Course guide
320122 - VPC - Computer Vision

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.
Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: Morros Rubio, Josep Ramon
Others: Vilaplana Besler, Veronica
Ruiz Hidalgo, Javier

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE26. (ENG) AUD: Coneixements i capacitats per aprofundir en tecnologies específiques de l'àmbit.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

Provide a vision of image and video processing, with special emphasis on content analysis applications.
Give an overview of the principal feature extraction techniques. Familiarize students with the fundamental principles of the geometry of one, two and multiple cameras and technologies of 3D recording and playback. Study detection, tracking and object recognition algorithms. Show examples of application, such as face recognition, extraction of foreground objects or 3D TV. Develop specific skills associated with academic work as detailed below.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## CONTENTS

### (ENG) INTRODUCCIÓ

**Description:**
- Introduction to computer vision
- Image formation, 3D sensors

**Full-or-part-time:** 8h  
Theory classes: 2h  
Self study: 6h

### (ENG) ESTRUCTURA D'IMATGE

**Description:**
- Color, texture and contours  
- Corners and blob detection  
- Grouping and modeling: RANSAC

**Full-or-part-time:** 13h  
Theory classes: 4h  
Self study: 9h

### (ENG) APLICACIONS MULTICÀMERA I 3D

**Description:**
- Single camera geometry  
- Camera calibration  
- Epipolar geometry: rectification, disparity and depth  
- 3D reconstruction: stereo and multiview, "structure from motion"

**Full-or-part-time:** 26h  
Theory classes: 8h  
Self study: 18h

### (ENG) DETECCIÓ I RECONOIXEMENT

**Description:**
- Specific object recognition: Face detection and recognition  
- Bag of words models  
- Discriminative models  
- Part-base models

**Full-or-part-time:** 26h  
Theory classes: 8h  
Self study: 18h
(ENG) SEGMENTACIÓ DE VÍDEO I SEGUIMENT D'OBJECTES

**Description:**
- Background substraction
- Object tracking: Mean-shift, Kalman filter, particle filter

**Full-or-part-time:** 13h
- Theory classes: 4h
- Self study : 9h

---

**ACTIVITIES**

(ENG) LABORATORI

**Full-or-part-time:** 60h
- Laboratory classes: 30h
- Self study: 30h

(ENG) EXAMEN 1

**Full-or-part-time:** 2h
- Theory classes: 2h

(ENG) EXAMEN 2

**Full-or-part-time:** 2h
- Theory classes: 2h

---

**GRADING SYSTEM**

- Examinations: 80% (1st term : 40%, 2nd term: 40%)
- Laboratory: 20%

---

**BIBLIOGRAPHY**

**Basic:**