---|
| | | | | *University library* | *Self study rooms* | *Other libraries* |
| *Basic materials* | | | | | | |
| 1 | 1998 | Misevičius E. Matematinė analizė. I d. (Mathematical Analysis) | Vilnius, TEV | 65 | 2 | |
| 2 | 2008 | Pekarskas V. Diferencialinis ir integralinis skaičiavimas. I d. (Differential and Integral Calculus) | Kaunas, Technologija | 44 | 6 | |
| *Supplementary materials* | | | | | | |
| 1 | 2007 | Misevičius E. Matematinės | VU leidykla | | | |

| | | analizės uždavinynas. I d. (Tasks for Mathematical Analysis I) | | |
|---|---|---|---|---|
| 2 | 2000 | Kubilius K., Saulis L. Matematinės analizės uždavinynas. I d. (Tasks for Mathematical Analysis I) | Vilnius, TEV | |
| 3 | 2003 | Stewart J. Calculus | Thomson | |

**Course programme designed by**

Assoc. prof. dr. Sigita Pečiulytė