COURSE SYLLABUS

Academic year 2024-2025

1. Programme Information

1.1. Higher education institution	**Lucian Blaga University of Sibiu**
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Computer Science and Electrical and Electronics Engineering
1.4. Field of study	Computer Science and Information Technology
1.5. Level of study	Master
1.6. Programme of study/qualification	ADVANCED COMPUTING SYSTEMS

2. Course Information

2.1. Name of course	Algorithm Complexity			Code	ACS.207.RU
2.2. Course coordinator	Prof. Arpad GELLERT, PhD				
2.3. Seminar/laboratory coordinator	Prof. Arpad GELLERT, PhD				
2.4. Year of study	1	2.5. Semester	2	2.6. Evaluation form	E
2.7. Course type	U	2.8. The formative category of the course			R

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e. Other	Total
1	-	1	-	-	**2**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e. Other	Total
14	-	14	-	-	**28**

Time Distribution for Individual Study	**Hours**
Learning by using course materials, references and personal notes	7
Additional learning by using library facilities, electronic databases and on-site information	9
Preparing seminars / laboratories, homework, portfolios and essays	28
Tutorial activities	1
Exams	2

3.3. Total Individual Study Hours *($NOSI_{sem}$)*	**47**
3.4. Total Hours in the Curriculum *($NOAD_{sem}$)*	**28**
3.5. Total Hours per Semester *($NOAD_{sem}$ + $NOSI_{sem}$)*	**75**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits	**3**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)	-
4.2. Competencies	A high-level programming language

5. Conditions (where applicable)

5.1. For course/lectures	Video projector, internet access
5.2. For practical activities (lab/sem/pr/app)	Computer network, internet access

1. Specific competencies acquired

		Number of credits assigned to the discipline	3	Credits distribution by competencies
6.1. Professional competencies	PC7	Conceives product design		0,5
	PC1	Manages data collection systems		0,5
	PC2	Analyses test data		0,5
	PC11	Develop data processing applications		0,5
	PC16	Performs analytical mathematical calculations		0,5
	PC23	Present analysis results		0,2
6.2. Transversal competencies	TC1	Demonstrates commitment		0,1
	TC3	Takes responsibility		0,1
	TC4	Works in teams		0,1

6. Course objectives (resulted from developed competencies)

6.1. Main course objective	By the end of this course the students should be able to analyze the complexity of algorithms, to design and implement algorithms in an efficient way. They should also have the knowledge necessary to choose the most appropriate algorithms and to improve their efficiency if necessary.
6.2. Specific course objectives	• Familiarization with the basic algorithm analysis and design techniques; • Developing the ability to choose the most appropriate algorithm to solve a certain problem; • Developing the ability to improve the time- and memory-efficiency of algorithms.

7. Content

8. 8.1 Lectures		**Teaching methods**	**Hours**
Lecture 1	Introduction. Asymptotic notations	Exposition, Discussion	2
Lecture 2	Recurrences	Exposition, Discussion	2
Lecture 3	Types of complexity analysis (best, worst and average case)	Exposition, Discussion	2
Lecture 4	Case study: searching algorithms	Exposition, Discussion	2
Lecture 5	Case study: genetic algorithms	Exposition, Discussion	2
Lecture 6	Case study: neural networks	Exposition, Discussion	2
Lecture 7	Case study: Markov chains	Exposition, Discussion	2
		Total lecture hours:	**14**

8.2.b. Laboratory	**Teaching methods**	**Hours**

Laboratory 1	Evaluation of searching algorithms	Development, Experiment	2
Laboratory 2	Evaluation of genetic algorithms	Development, Experiment	2
Laboratory 3	Evaluation of neural networks	Development, Experiment	2
Laboratory 4	Evaluation of transition table based Markov chain algorithms	Development, Experiment	2
Laboratory 5	Improving the memory efficiency of Markov chain algorithms	Development, Experiment	2
Laboratory 6	Improving the time efficiency of Markov chain algorithms	Development, Experiment	2
Laboratory 7	Final evaluation	Excercises	2
		Total laboratory hours:	14

9. Bibliography

9.1. Recommended Bibliography	Donald E. Knuth, *The Art of Computer Programming*, Vol. 1-4A, Third Edition, Addison-Wesley, 2011.
	Herbert S. Wilf, *Algorithms and Complexity*, Second Edition, AK Peters, 2002.
	Anany Levitin, *Introduction to the Design and Analysis of Algorithms*, Third Edition, Pearson, 2012.
9.2. Additional Bibliography	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest , Clifford Stein, *Introduction to Algorithms*, Third Edition, The MIT Press, 2009.

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program

Curricula are continuously updated based on the most prestigious international text-books and also based on the most relevant progresses in this field.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.
11.4a Exam / Colloquy	Theoretical knowledge acquired	Final evaluation:	40%	20%	CPE
11.4c Laboratory	Practical knowledge acquired	Experimental works		80%	CPE
11.5 Minimum performance standard					50%

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: 12.09.2024

Department Acceptance Date: 16.09.2024

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Prof. Arpad GELLERT, PhD	
Study Program Coordinator	Prof. Adrian FLOREA, PhD	
Head of Department	Assoc. Prof. Radu George CREȚULESCU, PhD	

Dean	Prof. Maria VINȚAN, PhD	

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