COURSE SHEET
Modern Techniques of Digital Image Processing
Academic year 2023-2024

1. About the program

1.1	University	University of Piteşti
1.2	Faculty	Sciences, Physical Education and Computer Science
1.3	Department	Mathematics-Computer Science
1.4	Field of study	Informatics
1.5	Cycle of studies	Master
1.6	Study Program / Qualification	*Advanced techniques for information processing/ Advanced techniques for information processing*

2. Discipline data

2.1	Name of the discipline			*Modern Techniques of Digital Image Processing*						
2.2	The holder of the course activities			Assoc.prof.PhD Doru Constantin						
2.3	Holder of laboratory activities			Assoc.prof.PhD Doru Constantin						
2.4	Year of study	1	2.5 Semester	2	2.6	Type of assessment	E	2.7	Discipline regimen	O

3. Estimated total time

3.1	Number of hours per week	4	3.2	of which course	2	3.3	laboratory	2
3.4	Total hours of the curriculum	56	3.5	of which course	28	3.6	laboratory	28

Distribution of the time fund	hours
Study by textbook, course support, bibliography and notes	56
Additional documentation in the library, on specialized electronic platforms and in the field	34
Preparation of seminars/ laboratories, themes, papers, portfolios, essays	44
Tutoring	6
Examination	4
Other activities.....	-

3.7	Total hours of self-study	144
3.8	**Total hours per semester**	**200**
3.9	**Number of credits**	**8**

4. Preconditions (where applicable)

4.1	Curriculum	-
4.2	Skills	-

5. Conditions (where applicable)

5.1	Conduct of the course	Room with video projector
5.2	Conducting the seminar/laboratory	Laboratory room with video projector and computer equipment

6. Acquired specific skills

Professional skills	Operation with scientific concepts and methods in the field of information processing in information systems; Development of theoretical concepts and practical methods regarding the process of development and maintenance of computer applications; Advanced information processing; Realization of it projects in an interdisciplinary context; Conceiving, designing and implementing information systems; Management of information systems.
Transversal competences	Applying the rules of organized and efficient work, of responsible attitudes towards the scientific-professional field, for the creative capitalization of one's own potential, respecting the principles and norms of professional ethics; Efficiently carrying out the activities organized in an interdisciplinary team by assuming execution and leadership functions, with the development of empathic capacities of inter-personal communication, networking and collaboration with various groups; Elaboration of own professional development project; the use of effective methods and techniques for learning, information, research and capacity development, for valuing knowledge, for adapting to the requirements of a dynamic society and for communicating in Romanian and English.

7. The objectives of the discipline

7.1 The general objective of the discipline	▶ The discipline has as its general objective the students' acquisition of basic knowledge, as well as advanced methods and techniques regarding image processing.
7.2 Specific objectives	*Cognitive objectives:* ▶ Knowledge of the mathematical and computer fundamentals of the main concepts in the field of image processing; ▶ Knowledge of image transformation algorithms and methods. *Procedural objectives:* ▶ Training the skills to implement the main algorithms of transformation, compression, restoration and classification of digital images. *Attitudinal objectives:* ▶ Rigor in modeling, design and implementation of image processing algorithms.

8. Contents

8.1. Course		Nr. hours	Teaching methods	Resources used
1.	Basic concepts of digital image processing	2	Explication Description and exemplification Demonstration Problematization Heuristic conversation Exercise	Blackboard Pen tablet Computer Video projector E-learning platform Zoom
2.	Digital Image Enhancement Techniques	4		
3.	Fourier transform and processing in the frequency domain	2		
4.	Digital image filtering methods	4		
5.	Image compression and restoration techniques	4		
6.	Feature extraction using modern techniques	4		
7.	Digital Image Classification Techniques and Algorithms	4		
8.	Neural techniques for digital image processing	4		

Bibliography
1. Note de curs și laborator - *suport electronic* - Doru Constantin.
2. Cris Solomon, Toby Breckon, *Fundamentals Digital Image Processing, Willey-Blackwell*, 2011.
3. Wilhelm Burger, Mark J. Burge, *Principles of Digital Image Processing,* Springer, 2009.
4. Richard C. Gonzalez, Richard E. Woods, *Digital Image Processing using Matlab*, Second Edition, Gatesmar 2009.
5. Mark S. Nixon, Alberto S. Aguado, *Feature Extraction and Image Processing*, Newnes, 2002.
6. Vinay K. Ingle, Jhon G. Proakis, *Digital Signal Processing using Matlab*, PWS Publishing Company, 1997.
7. Jan Teuber, *Digital Image Processing*, Prentice Hall, 2003.

8.2. Applications – Laboratory		Nr. hours	Teaching methods	Observations Resources used
1.	Implementation of classic algorithms for representation and processing of digital images	4	Explication Description and exemplification Case study Exercise Debate	Blackboard Pen tablet projector E-learning platform Zoom
2.	Implementation of algorithms for image restoration	6		
3.	Implementation of feature extraction algorithms	6		
4.	Implementation of digital image classification algorithms	6		
5.	Digital Image Classification Applications - Comparative Studies of Neural Digital Image Processing Methods and Algorithms	6		

Bibliography
1. Note de curs și laborator - *suport electronic* - Doru Constantin.
2. Cris Solomon, Toby Breckon, *Fundamentals Digital Image Processing, Willey-Blackwell*, 2011.
3. Wilhelm Burger, Mark J. Burge, *Principles of Digital Image Processing,* Springer, 2009.
4. Richard C. Gonzalez, Richard E. Woods, *Digital Image Processing using Matlab*, Second Edition, Gatesmar 2009.
5. Mark S. Nixon, Alberto S. Aguado, *Feature Extraction and Image Processing*, Newnes, 2002.
6. Vinay K. Ingle, Jhon G. Proakis, *Digital Signal Processing using Matlab*, PWS Publishing Company, 1997.
7. Jan Teuber, *Digital Image Processing*, Prentice Hall, 2003.

9. Corroborating the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and employers in the field related to the program

The competences acquired within the discipline allow the graduates to efficiently use the models and techniques specific to image processing in solving the requirements related to the practice and research in the field of informatics. The contents are correlated with those of similar disciplines in prestigious universities in the country and abroad (such as MIT) and adjusted after discussions with representatives of local IT employers (such as RoWeb, Lisa, Prodinf, Kepler, Osf, Endava).

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Percent of final grade
10.4 Course	Final evaluation	Practical test (algorithms and problems)	50%
10.5 Seminar/ Laboratory	Participatory activity, Project Activity (solving proposed problems) Periodical evaluation	Verification of project, practical test	10% 40%
10.6 Minimum performance standard	* Minimum knowledge set for passing the final exam: knowledge of the fundamental principles of the image processing field; knowledge of basic techniques and methods, implementations of basic algorithms used in image processing tasks.		

Date of completion   Course holder   Laboratory holder
19.09.2023   Assoc.prof.PhD Doru CONSTANTIN   Assoc.prof.PhD Doru CONSTANTIN

Date of approval in the Department   Director Department (provider)   Director Department (*beneficiary)*
19.09.2023   Assoc.prof.PhD Doru CONSTANTIN   Assoc.prof.PhD Doru CONSTANTIN