Mastère Spécialisé®
ARTIFICIAL INTELLIGENCE & BUSINESS TRANSFORMATION

BLOC 3 : PRACTICAL SKILLS
AIBT111_Hands-on

Course Director/Responsable du Module :	**ISAE-SUPAERO Contact/ Contact ISAE-SUPAERO :**
Lucas HERVIER	Nicolas DROUGARD

Objectives/Objectifs :

During each week of the whole program participants will manipulate AI tools on practical common themes (well-identified use cases) taking benefit of their accumulated knowledge.

After completing this module, distributed in all weeks of the program, participants will:

- Know about essential tools and libraries that can be used by data scientists;
- Have a practical knowledge on how to use AI tools to solve problems, and how to find solutions;
- Have a basic practical knowledge on how codes can be executed;
- Have faced practical technical problems and solved them.
- Cover multiple data types, ML models and tasks

Contents/Contenu :

Practical sessions based on real use cases and real data:

- Class 0 (optional):
  Object-Oriented Programming Review
- Class 1:
  Introduction, taxonomy
  Engage with common data scientist's libraries (e.g. pandas, scikit-learn, ...)
  Data exploration, features engineering, first ML models, results analysis
  Use Case: House price prediction
- Class 2:
  AI approaches that are not Machine Learning such as Genetic Algorithms
- Class 3:
  Commonly used ML models: SVM, Decision Tree, ..;
  Use Case: Breast Cancer detection
- Class 4:
  Introduction to ANN, Deep Learning, CNN and Pytorch.
  Computer Vision, Advanced models, Transfer Learning
  Use Case: Boston dataset, IMFDB, Eurosat
- Class 5:
  Introduction to Time-Series, Recurrent Neural Networks, LSTM
  Use Case: Capital Bikeshare
- Class 6:
  Introduction to unsupervised learning, common techniques and visualization
  Use Case: MNIST & Tiny ImageNet
- Class 7:
  Introduction to Natural Language Processing, Attention models and Transformers
  Use Case: TBD
- Class 8:

<table>
<tr><td></td><td>How to build reliable, explainable, fair AI and how to measure uncertainty
▪ Class 9:
NLP, approfondissement: LLMs, RAG
▪ Class 10:
Introduction to Reinforcement Learning, DQN, Soft-Actor Critic architecture
Framework: TeamCatcher</td></tr>
<tr><td><u>Prerequisites/Prérequis :</u>
Good knowledge on the Python programming language. Knowing how to use Jupyter Notebook is a plus!
Having a GitHub account and send your GitHub id to:
lucas.hervier@irt-saintexupery.com</td><td><u>Textbooks/Bibliographie :</u>
▪ None (practical skills associated to other courses)</td></tr>
<tr><td><u>Organization/Volume Horaire :</u>
7 hours for 9 weeks
▪ 1 day per week (except the second week).</td><td><u>Evaluation/Evaluation :</u>
▪ Each BE will lead to an evaluation. The final grade will be the mean of those intermediate evaluations.</td></tr>
<tr><td><u>Hours Personal Work/Heures Travail Personnel :</u>
▪ 70 hours minimal. Possibly more depending on how you want to dive into the specifics</td><td><u>ECTS :</u>
▪ 5 ECTS</td></tr>
</table>