

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
Advanced Image Processing	CSE587	2	3	3	7

Prerequisites	CSE587 – ADVANCED IMAGE PROCESSING
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Language of Instruction	English
Course Level	Graduate
Course Type	Compulsory
Course Coordinator	
Instructors	Assist.Prof. Dionysis Goularas
Assistants	
Goals	The aim of this course is to provide students with knowledge and abilities to handle special and advanced topics related with Image Processing techniques.
Content	The objective of this course is to provide special and advanced concepts on digital image processing. After covering general subjects related with color processing and filtering in spatial and frequency domain, other subjects such as image compression and recognition will be studied. Special attention is given to the assignments and the project. It will be demanded by the student to understand the mathematics and program many algorithms and applications related with these subjects.

Course Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1) Knowledge in Information Theory	3	1,2	A,C,D
2) Ability to conduct experiments, gather data, analyze and interpret results for investigating engineering solutions to Image Processing problems	4	1,2	A,C,D

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT		
Week	Topics	Study Materials
1	Fields of Digital Image Processing	Textbook
2	Color Processing	Textbook
3	Spatial filtering I. Smoothing, Shaping, Edge detection.	Textbook
4	Spatial filtering II. Advanced techniques	Textbook
5	Filtering in the frequency domain I.	Textbook
6	Filtering in the frequency domain II. Advanced techniques	Textbook
7	Image Restoration and Reconstruction	Textbook
8	Midterm	Textbook
9	Image Compression I. Information theory	Textbook
10	Image Compression II. Applications	Textbook
11	Special Techniques on Image Segmentation I	Textbook
12	Special Techniques on Image Segmentation II	Textbook
13	Principal Component Analysis	Textbook
14	Object recognition. Special cases.	Textbook

RECOMMENDED SOURCES	
Textbook	Raphael C. Gonzalez Richard E. Woods, Digital Image Processing, Third Edition Prentice Hall 2008
Additional Resources	Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	1	50
Assignment	5	25
Project	1	25
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Knowledge in the advanced computer architecture field					
2	Knowledge in advanced system design for computer engineering					
3	Knowledge in the theoretical topics of computer science					X
4	Ability to comprehend, analyse and critique academic publications and conduct scholarly research at the frontiers of computer engineering					X
5	Ability and knowledge in the fields of Next-Generation and contemporary computer networks					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 13x Total course hours)	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	15	2	30
Midterm examination	1	2	2
Homework	5	10	50
Project	1	50	50

Final examination	1	3	3
Total Work Load			174
Total Work Load / 25 (h)			6.96
ECTS Credit of the Course			7