

Name of the course: Applied Deep Learning	Total credits: 2+2+1=5
IPM-18AUTADLEG	
Type: Obligatory	
A tanóra típusa: lecture: 26 practice: 26 consultation: 13 Other: projects in teamwork	
Type of testing: exam Other: projects, tests	
Semester: 3rd	
Subject requirements: Introduction to Vehicles and Sensors, Signal and Image Processing, Numerical Methods for Optimization, AI in Processes and Automation (IPM-18AAUTIVSEG, IPM-18AUTISPE, IPM-18AUTNMEG)	
Description	
In this course practical problems are addressed with deep learning techniques. Architectures: auto-encoders, convolutional neural networks, recurrent neural networks, long short-term memory, residual networks, and highway networks. Image processing: image restoration and super-resolution, bounding boxes, objects, face, hand, body recognition. Speech processing: speaker identification, speaker de-identification, speech recognition and speech production. Motion and control: deep learning for motion via imitation, dynamic movement primitives. Deep methods for anomaly detection, optical flow, tracking, multi-modal tracking, information fusion and pattern completion.	
Literature	
Compulsory Ian Goodfellow and Yoshua Bengio and Aaron Courville: Deep Learning. MIT Press, 2016. Hardcover: ISBN: 9780262035613, eBook: ISBN: 9780262337434	
Recommended - Jason Brownlee: Applied Deep Learning in Python Mini-Course - Aurélien Geron: Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems O'Reilly Media, Inc. 2017. ISBN: 1491962291 - Josh Patterson and Adam Gibson: Deep Learning: A Practitioner's Approach. O'Reilly Media, Inc. 2017. ISBN: 1491914254 - Sayan Pathak, Roland Fernandez, and Jonathan Sanito, Deep Learning Explained, MOOC edX, https://www.edx.org/course/deep-learning-explained-microsoft-dat236x	
Competencies	
Knowledge - Possession of complex and up-to-date knowledge in deep learning technology, regarding the design, training, validation and testing of such networks in different application areas - Knowledge of the underlying mathematical principles including best practices, knowledge on network architectures, methods of architecture description and design. - Detailed and expert-level knowledge of the technical terms and expressions of deep learning concepts in English.	

Competencies

- Expertise in the application of the concepts and methods of deep learning methods in the modeling of complex phenomena in different application areas. Ability to develop applications with real-time requirements.
- Ability to formalize complex technical problems, to analyze theoretical and practical background, and to provide adequate solutions.
- Skills for cooperation and team work, and ability to take leading role.
- Ability for written and oral communication in English, using the technical terms and expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

Attitude

- Attends professional, technological development related to their qualification.
- Commitment to critical feedback and self-assessment.
- Commitment to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Open to initiate collaboration with IT and other specialists.

Autonomy and responsibility

- a) Takes responsibility for his professional decisions taken during his professional activities.
- b) Takes responsibility for observing and enforcing deadlines.
- c) Takes responsibility for own and fellow workers' work.