ESIROI
ÉCOLE D'INGÉNIEURS
UNIVERSITÉ DE LA RÉUNION

DEPARTMENT : *IT*
SEMESTER : *S9*

IDENTIFICATION

Course code :	IOT903
ECTS :	3

DURATION

Lectures :	10
Tutorial classes :	8
Labs :	6
Total :	24

Project :
Personnal work :

ASSESSMENT

A knowledge assessment, a lab report, and an oral presentation.

TEACHING MATERIALS

Slides and practical work sheets.

LANGUAGE

English

CONTACT

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Modifié le : 14 juillet 2026

UE : UE9-Ressources

COURSE : Internet of Things : Deployment

SCOPE OF THE COURSE

OBJECTIVES

The aim of this course is to cover advanced concepts in deep learning. It also aims to raise awareness of related issues such as data leakage, privacy protection, and environmental impact.

COMPETENCE AND SKILLS

- Design, develop and use tools and applications integrating data management and their valorization (1.5)-(1.4)
- Define, implement and use descriptive and predictive analysis by exploiting massive data (2.5)-(2.4)
- Apply data analysis methods for multimedia data (images, signals) (2.5)-(2.4)

PROGRAM

Depending on the background of the students present (incoming mobility…), a recap of deep learning concepts may be provided.

The following advanced topics may be covered :

- Autoencoders and their uses ;
- Deep generative models, such as Generative Adversarial Neural Networks (GANNs) and their potential applications ;
- Practical challenges of these approaches, for example : convergence, mode collapse, etc.
- Approaches to address or mitigate the effects of the phenomena described above.

Raising awareness of privacy issues is an additional key element not covered earlier in the program. This may refer both to the problems posed by the datasets used for training and to the results published or even the weights embedded in neural networks that may reveal elements of the training set.

Finally, awareness of the cost of training deep models and their carbon footprint may be addressed, along with ways to limit them.

BIBLIOGRAPHY

Goodfellow, I., Bengio, Y., Courville, A. (2016). Deep learning. MIT press.
Boulemtafes, A., Derhab, A., Challal, Y. (2020). A review of privacy-preserving techniques for deep learning. Neurocomputing, 384, 21-45.
Ligozat, A. L., Luccioni, S. (2021). A Practical Guide to Quantifying Carbon Emissions for Machine Learning Researchers and Practitioners (Doctoral dissertation, MILA ; LISN).

REQUIREMENTS

Following modules :

— "Machine Learning" and "Massive Data Systems" from S7.
— "Data Mining" from S6.
— "Probability and Random Variables" from S5 and "Stochastic Processes" from S6.