SYLLABUS

Mathematical analysis

1. Information on academic programme

1.1. University	**„1 Decembrie 1918" of Alba Iulia**
1.2. Faculty	**Faculty of Informatics and Engineering**
1.3. Department	**Informatics, Mathematics and Electronics Department**
1.4. Field of Study	**Computer Science**
1.5. Cycle of Study	**Undergraduate**
1.6. Academic program / Qualification	**Computer Science** **ESCO-08: 2512/ Software developers** **Analyst 251201** **Computer System Programmer 251204** **Computer System Engineer 251203**

2. Information of Course Matter

2.1. **Course**		**Mathematical analysis**		2.2. **Code**		**CSE 105**	
2.3. **Course Leader**			Popa Ioan-Lucian				
2.4. **Seminar Tutor**			Popa Ioan-Lucian				
2.5. Academic Year	**I**	2.6. Semester	**I**	2.7. Type of Evaluation (E – final exam/ CE - colloquy examination / CA -continuous assessment)	**E**	2.8. Type of course (**C**– Compulsory, **Op** – optional, **F** - Facultative)	**C**

3. Course Structure (Weekly number of hours)

3.1. Weekly number of hours	**4**	3.2. course	***2***	3.3. seminar, laboratory	***2***
3.4. Total number of hours in the curriculum	**56**	3.5. course	***28***	3.6. seminar, laboratory	***28***

Allocation of time:	Hours
Individual study of readers	***40***
Documentation (library)	***40***
Home assignments, Essays, Portfolios	***12***
Tutorials	**-**
Assessment (examinations)	***2***
Other activities…….	**-**

3.7 Total number of hours for individual study	94
3.8 Total number of hours in the curriculum	56
3.9 Total number of hours per semester	150
3.10 Number of ECTS	6

4. Prerequisites (*where applicable*)

4.1. curriculum-based	***CP1 (1 ECTS), CP3 (1 ECTS), CP7 (1 ECTS), CP13 (1 ECTS), CP26 (2 ECTS)***
4.2. competence-based	**Not applicable**

5. Requisites (*where applicable*)

5.1. course-related	Laboratory equipped with video projector / boar
5.2. seminar/laboratory-based	Laboratory equipped with video projector / boar

6. Specific competences to be aquired (chosen by the course leader from the programme general competences grid)

Professional competences	**C4.5 The embedding of formal models in specific applications in various domains.** After browsing the course, the students will gain skills in the use of mathematical analysis for transposition of problems in various programming languages. So the discipline contributes to the formation of some general skills specific for the study domain.
Transversal competences	-

7. Course objectives (as per the programme specific competences grid)

7.1 General objectives of the course	Depth study of sequences of real numbers, series of real numbers, differential and integral calculus of real functions of one or several real variables. Achieving these goals allow students to use theoretical foundations of informatics (computer science) and formal models.
7.2 Specific objectives of the course	Students must: -know the fundamental notions of mathematical analysis; -calculate limits strings; -study the convergence of numerical series; -calculate derivates of functions of one or more variables; -calculate various types of integrals; -calculate extreme points of functions of several variables. Achieving these specific objectives allows: C4.1 Define the concepts and principles of computer science and mathematical theories and models; C4.2 Interpretation of mathematics and computer science models(formal). C4.3 Identifying appropriate models and methods to solve real problems. C4.4 Using simulation for studying the behaviour of the realized models and performance evaluation. C4.5 Incorporation of formal models in specific applications in various fields.

8. Course contents

8.1 Course (learning units)	Teaching methods	Remarks
1. Strings.	***Lecture, conversation, exemplification***	2 hours – Face to face
2. Numerical series.	***Lecture, conversation, exemplification***	2 hours – Face to face
3. Numerical series.	***Lecture, conversation, exemplification***	2 hours – Face to face
4. Functions between metrical spaces.	***Lecture, conversation, exemplification***	2 hours – Face to face
5. Functions between metrical spaces.	***Lecture, conversation, exemplification***	2 hours – Face to face
6. Functions between metrical spaces.	***Lecture, conversation, exemplification***	2 hours – Face to face
7. Integration of real functions.	***Lecture, conversation, exemplification***	2 hours – Face to face
8. Integration of real functions.	***Lecture, conversation, exemplification***	2 hours – Face to face
9. Strings and series of functions	***Lecture, conversation, exemplification***	2 hours - Online
10. Strings and series of functions	***Lecture, conversation, exemplification***	2 hours - Online
11. Functions derivations of more than one variable	***Lecture, conversation, exemplification***	2 hours - Online
12. Functions derivations of more than one variable	***Lecture, conversation, exemplification***	2 hours - Online
13. Basic knowledge regarding integrals	***Lecture, conversation, exemplification***	2 hours – Face to face
14. Basic knowledge regarding integrals	***Lecture, conversation, exemplification***	2 hours – Face to face

8.2 Bibliography

1.Breaz D., Acu, M., Analiză matematică, Editura Risoprint, Cluj Napoca, 2008.
2. Breckner W.W.: Analiza matematica. Topologia spaţiului R^n, Cluj-Napoca, Universitatea, 1985
3. Bucur G., Campu E., Gaina S.: Culegere de probleme de calcul diferenţial si integral, II, Editura tehnica, Bucuresti, 1966
4. Cobzas St.: Analiza matematica (Calcul diferenţial), Presa Universitara Clujeana, Cluj-Napoca, 1997
5. Duca D.I., Duca E.: Culegere de probleme de analiza matematica, 1, 2, Editura GIL, Zalău, 1996, 1997
6. Siretchi Gh.: Calcul diferenţial si integral, I, II, Editura Ştiinţifica şi Enciclopedica, Bucureşti, 1985
7. ***: Analiză matematică, I, Ed. a V-a, Editura Didactica si Pedagogica, Bucureşti, 1980
8. Colojoară, I.: Analiză matematică, Editura Didactică şi Pedagogică, Bucureşti 1979.
9.Flondor, P., Stănăşilă, O.: Lecţii de Analiză matematică, Editura ALL, Bucureşti 1993.

Seminars-laboratories	Teaching methods	
1.1 Strings applications, real numbers strings, strings in metric spaces. 1.2 Calculation of string limits	***Questioning, samples, demonstration***	2 hours – Face to face
2.1 Applications to numerical series and convergence criteria for series with random terms.	***Questioning, samples, demonstration***	2 hours – Face to face
3.1 Applications to absolute convergent series, semiconvergent series, and series with positive terms.	***Questioning, samples,***	2 hours – Face

	demonstration	to face
4.1 Applications to functions between metric spaces.	***Questioning, samples, demonstration***	2 hours – Face to face
5.1 Applications regarding function calculation of the limits in one point. 5.2 Continuity of functions between metric spaces.	***Questioning, samples, demonstration***	2 hours – Face to face
6.1 Applications to real functions differential. 6.2 Applications to a real function differential.	***Questioning, samples, demonstration***	2 hours – Face to face
7.1 Calculation of some integrals out of real functions.	***Questioning, samples, demonstration***	2 hours – Face to face
8.1 Applications to calculate defined integrals.	***Questioning, samples, demonstration***	2 hours – Face to face
9.1 Applications of strings and series of functions.	***Questioning, samples, demonstration***	2 hours – Face to face
10.1 Applications of rise series and Taylor series.	***Questioning, samples, demonstration***	2 hours - Online
11.1 Applications to function derivations of more than one variable, partial derivations.	***Questioning, samples, demonstration***	2 hours - Online
12.1 Applications to functions differentials of more than one variable and functions extremes of more than one variables. 12.2 Conditioned extremes.	***Questioning, samples, demonstration***	2 hours - Online
13.1 Improper integrals applications. 13.2 Applications of integrals with parameters.	***Questioning, samples, demonstration***	2 hours – Face to face
14.1 Applications of Eulerian integrals and double integrals.	***Questioning, samples, demonstration***	2 hours – Face to face

Bibliography

1.Breaz D., Acu, M., Analiză matematică, Editura Risoprint, Cluj Napoca, 2008.
2. Breckner W.W.: Analiza matematica. Topologia spaţiului R^n, Cluj-Napoca, Universitatea, 1985
3. Bucur G., Campu E., Gaina S.: Culegere de probleme de calcul diferenţial si integral, II, Editura tehnica, Bucuresti, 1966
4. Cobzas St.: Analiza matematica (Calcul diferenţial), Presa Universitara Clujeana, Cluj-Napoca, 1997
5. Duca D.I., Duca E.: Culegere de probleme de analiza matematica, 1, 2, Editura GIL, Zalău, 1996, 1997
6. Siretchi Gh.: Calcul diferenţial si integral, I, II, Editura Ştiinţifica şi Enciclopedica, Bucureşti, 1985
7. ***: Analiză matematică, I, Ed. a V-a, Editura Didactica si Pedagogica, Bucureşti, 1980
8. Colojoară, I.: Analiză matematică, Editura Didactică şi Pedagogică, Bucureşti 1979.
9.Flondor, P., Stănăşilă, O.: Lecţii de Analiză matematică, Editura ALL, Bucureşti 1993.

1. Corroboration of course contents with the expectations of the epistemic community's significant representatives, professional associations and employers in the field of the academic programme

Gaining knowledge by the students regarding this discipline assumes a training on the labour market in such way that they can solve any problems that appear by creating proper mathematics models.

2. Assessment

Activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	*Final evaluation*	*Written paper*	60%
	-	-	-

10.5 Seminar/laboratory	*Continuous assessment*	*Laboratory activities portfolio*	40%
	-		-
10.6 Minimum performance standard:			
In order to obtain credits for this discipline the student have to know how to work with elementary mathematical analysis notions, which are necessary in the basic theoretical bases of computer science and formal models. Attendance at courses and seminars according to the general requirements of the faculty. • knowledge of the basics (minimum grade 5 at the final evaluation) • the ability to apply theoretical notions in practice (minimum 5 seminar average) The final grade is calculated as the arithmetic mean of the grades awarded for the components specified in 10.4 and 10.5. The exam is considered to be passed if the average is at least 5 (the marks from 10.4 and 10.5 must be higher than 5 each). At each of the exam sessions (including the ones of rest and enlargement) the mark is calculated according to the same rule. In the overdue / enlargement session, only the evidence for which no promotion note has been obtained (minimum 5) can be claimed, unless the student wishes to support the evidence already promoted. Note: Students can participate in the consultation hours (2 modules / week according to the schedule established at the beginning of the semester) in which the course holder and / or seminar / laboratory answers the students' questions and offers additional explanations related to the content of the course, the laboratory applications and themes.			

Submission date

Course leader signature

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Seminar tutor signature

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Date of approval by Department members

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Department director signature

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Date of approval by Faculty council

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Dean of faculty

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