

## CURRICULA

### I. DESCRIEREA SINTETICĂ A PROGRAMULUI DE STUDII

Denumirea programului de studii: **COMPUTER SCIENCE**

Domeniul fundamental: COMPUTER SCIENCE

Domeniul de licență: COMPUTER SCIENCE IN ENGLISH

Titlul absolventului: Degree in Computer Science

Durata studiilor: 3 years, 6 semesters, 180 credits

Forma de învățământ: full-time studies

Finalizarea studiilor: bachelor exam, 10 credits ECTS

Corespondența ESCO-08: **2512/ Software developers**

Calificări/oportunități/Cod COR: Analist/251201, Programator de sistem informatic/251204, Inginer de sistem în informatică/251203

Acces în ciclul de masterat: YES

Valabil începând cu anul universitar 2025-2026

### II. MISSION, OBJECTIVES AND COMPETENCES OF GRADUATE

#### II.1. Mission

Training education specialist's degree in Computer Science, specializing in Computer Science: the study programme prepares programmers, analysts - programmers, system software engineers, computer network administrators, data base administrators, IT consultants and – provided crossing a pedagogical module training organized by the Department of Teacher Training – teachers Informatics specialization in primary and secondary education.

#### II.2. General objective and specific objectives

##### Objectives:

- **General objective:** Acquiring theoretical knowledge needed for the implementation of software systems and the management of computer networks;
- **Specific objectives:**
  - Practical skills training necessary to achieve software systems and network infrastructure installation and management;
  - Developing communication and collaborations skills that are specific in elaboration of projects for IT & C solutions and services.

#### II.3. Learning outcomes provided by the study program:

##### II.3.1. Professional competences (ESCO, core group)

ESCO 2512 - Software Designers - Software designers research, analyze, and evaluate requirements for existing or new computer applications and operating systems, and design, develop, test, and maintain software solutions to meet these requirements.

#### **Relevant professional competences for the Informatics program (according to ESCO 2512):**

1. Analyze business processes
2. Develop documentation in accordance with legal requirements
3. Design the information system
4. Translate requirements into a visual model
5. Manage the transition from old systems to ICT (Information and Communication Technology)
6. Develop feasibility studies

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7. Create data models
8. Identify the needs of ICT users
9. Design cloud architectures
10. Remediate software errors
11. Automate tasks in the field of cloud computing
12. Develop cloud computing services
13. Solve ICT system problems
14. Interpret technical texts
15. Manage keys for data protection
16. Design cloud database
17. Manage data in the cloud and its storage
18. Perform application modification and transfer to the cloud
19. Respond to cloud incidents
20. Plan migration to cloud infrastructure
21. Implement cloud resources
22. Address organizational complexity
23. Design cloud networks
24. Utilize user-driven design methodologies
25. Design computer graphics
26. Create design sketches
27. Utilize software libraries
28. Design user interface
29. Utilize software design patterns
30. Conduct scientific research
31. Identify customer requirements
32. Interpret technical requirements
33. Use computer-aided software engineering tools
34. Develop automated migration methods
35. Manage engineering projects
36. Use technical drawing software

### II.3.2. Transversal competences (ESCO)

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### II.3.3. Learning outcomes according to degree field and/or branch of science<sup>3</sup>

Nr. crt.	Knowledge	Skills	Responsibility and autonomy	Examples of courses that can contribute to achieving learning outcomes
1	The student/graduate identifies, explains and argues fundamental concepts of data structures, algorithms and programming paradigms, as well as computer architecture.	The student/graduate designs, develops and demonstrates complex software solutions using efficient algorithms and diverse programming paradigms.	The student/graduate coordinates technical teams for the development of IT applications, assuming responsible decisions related to their optimization and integration..	Structuri de date, Introducere în programare, Proiectarea algoritmilor, Arhitectura calculatoarelor.  Algoritmi fundamentali
2	The student/graduate selects, explains, and specifies the mathematical foundations applied in computer science, including formal logic, algebra, probability, and statistics.	The student/graduate applies, evaluates, proposes mathematical methods for modeling, simulating and solving computer science problems.	The student/graduate develops interdisciplinary solutions by integrating mathematics with related fields and collaborating effectively with specialized teams.	Logică pentru informatică, Probabilități și statistică, Fundamente algebrice ale informaticii,  Algebra liniară, Calcul diferențial și integral, Grafuri și teoria grafurilor,
3	The student/graduate describes, identifies and explains the functioning and administration of computer networks and operating systems.	The student/graduate proposes, designs, justifies the configuration, security assurance and optimization of IT infrastructures. The student/graduate designs, applies, operates, develops relational databases.	The student/graduate ethically and responsibly builds secure and scalable IT solutions, collaborating with specialists from related fields.	Rețele de calculatoare, Sisteme de operare

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4	The student/graduate identifies, chooses and argues principles and models for database design.	The student/graduate designs, builds, develops databases and database systems.	The student/graduate designs, manages the activities necessary for the development of a database system.	Baze de date,  Sisteme de gestiune a bazelor de date
5	The student/graduate selects, describes, analyzes and explains modern programming paradigms, including functional, object-oriented and parallel programming, using current languages and frameworks.	The student/graduate designs, plans, builds, develops scalable software applications and uses hardware and software resources efficiently	The student/graduate produces software and continuously adapts it to new technologies and market requirements.	Programare avansată, Programare orientată pe obiect, Tehnologii Web, Programare logică și funcțională;  Programare paralelă, concurentă și distribuită, IoT.
6	The student/graduate identifies, compares, recognizes and describes advanced concepts and techniques in the field of artificial intelligence, machine learning and natural language processing.	The student/graduate designs, implements, experiments with predictive models and develops applications based on machine learning algorithms.	The student/graduate applies an ethical framework in the use of AI, with responsibility for the social impact of the proposed solutions.	Inteligență artificială, Învățare automată,

				Tehnici de procesare a limbajului natural,
				Rețele neuronale
7	The student/graduate names, recognizes, and argues for computer security techniques, both software and hardware.	The student/graduate estimates computer security risks, proposes, resolves, and tests IT security solutions.	The student/graduate knows and implements computer security requirements.	Criptare,  Securitatea Sistemelor Informatice, Criminalitate cibernetică
8	The student/graduate names, gives examples, concludes, specifies, recognizes and argues critically	The student/graduate initiates, prepares, carries out, and proposes methods for developing complex IT projects.	The student/graduate develops a collaborative environment and assumes responsibility	Ingineria programării, Managementul proiectelor IT,

### III. REQUIREMENTS FOR GETTING THE BACHELOR'S DEGREE

Number of ECTS credits for compulsory courses: **154 (85,6%)**

Number/percent of ECTS credits for elective courses: **26 ( 14,4%)**

Number of ECTS credits for assessment exam of fundamental and speciality knowledge: 5

Number of ECTS credits for Bachelor's Paper defence and presentation: 5

### IV. THE STRUCTURE OF THE ACADEMIC YEARS (per number of weeks)

Academic years	Didactic activities		Examination sessions			Holidays		
	Sem. I	Sem. II	Winter	Summer	Not passing exam	Winter	Spring*	Summer
I	14	14	3	3	2	2	1	13
II	14	14	3	3	2	2	1	10
III	14	14	3	3+1	-	2	1	-
TOTAL	42	42	9	9+1	4	6	3	23

### V. NUMBER OF HOURS PER WEEKS (compulsory route)

YEAR	Semester	C	S	L	P	TOTAL
I	1	12	8	6	0	26
I	2	12	6	8	0	26
II	1	13	2	11	0	26

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II	2	10	2	8	8	<b>28</b>
III	1	13	0	13	0	<b>26</b>
III	2	12	0	10	4	<b>26</b>
<b>TOTAL</b>	<b>72</b>	<b>18</b>	<b>56</b>	<b>12</b>	<b>158</b>	

## VI. PROMOTION CONDITIONS

Ani de studiu	Număr de credite la disciplinele								Obligatorii necreditate
	Obligatorii	Opționale	Total	Fundamentale	Specialitate	Complementare	Total	Facultative complementare	
I	56	4	60	22	30	8	60	4	-
II	55	5	60	27	33	-	60	9	-
III	43	17	60	-	53	7	60	8	-
<b>TOTAL</b>	<b>154</b>	<b>26</b>	<b>180</b>	<b>49</b>	<b>116</b>	<b>15</b>	<b>180</b>	<b>21</b>	<b>-</b>

## VII. REPORT OF PRACTICAL APPLICATION/COURSE <sup>6</sup>

Nr. crt.	Total number of hours per semester		Year	Semester	The report per semester hours of practical applications/course
	Total hours of practical applications	Total course hours			
1	14	12	I	1	1,08/0,92
2	14	12		2	1,08/0,92
3	13	13	II	1	1/1
4	18	10		2	1,29/0,71
5	13	13	III	1	1/1
6	14	12		2	1,08/0,92
<b>TOTAL</b>	<b>86</b>	<b>72</b>	<b>TOȚI ANII</b>		<b>1,09/0,91</b>

## VIII. EXAMENUL DE LICENȚĂ

Drawing up the bachelor's thesis: **semesters 5-6**

Bachelor's thesis refinement: **semester 6, 2 weeks**

Bachelor's thesis defence: **june – july, september, february**

Bachelor's degree examination: **10 credits:**

- Number of ECTS credits for assessment exam of fundamental and speciality knowledge: 5
- Number of ECTS credits for Bachelor's Paper defence and presentation: 5

The curriculum includes a package of optional courses related to the pedagogical module that are presented in the annex.

<sup>5</sup> Vacanță intersemestrială

<sup>6</sup> Disciplinele sunt desemnate prin coduri.

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# IX. THE STRUCTURE OF THE EDUCATION PLAN

Nr. crt.	Code of Discipline	ACADEMIC YEAR 2025-2026 FIRST YEAR OF STUDY DISCIPLINES	Type of discipline	Number of hours of learning activities						Total per pe semester	Types of assesment	Number of ECTS credits
				Didactic collective activities								
				Corse	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 1												
COMPULSORY COURSES												
1	CSE 101	Computer architecture system	S	2	0	2	0	4	56	E	4	
2	CSE 102	Logics for informatics	F	2	2	0	0	4	56	E	4	
3	CSE 103	Programming basics	S	2	0	2	0	4	56	E	4	
4	CSE 104	Linear algebra	F	1	1	0	0	2	28	C	3	
5	CSE 105	Mathematical analysis	F	2	2	0	0	4	56	E	4	
6	CSE 106	Algorithm design	S	2	0	2	0	4	56	E	4	
7	CSE 107	Algebraic fundamentals of computer science	F	1	1	0	0	2	28	C	3	
8	CSE 108	Sport and physical education 1	C	0	1	0	0	1	14	C	2	
OPTIONAL COURSES												
9	CSE 109.1	English language 1	C	0	1	0	0	1	14	C	2	
	CSE 109.2	French language 1										
	CSE 109.3	German language 1										
Total compulsory study period				12	8	6	0	26	364	5E+4C	30	
FACULTATIVE COURSES*												
10	CSE 110	Embedded systems architecture	C	2	0	0	0	2	28	C	2	
Total facultative study period				2	0	0	0	2	28	1C	2	

\* At the "1 Decembrie 1918" University of Alba Iulia, the completion of optional subjects is carried out according to the provisions of the ECTS Application Guide (approved by the UAB Senate) and other legal provisions in force that allow the choice of flexible training paths by students from all UAB specializations.

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Nr. crt.	Code of Discipline	ACADEMIC YEAR 2025-2026 FIRST YEAR OF STUDY DISCIPLINES	Type of discipline	Number of hours of learning activities						Total per pe semester	Types of assesment	Number of ECTS credits
				Didactic collective activities								
				Corse	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 2												
COMPULSORY COURSES												
11	CSE 111	Data structures	S	2	0	2	0	4	56	E	5	
12	CSE 112	Operating systems	S	2	0	2	0	4	56	E	4	
13	CSE 113	Graph algorithms	F	2	2	0	0	4	56	E	4	
14	CSE 114	Probabilistic and mathematical statistics	F	2	2	0	0	4	56	E	4	
15	CSE 115	Graphical interface design	S	2	0	2	0	4	56	C	4	
16	CSE 116	Digital image processing	S	2	0	2	0	4	56	E	5	
17	CSE 117	Sport and physical education 2	C	0	1	0	0	1	14	C	2	
OPTIONAL COURSES												
18	CSE 118.1	English language 2	C	0	1	0	0	1	14	C	2	
	CSE 118.2	French language 2										
	CSE 118.3	German language 2										
Total compulsory study period				12	6	8	0	26	364	5E+3C	30	
FACULTATIVE COURSES*												
19	CSE 119	Computational geometry	F	2	1	1	-	4	56	C	2	
Total facultative study period				2	1	1	-	4	56	1C	2	
TOTAL PER ACADEMIC YEAR			Compulsory course						728	10E+7C	60	
			Facultative course						84	2C	4	
			General total						812	10E+9C	64	

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Nr. crt.	Code of Discipline	ACADEMIC YEAR 2026-2027 SECOND YEAR OF STUDY DISCIPLINES	Type of discipline	Number of hours of learning activities						Total hours per semester	Types of assesment	Number of ECTS credits
				Didactic collective activities								
				Course	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 1												
COMPULSORY COURSES												
1	CSE 201	Databases	F	2	0	2	0	4	56	E	5	
2	CSE 202	Fundamental algorithms	F	2	0	2	0	4	56	E	4	
3	CSE 203	Computer networks	F	2	0	2	0	4	56	E	4	
4	CSE 204	Object oriented programming	S	2	0	2	0	4	56	E	5	
5	CSE 205	Logical and functional programming	S	1	0	1	0	2	28	E	3	
6	CSE 206	Integral and differential calculus	F	2	2	0	0	4	56	C	4	
OPTIONAL COURSES												
7	CSE 207.1	Mathematical software	F	2	0	2	0	4	56	C	5	
	CSE 207.2	Complex analysis										
Total compulsory study period				13	2	11	0	26	364	5E+2C	30	
FACULTATIVE COURSES*												
8	CSE 208	Project	S	2	1	1	-	4	56	V	4	
Total facultative study period				2	1	1	-	4	56	1V	4	

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				Didactic collective activities								
				Course	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 2												
COMPULSORY COURSES												
9	CSE 209	Numerical calculus	F	2	0	2	0	4	56	E	5	
10	CSE 210	WEB applications development	S	2	0	2	0	4	56	E	5	
11	CSE 211	Database management systems	S	2	0	2	0	4	56	E	5	
12	CSE 212	Advanced programming techniques	S	2	0	2	0	4	56	E	5	
13	CSE 213	Optimization techniques	S	2	2	0	0	4	56	E	5	
14	CSE 214	Speciality internship*	S	0	0	0	8	8	112	C	5	
Total compulsory study period				10	2	8	8	28	392	5E+1C	30	
FACULTATIVE COURSES*												
15	CSE215	Embedded systems programming 1	S	2	1	1	-	4	56	V	4	
Total facultative study period				2	1	1	-	4	56	1V	4	
TOTAL PER ACADEMIC YEAR			Compulsory course						756	10E+3C	60	
			Facultative course						112	2V	8	
			General total						868	10E+3C+2V	68	

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Nr. crt.	Code of Discipline	ACADEMIC YEAR 2027-2028 THIRD YEAR OF STUDY DISCIPLINES	Type of discipline	Number of hours of learning activities						Total hours per semester	Types of assesment	Number of ECTS credits Didactic collective activities
				Didactic collective activities								
				Course	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 1												
COMPULSORY COURSES												
1	CSE 301	Artificial intelligence	S	2	0	2	0	4	56	E	5	
2	CSE 302	IoT (Internet of Things)	S	2	0	2	0	4	56	E	4	
3	CSE 303	Parallel and Concurrent Programming	S	2	0	2	0	4	56	E	5	
4	CSE 304	Techniques for Natural Language Processing	S	2	0	1	0	3	42	E	3	
5	CSE 305	Development of mobile application	S	2	0	2	0	4	56	E	5	
OPTIONAL COURSES												
6	CSE 306.1	Machine learning	S	2	0	2	0	4	56	C	4	
	CSE 306.2	Ethics and academic integrity										
7	CSE 307.1	Encryption	S	1	0	2	0	3	42	C	4	
	CSE 307.2	Multimedia techniques and technologies										
Total compulsory study period				13	0	13	0	26	364	5E+2C	30	
FACULTATIVE COURSES*												
8	CSE 308	Intelligent robots	C	2	1	1	-	4	56	V	4	
Total facultative study period				2	1	1	-	4	56	1V	4	

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				Didactic collective activities								
				Course	Seminar	Laboratory	Practice	Total per week				
1	2	3	4	5	6	7	8	9	10	11	12	
SEMESTER 2												
COMPULSORY COURSES												
9	CSE 309	Modeling and simulation	S	2	0	2	0	4	56	E	5	
10	CSE 310	Software engineering	S	2	0	1	0	3	42	E	5	
11	CSE 311	Practice for the development of the bachelor`s thesis	C	0	0	0	4	4	56	C	3	
12	CSE 312	Computational intelligence	S	2	0	1	0	3	42	E	4	
13	CSE 313	Neural Networks	S	2	0	2	0	4	56	E	4	
OPTIONAL COURSES												
14	CSE 314.1	IT Project Management	C	2	0	2	0	4	56	C	4	
	CSE 314.2	Cybercrime										
15	CSE 315.1	Information Systems Security	S	2	0	2	0	4	56	C	5	
	CSE 315.2	Formal Languages and Compilers										
Total compulsory study period				12	0	10	4	26	364	4E+3C	30	
FACULTATIVE COURSES*												
16	CSE3 16	Embedded systems programming 2	S	2	1	1	-	4	56	V	4	
Total facultative study period				2	1	1	-	4	56	1V	4	
TOTAL PER ACADEMIC YEAR			Compulsory course						728	9E+5C	60	
			Facultative course						112	2V	8	
			General total						840	9E+5C+2V	68	

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### X. BILANȚ GENERAL

Nr. crt.	Discipline categories	Discipline code	Nb. Of hours	Îndeplinit %	
				Compulsory course	+Facultativ course
1.	Compulsory disciplines	CSE 101-ICSE 108, CSE 111-117 CSE 201-2016 CSE 209-214 CSE 301-305 CSE 309-317	1918	1918/2212= <b>86,71%</b>	1918/2520= <b>76,11%</b>
2.	Optional disciplines/DA	CSE 109, CSE 118, CSE 207 CSE 306-307 CSE 314-315	294	294/2212= <b>13,29%</b>	294/2520= <b>11,67%</b>
3.	Facultative disciplines	CSE 110, CSE 119 CSE 208, CSE 215 CSE 308, CSE 316	308	-	308/2520= <b>12,22%</b>
Total			2520		
Nr. crt.	Discipline categories	Discipline code	Nb. Of hours	Îndeplinit %	
				Parcurs obligatoriu	+Parcurs facultativ
1.	Specialization disciplines	S	1428 (cu facultative 1596)	1428/2212= <b>64,56%</b>	1596/2520= <b>63,3%</b>
2.	Complementary disciplines	C	168 ( cu facultative 252)	168/2212= <b>7,59%</b>	252/2520= <b>10%</b>
3.	Fundamental disciplines	F	616 (cu facultative 672)	616/2212= <b>27,85%</b>	672/2520= <b>26,67%</b>
Total			2212 (cu facultative 2520)	100%	100%

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