UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
ECE-436	Image Processing	6
Department	**Semester**	**Prerequisites**
Engineering	Fall or Spring	ECE-332, MATH-280
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	4th	Dr George Gregoriou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Provide knowledge and a fundamental understanding of digital image processing principles, analytical methods and techniques.
- Expose students to state-of-the-art technology through a hands-on approach to digital image processing.
- Give students the mathematical fundamentals of common digital image processing algorithms along with their implementation details.
- Provide hands-on experience in using software for processing digital images.
- Give experience to students to work collaboratively in teams on larger projects.
- Develop a foundation that can be used as the basis for further study and research in image processing.

Learning Outcomes:

After completion of the course students are expected to:

- Discuss the theoretical foundations of modern image processing.
- Demonstrate knowledge and understanding of digital image processing principles and techniques.
- Apply the theory to practical image processing problems in order to process and visualize digital information.
- Identify the different digital image processing and visualization techniques and their applications.
- Demonstrate understanding of different procedures involved in the computer representation of images: noise elimination, image enhancement, image restoration, image compression and other image analysis techniques.
- Be exposed to current technologies and issues that are specific to image processing systems.

Course Contents:

- Motivation - background material (probability, matrices).

- Digital image fundamentals: elements of visual perception; electromagnetic spectrum; image sensing and acquisition; sampling and quantization; basic relationships between pixels.
- Image enhancement in the spatial domain: gray level transformations, histogram processing; enhancement using arithmetic operations, spatial filtering, smoothing spatial filters; sharpening spatial filters.
- Image enhancement in the frequency domain: Fourier Transform; smoothing filters; sharpening filters.
- Image restoration: image degradation model; noise modeling; noise removal - spatial filtering.
- Color image processing: color fundamentals; color models; pseudo-color image processing.
- Image compression: compression models; error-free compression.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises, projects

Assessment Methods:

Homework, projects, mid-term exam, final exam

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
R. Gonzalez, R. Woods	Digital Image Processing	Prentice Hall	2008	013168728X

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
R. Gonzalez, R. Woods, S. Eddins	Digital Image Processing using MATLAB	Pearson Prentice Hall	2009	9780982085400
W. Pratt	Digital Image Processing	Wiley	2007	9780471767770