

Academic Year: (2019 / 2020)

Review date: 28-04-2020

Department assigned to the subject:

Coordinating teacher: GONZALEZ DIAZ, IVAN

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Machine Learning
Statistical Signal Processing
Biomedical Image Processing
Deep learning

OBJECTIVES

Basic competences

CB6 Having and understanding the knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
CB7 Students know how to apply their acquired knowledge and problem-solving skills in new or unfamiliar settings within broader (or multidisciplinary) contexts related to their field of study.
CB8 Students are able to integrate knowledge and to face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
CB9 Students know how to communicate their conclusions and the knowledge and ultimate reasons behind them to specialised and non-specialised audiences in a clear and unambiguous way.
CB10 Students have the learning skills that will enable them to continue studying in a way that will be largely self-directed or autonomous.

General competences

CG2 Ability to apply the knowledge of skills and research methods related to engineering.
CG3 Ability to apply the knowledge of research skills and methods related to Life Sciences.
CG4 Ability to contribute to the widening of the frontiers of knowledge through an original research, part of which merits publication referenced at an international level.
CG5 Ability to perform a critical analysis and an evaluation and synthesis of new and complex ideas.
CG6 Ability to communicate with the academic and scientific community and with society in general about their fields of knowledge in the modes and languages commonly used in their international scientific community.

Specific competences

CE6 Ability to understand the basis of the main technologies involved in biomedical imaging systems.
CE7 Ability to solve a biomedical problem from an engineering perspective based on the acquisition and processing of biomedical images

DESCRIPTION OF CONTENTS: PROGRAMME

Block 1: image Formation

Topic 1: Light, shading and color.
Topic 2: Geometric Camera Models and Camera Calibration

Block 2: Early Vision

Topic 3: Local Invariant Features
Topic 4: Motion Estimation and Optical Flow
Topic 5: Stereopsis and Structure from Motion

Block 3: Mid-level Vision

Topic 6: Object Tracking

Topic 7: Image Registration: rigid and deformable

Topic 8: Surface Estimation

Block 4: High-level Vision

Topic 9: Object Recognition & Image Classification with Convolutional Neural Networks

Topic 10: Other applications of Deep Learning in images: object detection, segmentation, image matching, etc.

LEARNING ACTIVITIES AND METHODOLOGY

AF3	Theoretical practical classes
AF4	Laboratory practices
AF5	Tutorials
AF6	Team work
AF7	Student individual work
AF8	Partial and final exams

Activity code	total hours number	presencial hours number	% Student Presence
AF3	134	134	100%
AF4	42	42	100%
AF5	24	0	0%
AF6	120	0	0%
AF7	248	0	0%
AF8	16	16	100%
SUBJECT TOTAL	600	184	30,66%

ASSESSMENT SYSTEM

Continuous assessment based on the following aspects :

- Evaluation of laboratory and presentation / study scientific articles on topics of interest (50%).
- Development of a final project related to the subject of the course (50%).

% end-of-term-examination:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

BASIC BIBLIOGRAPHY

- Forsyth, Ponce Computer Vision: A Modern Approach, Pearson, 2012
- Ian Goodfellow, Yoshua Bengio, Aaron Courville Deep Learning, The MIT Press, Cambridge, Massachussetts, London, England, 2016
- Richard Hartley & Andrew Zisserman Multiple View Geometry in Computer Vision, Cambridge University Press, 2003
- Richard Szeliski Computer Vision: Algorithms and Applications, Springer-Verlag, 2011