SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Automation and Computer Science
1.3	Department	Computer Science
1.4	Field of study	Computer Science and Information Technology
1.5	Cycle of study	Master of Science
1.6	Program of study/Qualification	Data Science / Master
1.7	Form of education	Full time
1.8	Subject code	11

2. Data about the subject

2.1	Subject name			***Image Processing and Computer Vision***			
2.2	Course responsible/lecturer			Prof.Dr.Ing. Nedevschi Sergiu - Sergiu.Nedevschi@cs.utcluj.ro Prof.Dr.Ing. Oniga Florin - Florin.Oniga@cs.utcluj.ro			
2.3	Teachers in charge of laboratories			Conf.dr.ing. Mariţa Tiberiu - Tiberiu.Marita@cs.utcluj.ro			
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	E–exam, C–colloq., V-verif.		E
2.7 Subject category	Formative category: DA – advanced, DS – speciality, DC – complementary						DS
	Optionality: DI – imposed, DO – optional (alternative), DF – optional (free choice)						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	1	3.3 Laboratory	-	3.3 Project	-
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	14	3.6 Laboratory	-	3.6 Project	-

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	23
(b) Supplementary study in the library, online and in the field	23
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	Mathematical methods and models that can be applied in image processing

5. Requirements (where appropriate)

5.1	For the course	Video projector, blackboard, screen, computer
5.2	For the seminar / laboratory / project	Computers, equipment and specific software

6. Specific competences

6.1 Professional competences	**C1 -** Working with advanced mathematical methods and models, engineering and computing specific techniques and technologies **C3 –** Innovative design of artificial intelligence and computer vision systems and related software and hardware using the specific tools. **C5** - Creative pooling of multidisciplinary knowledge in the field of computers and information technology for research, design, optimization, implementation and testing of theories, algorithms and original methods specific to artificial intelligence and computer vision systems.
6.2 Cross competences	NA

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Development of skills and abilities for the design of image processing and computer vision systems in the context of data science
7.2	Specific objectives	Assimilation of knowledge and skills in the context of data science regarding: - Understanding and using concepts, paradigms, and models of image processing and computer vision. - Studying, designing, implementing, and evaluating modules of applications for image processing and computer vision. - Image processing and computer vision methods.

8. Contents

8.1. Lecture	Number of hours	Teaching methods	Notes
Introduction	2	Interactive presentation, student involvement in presentations and debates	
Image Acquisition	2		
Image Preprocessing	2		
Image Segmentation	2		
Feature Extraction	2		
Image Classification	2		
Object Detection	2		
Image Recognition	2		
Image Restoration	2		
Image Compression	2		
Image Synthesis	2		
Video Processing	2		
Biometric Image Processing	2		
Content-Based Image Retrieval	2		

Bibliography

1. David Forsyth, Jean Ponce „Computer Vision A Modern Approach", Prentice Hall, USA, 2002
2. Gonzalez, R. C., & Woods, R. E. (2007). Digital Image Processing (3rd ed.). Pearson.
3. Szeliski, R. (2010). Computer Vision: Algorithms and Applications. Springer.
4. IEEE Transactions on Pattern Analyses and Machine Intelligence
5. IEEE Transactions on Image Processing
6. CVPR, ECCV and ICCV papers

8.2. Seminars /Laboratory/Project	Number of hours	Teaching methods	Notes
Image Preprocessing Techniques	2	Experiments and implementation using specific software tools (Python / Matlab based)	
Image Segmentation and Feature Extraction	2		
Image Classification with Machine Learning	2		
Object Detection and Recognition	2		
Image Restoration and Compression	2		
Image Synthesis and Generative Models	2		
Image Annotation and Labeling	2		

Bibliography

1. Dey, S. (2017). Python Image Processing Cookbook. Packt Publishing.
2. Gonzalez, R. C., Woods, R. E., & Eddins, S. L. (2021). Digital Image Processing Using MATLAB (3rd ed.). Gatesmark Publishing.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

It is carried out through periodic meetings with representatives of the economic environment

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Exam	Written examination	50%
10.5 Applications (Seminars /**Laboratory**/Project)	Testing the practical abilities of designing and implementing solutions to specific problems. Attendance and activity.	Lab assessment (continuous evaluation of activity, written and oral verification), project assessment	50%
10.6 Minimum standard of performance: Both, Written examination and Oral examination, marks are bigger or equal with 5			

Date of filling in:		**Title Surname Name**	**Signature**
	Lecturer	Prof.Dr.Ing. Nedevschi Sergiu	
		Prof.Dr.Ing. Oniga Florin	
	Applications	Conf.dr.ing. Mariţa Tiberiu	

Date of approval in the department 20.02.2024	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the faculty council 22.02.2024	Dean Prof.dr.ing. Mihaela Dinsoreanu