UNIVERSITATEA
LUCIAN BLAGA
—DIN SIBIU—

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	Advances in Computer Vision		Cod	ACS.301.RO
2.2. Course coordinator	prof. dr. ing. Remus BRAD			
2.3. Seminar/laboratory coordinator	prof. dr. ing. Arpad GELLERT			

2.4. Year of study[1]	2	**2.5.** Semester[2]		3	**2.6.** Evaluation form[3]		E
2.7. Course type[4]			O	**2.8.** The formative category of the course[5]			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
2		1	1		**4**

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[6]
28		14	14		**56**

Time Distribution for Individual Study[7]	Nr. ore
Learning by using course materials, references and personal notes	12
Additional learning by using library facilities, electronic databases and on-site information	10
Preparing seminars / laboratories, homework, portfolios and essays	56
Tutorial activities[8]	12
Exams[9]	4
3.3. Total Individual Study Hours[10] (NOSIsem)	**94**
3.4. Total Hours in the Curriculum (NOADsem)	**56**
3.5. Total Hours per Semester[11] (NOADsem + NOSIsem)	**150**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[12]	**6**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[13]	Computer Vision and Image Processing
4.2. Competencies	Programming in C++ or C#

5. Conditions (where applicable)

5.1. For course/lectures[14]	Tablă, videoProjector, materiale didactice specifice, platforme on-line etc.
5.2. For practical activities (lab/sem/pr/app)[15]	Sală dotată cu calculatoare, avand instalate softuri specifice disciplinei

6. Specific competencies acquired[16]

		Number of credits assigned to the discipline [17] 6		Credits distribution by competencies [18]
6.1. Professional competencies	PC11	develop data processing applications		1
	PC12	develop professional networks with researchers		1
	PC13	develop open source software		1
	PC14	disseminates results to the scientific community		1
	PC15	conducts scientific research		1
6.2. Transversal competencies	TC1	demonstrates commitment		0
	TC2	manages personal development		1
	TC3	takes responsibility		0

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	This course is designed to provide an in-depth study of selected areas in computer vision leading to the ability to understand contemporary terminology, progress, issues, and trends. The interdisciplinary nature of computer vision is emphasized in the wide variety of examples and applications presented with both slide and video materials. We will cover computer vision topics in i) object detection and segmentation, ii) object tracking, iii) object recognition, iv) texture analysis and synthesis v) scene analysis and inference. In following this course, students will acquire: an understanding of some current research issues in computer vision; the skills and knowledge needed to appreciate papers in the area.
7.2. Specific course objectives	Knowledge of basic methods of image processing Knowledge of classical pattern recognition Knowledge of current trends in artificial vision Assessment of how work at pixel level and region in order to extract information Implementation of image processing techniques in the Framework Program

8. Content

8.1. Lectures [19]		Teaching methods[20]	Hours
Lecture 1	Course Introduction. Cameras and Lenses	Exposition, discussions	2
Lecture 2	Image Statistics	Exposition, discussions	2
Lecture 3	Object description	Exposition, discussions	2
Lecture 4	Object description (cont.)	Exposition, discussions	2

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Lecture 5	Content-Based Image Retrieval	Exposition,discussions	2
Lecture 6	Content-Based Image Retrieval (cont.)	Exposition,discussions	2
Lecture 7	Face Detection and Recognition	Exposition,discussions	2
Lecture 8	Texture	Exposition,discussions	2
Lecture 9	Medical Applications of Computer Vision	Exposition,discussions	2
Lecture 10	Medical Applications of Computer Vision (cont.)	Exposition,discussions	2
Lecture 11	Applications in Microscopy	Exposition,discussions	2
Lecture 12	Stereo Matching	Exposition,discussions	2
Lecture 13	Motion Segmentation	Exposition,discussions	2
Lecture 14	How to Write Papers and Give Talks	Exposition,discussions	2
		Total lecture hours:	**28**

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8.2. Practical activities (8.2.a. Seminar[21]/ 8.2.b. Laboratory[22]/ 8.2.c. Project[23])		Teaching methods	Hours
Lab 1	Implementation of color-based image segmentation	Exercise, experiment	2
Lab 2	Implementation of image feature matching	Exercise, experiment	2
Lab 3	Implementation of a stereo technique	Exercise, experiment	2
Lab 4	Image or texture classification	Exercise, experiment	2
Lab 5	Image or texture classification (cont.)	Exercise, experiment	2
Lab 6	Implementation of an Optical Flow or Motion processing	Exercise, experiment	2
Lab 7	Implementation of an Optical Flow or Motion processing (cont.)	Exercise, experiment	2
		Total seminar/laboratory hours:	14

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Ministerul Educației
Universitatea "Lucian Blaga" din Sibiu
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8.2.c. Project		Metode de predare[24]	Nr. ore
Project 1	Implementation of a stereo technique	Exercise	2
Project 2	Implementation of a stereo technique	Exercise	2
Project 3	Implementation of a stereo technique	Exercise	2
Project 4	Implementation of a stereo technique	Exercise	2
Project 5	Implementation of a Inpainting technique	Exercise	2
Project 6	Implementation of a Inpainting technique	Exercise	2
Project 7	Implementation of a Inpainting technique	Exercise	2
		Total Project hours:	14

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9. Bibliography

9.1. Recommended Bibliography	Journals: IEEE Trans. on Pattern Analysis and Machine Intelligence, Computer Vision and Image Understanding, IEEE Trans. on Image Processing	
	Sonka, M, Hlavac, V, and Boyle R., Image Processing, Analysis and Machine Vision, 3nd Ed., Thompson	
9.2. Additional Bibliography	Jain, R., Kasturi, R., and Schunck, B. G. Machine Vision, McGraw Hill	
	Forsyth, D., Ponce, J.: Computer Vision - A Modern Approach, Prentice Hall; ; ISBN : 0130851981	

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

Students will acquire research skills and synthesis abilities preparing them for the transition to a new stage of doctoral admission.
It is carried out through regular discussions in a formal and informal setting with the representatives of the profile companies.
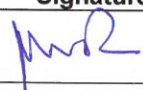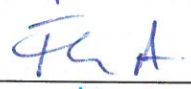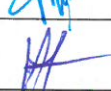
11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	25%	100%	CPE
		Homework:	25%		
		Other activities[28]:	0%		
		Final evaluation:	50%		
11.5 Minimum performance standard[29] The final assessment will include written work consisting of (partial) grid tests and problems. • Knowledge, understanding and explaining the basics of evolutionary computing. • Constant interest to acquire discipline. • Partial fulfilment (50%) of homework, essays and tests given during the semester.					CPE

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: 09.09.2024

Department Acceptance Date: 16.09.2024

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Prof. Remus BRAD, 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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[1] *1-4 for bachelor, 1-2 for master*
[2] *1-8 pentru licență, 1-3 pentru master*
[3] *Exam, colloquium or VP A/R - from the curriculum*
[4] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[5] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[6] *Este egal cu 14 săptămâni x numărul de ore de la punctul 3.1 (similar pentru 3.2.a.b.c.)*
[7] *The following lines refer to individual study; the total is completed at point 3.37.*
[8] *Between 7 and 14 hours*
[9] *Between 2 and 6 hours*
[10] *The sum of the values from the previous lines, which refer to individual study.*
[11] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[12] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No. credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30 \, credits$$

Where:
- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	Course	Applications (S/L/P)
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[13] *The courses that should have been previously completed or equivalent will be mentioned*
[14] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[15] *Computing technology, software packages, experimental stands, online platforms, etc.*
[16] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[17] *Din planul de învățământ*
[18] *Creditele alocate disciplinei se distribuie pe competențe profesionale și transversale în funcție de specificul disciplinei*
[19] *Titluri de capitole și paragrafe*
[20] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[21] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[22] *Practical demonstration, exercise, experiment*
[23] *Case study, demonstration, exercise, error analysis, etc.*
[24] *Studiu de caz, demonstrație, exercițiu, analiza erorilor etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*

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