uc3m | Universidad Carlos III de Madrid
Vicerrectorado de Estudios
Apoyo a la docencia y gestión del grado

COURSE: Audio & Visual Analytics		
DEGREE: Degree on Telecommunication Technologies Engineering	YEAR: 4th	TERM: 1st

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
1	1	Course Presentation Overview of Audio & Visual Analytics		x		Course Presentation Overview of Audio & Visual Analytics (Study)	1,66	6,5
	2	Digital speech, audio, Image and video		x		Sampling and quantification. Color models. (Study and practical exercises)	1,66	
2	3	Basic image processing techniques: intensity transformations		x		Basic Intensity transformations. Histograms. Histogram Equalization. (Study and practical exercises)	1,66	6,5
	4	Basic image processing techniques: filtering		x		Correlation and convolution. Low-pass filters. High-pass filters. Gaussian Filters. Statistical ordered filters. (Study & practical exercises)	1,66	
3	5	Basic image processing techniques: edge detection		x		Gradient and Laplacian. Discrete approximations of first and second derivative. Canny detector. (Study & practical exercises)	1,66	6,5
	6	Lab Session: Basic image processing techniques		x	Lab 4.0B01A/ Aula informática	Reading and displaying images. Accessing sub-images and components. Color models. (Practical computer implementations)	1,66	
4	7	Lab Session: Basic image processing techniques		x	Lab 4.0B01A/ Aula informática	Histograms. Histogram equalization. Filtering. Edge detection (Practical computer implementations)	1,66	6,5
	8	Image segmentation		x		Threshold-based segmentation. Region evolution. Connected components. (Study & practical exercises	1,66	
5	9	Image segmentation		x		Threshold-based segmentation. SLIC. (Study & practical exercises)	1,66	6,5
	10	Mathematical morphology		x		Basic morphological operations. Basic morphological algorithms. (Study & practical exercises)	1,66	
6	11	Lab Session: image segmentation		x	Lab 4.0B01A/ Aula informática	Threshold-based and clustering-based segmentations. (Practical computer implementations)	1,66	6,5
	12	Principal Component Analysis. Lines detection: Hough Transform		x		Principal component analysis. Hough transform. (Study & practical exercises)	1,66	

WEEKLY PLANNING								
WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
7	13	Basic form, color and texture descriptors		x		Basic form, color and texture descriptors. (Study & practical exercises)	1,66	6,5
	14	Basic form, color and texture descriptors		x		Basic form, color and texture descriptors. (Study & practical exercises)	1,66	
8	15	Lab Session: image representation for classification & detection		x	Lab 4.0B01A/ Aula informática	Basic form, color and texture descriptors for image representation (Practical computer implementation	1,66	6,5
	16	Lab Session: Project 1 (1)		x	Lab 4.0B01A/ Aula informática	Implementation of a software project related to image processing (e.g. face recognition, constructio of panoramic images, vehicle detection, etc.)	1,66	
9	17	Lab Session: Project 1 (2)		x	Lab 4.0B01A/ Aula informática	Implementation of a software project related to image processing (e.g. face recognition, constructio of panoramic images, vehicle detection, etc.)	1,66	6,5
	18	Speech Production and Audio Perception. Speech and Audio Signals		x		Speech Production and Audio Perception. Speech and Audio Signals. (Study & practical exercises)	1,66	
10	19	Short-term speech and audio analysis		x		Motivation for short-term analysis. Windowing, Autocorrelation. Short-term Fourier Transform. Spectrogram. Mel-Frequency Cepstral Coefficients (MFCCs). (Study & practical exercises)	1,66	6,5
	20	How does Shazam work?		x		Shazam: "audio fingerprinting" (Study & practical exercises).	1,66	
11	21	Lab Session: speech and audio signals		x	Lab 4.0B01A/ Aula informática	Reading, displaying and playing speech and audio signales. Resampling. (Practical computer implementations)	1,66	6,5
	22	Lab Session: short-term analylisis of speech and audio		x	Lab 4.0B01A/ Aula informática	Windowing, Autocorrelation. Short-term Fourier Transform, MFFCs. (Practical computer implementations)	1,66	
12	23	Speech and audio representation for classification, detection or recognition (1)		x		Basic descriptors for speech and audio representation. (Study & practical exercises)	1,66	6,5
	24	Speech and audio representation for classification, detection or recognition (2)		x		Basic descriptors for speech and audio representation. (Study & practical exercises)	1,66	
13	25	Lab Session: speech and audio representation for classification, detecti or recognition (1)		x	Lab 4.0B01A/ Aula informática	Basic descriptors for speech and audio representation. (Practical computer implementations)	1,66	6,5
	26	Lab Session: speech and audio representation for classification, detecti or recognition (2)		x	Lab 4.0B01A/ Aula informática	Basic descriptors for speech and audio representation. (Practical computer implementations)	1,66	

WEEKLY PLANNING								
WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
14	27	Lab Session: Project 2 (1)		x	Lab 4.0B01A/ Aula informática	Implementation of a software project related to speech or audio processing (for example: clustering systems or classification of audio by genres, classification of electrocardiograms, classification of emotions, etc.)	1,66	6,5
	28	Introduction to NNs and their Applications in speech, audio, image and video processing		x		Introductory lesson to neural networks and their applications in speech, audio, image and video processing (Study).	1,66	
	29	Lab Session: Project 2 (2)		x	Lab 4.0B01A/ Aula informática	Implementation of a software project related to speech or audio processing (for example: clustering systems or classification of audio by genres, classification of electrocardiograms, classification of emotions, etc.)	1,66	3,25
						Subtotal 1	**48**	**94**
						Total 1 *(Hours of class plus student homework)*	**142**	
15		Tutorials, handing in, etc					3,6	-
16 17 18		Assessment					4	10
						Subtotal 2	**8**	**10**
						Total 2 *(Hours of class plus student homework)*	**18**	
TOTAL (*Maximun 160 horas*)							**160**	