

## SYLLABUS

### 1. Information regarding the programme

|                                     |   |
|-------------------------------------|---|
| 1.1 Higher education institution    | Babeş-Bolyai University Cluj-Napoca         |
| 1.2 Faculty                         | Faculty of Mathematics and Computer Science |
| 1.3 Department                      | Department of Mathematics                   |
| 1.4 Field of study                  | Mathematics                                 |
| 1.5 Study cycle                     | Bachelor                                    |
| 1.6 Study programme / Qualification | Mathematics for Computer Science            |

### 2. Information regarding the discipline

|                            |                                |              |          |                         |          |                        |          |
|----------------------------|--------------------------------|--------------|----------|-------------------------|----------|------------------------|----------|
| 2.1 Name of the discipline | <b>Basic Mathematics</b>       |              |          |                         |          |                        |          |
| 2.2 Course coordinator     | <b>Conf. Dr. Teodor Grosan</b> |              |          |                         |          |                        |          |
| 2.3 Seminar coordinator    | <b>Conf. Dr. Teodor Grosan</b> |              |          |                         |          |                        |          |
| 2.4. Year of study         | <b>1</b>                       | 2.5 Semester | <b>1</b> | 2.6. Type of evaluation | <b>C</b> | 2.7 Type of discipline | <b>F</b> |

### 3. Total estimated time (hours/semester of didactic activities)

|   |    |                      |    |                        |       |
|---|----|----------------------|----|------------------------|-------|
| 3.1 Hours per week  | 3  | Of which: 3.2 course | 2  | 3.3 seminar/laboratory | 1     |
| 3.4 Total hours in the curriculum   | 42 | Of which: 3.5 course | 28 | 3.6 seminar/laboratory | 14    |
| Time allotment:   |    |                      |    |                        | hours |
| Learning using manual, course support, bibliography, course notes                     |    |                      |    |                        | 3     |
| Additional documentation (in libraries, on electronic platforms, field documentation) |    |                      |    |                        | 6     |
| Preparation for seminars/labs, homework, papers, portfolios and essays                |    |                      |    |                        | 10    |
| Tutorship   |    |                      |    |                        | 10    |
| Evaluations   |    |                      |    |                        | 4     |
| Other activities: .....   |    |                      |    |                        |       |
| 3.7 Total individual study hours  |    |                      | 33 |                        |       |
| 3.8 Total hours per semester  |    |                      | 75 |                        |       |
| 3.9 Number of ECTS credits  |    |                      | 3  |                        |       |

### 4. Prerequisites (if necessary)

|                   |   |
|-------------------|---|
| 4.1. curriculum   | <ul style="list-style-type: none"> <li>Elementary high-school calculus</li> </ul> |
| 4.2. competencies | <ul style="list-style-type: none"> <li>Logical thinking abilities</li> </ul>      |

### 5. Conditions (if necessary)

|                                      |  |
|--------------------------------------|--|
| 5.1. for the course                  | <ul style="list-style-type: none"> <li></li> </ul> |
| 5.2. for the seminar /lab activities | <ul style="list-style-type: none"> <li></li> </ul> |

## 6. Specific competencies acquired

|                                  |   |
|----------------------------------|---|
| <b>Professional competencies</b> | C4.1 Defining basic concepts, theory and mathematical models<br>C4.2 Interpretation of mathematical models<br>C4.3 Identifying the appropriate models and methods for solving problems  |
| <b>Transversal competencies</b>  | CT1 Application of efficient and rigorous working rules, manifest responsible attitudes towards the scientific and didactic fields, respecting the professional and ethical principles.<br><br>CT3 Use of efficient methods and techniques for learning, information, research and development of abilities for knowledge acquiring, for adapting to the needs of a dynamic society and for communication in a widely used foreign language |

## 7. Objectives of the discipline (outcome of the acquired competencies)

|  |  |
|--|--|
| 7.1 General objective of the discipline  | • Knowledge, understanding and use of main concepts and results high- school calculus  |
| 7.2 Specific objective of the discipline | • Mathematical manipulation of mathematical theories, concepts and symbols. Arithmetic, sequences in $\mathbb{R}$ , real functions, matrices, algebraic structures, differential and integral calculus in $\mathbb{R}$ |

## 8. Content

| 8.1 Course  | Teaching methods                           | Remarks                |
|---|--|------------------------|
| 1. Sets ( $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}, \mathbb{R} \setminus \mathbb{Q}$ ). Mathematical induction | Lecture, discussion, discussion of case.   |                        |
| 2. Combinatorics. Geometric and arithmetic series   | Lecture, discussion, discussion of case.   |                        |
| 3. Functions. Equations   | Lecture, discussion, discussion of case.   |                        |
| 4. Polynomials  | Lecture, discussion, discussion of case. . |                        |
| 5. Sequences in $\mathbb{R}$  | Lecture, discussion, discussion of case.   |                        |
| 6. Limit of functions. Continuity of real functions   | Lecture, discussion, discussion of case.   |                        |
| 7. Evaluation   | Written exam                               | 50% of the final grade |
| 8. Derivability of real functions   | Lecture, discussion, discussion of case.   |                        |
| 10. Linear systems of equations   | Lecture, discussion, discussion of case.   |                        |
| 11. Integrals   | Lecture, discussion, discussion of case..  |                        |
| 12. Algebraic structures  | Lecture, discussion, discussion of case.   |                        |
| 13. Elements of geometry  | Lecture, discussion, discussion of case.   |                        |
| 14. Evaluation  | Written exam                               | 50% of the final grade |

**Bibliografie**

- [1] D. ANDRICA, D. I. DUCA, I. PURDEA, I. POP: Matematica de bază, Editura Studium, Cluj-Napoca, 2005.
- [2] Ș. COBZAȘ: Analiză matematică (Calcul diferențial), Presa Universitară Clujeană, Cluj-Napoca, 1997.
- [3] D. I. DUCA, M. MEGAN, I. PURDEA, O. POP: Matematică pentru clasa a XII-a, Editura GIL Educațional, Zalău, 1999.
- [4] G. M. FIHTENHOLTȘ, Curs de calcul diferențial și integral (vol.I și II), Editura Tehnică, București, 1963, 1965.
- [5] M. MEGAN, A. L. SASU, M. NEAMȚU și A. CRĂCIUNESCU: Bazele analizei matematice prin exerciții și probleme, Editura Helicon, Timișoara, 1996.

| 8.2 Seminar / laborator   | Teaching methods                                      | Remarks |
|---|---|---------|
| 1. Sets (N,Z,Q,R,R\Q). Mathematical induction. Combinatorics. Geometric and arithmetic series | Discussion, problem solving, self-study, team work.   |         |
| 2. Functions. Equations. Polynomials  | Discussion, problem solving, self-study, team work.   |         |
| 3. Sequences in R. Limit of functions   | Discussion, problem solving, self-study, team work. . |         |
| 4. Continuity of real functions. Derivability of real functions                               | Discussion, problem solving, self-study, team work.   |         |
| 5. Linear systems of equations  | Discussion, problem solving, self-study, team work.   |         |
| 6. Integrals  | Discussion, problem solving, self-study, team work.   |         |
| 7. Algebraic structures. Elements of geometry   |   |         |

**Bibliografie**

- [6] D. M. BĂTINEȚU, I. V. MAFTEI, I.M. STANCU-MINASIAN: Exerciții și probleme de analiză matematică pentru clasele a XI-a și a XII-a, Editura Didactică și Pedagogică, București, 1981.
- [7] C. NĂSTĂSESCU, C. NIȚĂ, M. BRANDIBURU, D. JOIȚA: Exerciții și probleme de algebră pentru clasele IX – XII, Editura Didactică și Pedagogică București.
- [8] D. I. DUCA, E. DUCA: Exerciții și probleme de analiză matematică (vol. 1 și 2), Casa Cărții de Știință, Cluj-Napoca, 2009.
- [9] I. STAMATE, I. CRIȘAN: Culegere de probleme de algebră și analiză matematică pentru licee, Editura Didactică și Pedagogică, București, 1969.
- [10] I. STAMATE, I. STOIAN: Culegere de exerciții și probleme de algebră pentru licee, Editura Didactică și Pedagogică, București, 1979.

### **9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program**

The content of this discipline is in accordance with the curricula of the most important universities in Romania and abroad. This discipline is useful in preparing future teachers and researchers in, as well as those who use mathematical models and advanced methods of study in other areas.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria                | 10.2 Evaluation methods                              | 10.3 Share in the grade (%) |
|------------------|---|--|-----------------------------|
| 10.4 Course      | Knowledge of concepts and basic results | Written midterm evaluation and final term evaluation | 50%+50%                     |

|   |   |  |  |
|---|---|--|--|
|   | Ability to apply theory in solving problems |  |  |
| 10.5 Seminar/lab activities   |   |  |  |
| 10.6 Minimum performance standards  |   |  |  |
| ➤ At least grade 5 (from a scale of 1 to 10) at both written exam and seminar activity during the semester. |   |  |  |

Date

.4.05.2020.....

Signature of course coordinator

...Conf.dr. Teodor Grosan

Signature of seminar coordinator

Conf.dr. Teodor Grosan

Date of approval

....30.04.2020.....

Signature of the head of department

Prof.dr. Octavian Agratini