

## Course guide

### 230376 - DLV - Deep Learning for Vision

Last modified: 06/05/2019

**Unit in charge:** Barcelona School of Telecommunications Engineering  
**Teaching unit:** 739 - TSC - Department of Signal Theory and Communications.

**Degree:** Academic year: 2019 ECTS Credits: 3.0  
**Languages:** English

#### LECTURER

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**Coordinating lecturer:** Xavier Giró i Nieto

**Others:** Giró Nieto, Xavier  
Sayrol Clois, Elisa  
Ruiz Hidalgo, Javier

#### REQUIREMENTS

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Deep Learning for Artificial Intelligence

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

CE1. Ability to apply information theory methods, adaptive modulation and channel coding, as well as advanced techniques of digital signal processing to communication and audiovisual systems.

**Transversal:**

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

#### TEACHING METHODOLOGY

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- Lectures
- Group work
- Group work (distance)

#### LEARNING OBJECTIVES OF THE SUBJECT

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The aim of this course is to train students in methods of deep learning for computer vision. Convolutional neural networks (convnets) will be presented and analyzed in detail to understand the potential of these state of the art tools in visual pattern recognition. Engineering tips and scalability issues will be addressed to solve tasks such as image classification, object detection or automatic textual captioning.

## STUDY LOAD

Type	Hours	Percentage
Self study	51,0	68.00
Hours large group	12,0	16.00
Hours small group	12,0	16.00

**Total learning time:** 75 h

## CONTENTS

### 1. State of the Art in Computer Vision

**Description:**

- Still images: Object detection, image and instance segmentation, saliency prediction, visual search.
- Videos: Action recognition, object tracking, video object segmentation, super-resolution, self-supervised learning.
- 3D & volumes: 3D Analysis, 3D reconstruction, medical applications.

**Full-or-part-time:** 12h

Theory classes: 12h

### 2. Industry Talks

**Description:**

Talks by industrial professionals who are applying deep learning to address their challenges.

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

Theory classes: 2h

## ACTIVITIES

### Exam

**Description:**

Written exam to evaluate the learning over the lecture contents.

**Full-or-part-time:** 10h

Guided activities: 1h

Self study: 9h



## Project

### Description:

Development and training of a deep neural network that will solve a computer vision task.

### Delivery:

Oral presentation in class.

Release of the source codes and trained models.

### Full-or-part-time: 51h

Theory classes: 2h

Guided activities: 12h

Self study: 37h

## GRADING SYSTEM

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Exam: 50%

Project: 50%

Attendance: -10 % penalty for each not completed day

## BIBLIOGRAPHY

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### Basic:

- Goodfellow, I.; Bengio, Y.; Courville, A. Deep learning [on line]. 2016 [Consultation: 20/02/2018]. Available on: <http://www.deeplearningbook.org/>.

## RESOURCES

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### Hyperlink:

- Nom reCourse website.

4th Summer School on Deep Learning for Vision. Barcelona. UPC ETSETB TelecomBCN (June 25 - July 3, 2019).

<https://telecombcn-dl.github.io/2019-dlcv/>- Fei-Fei Li, Andrej Karpathy, "CS231n: Convolutional neural networks for visual recognition". Stanford University, 2015. <http://cs231n.stanford.edu/>