Advanced optimal control: from reusable rocket landing to efficient training of neural networks

IPSA course 2025

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What must be returned before the examination?

Lecture notes and template codes may be found at https://rbonalli.github.io/ipsa.html.

By April 30, 2025 (midnight), each group must send one copy of the files listed below to riccardo.bonalli@centralesupelec.fr. Put everything in one zip file named “First and Last Name of group representative.zip”. No files = no admission to the examination!

1. The Jupyter Notebook of the Python session 1 (reusable rocket landing).
   This Jupyter Notebook must be complete, fully working, and contain all necessary outputs, like, optimal costs, solver outputs (optimality, iterations, etc.), and plots.
   Comment any code line you added and any result you found!

2. The Jupyter Notebook of the Python session 2 (NeuralODE).
   This Jupyter Notebook must be complete, fully working, and contain all necessary outputs, like, loss values, solver outputs (SGD iterations, etc.), and plots.
   Comment any code line you added and any result you found!

What does the examination consist of?

1. Examination date: Mai 6, 2025.

2. Examination kind: Oral presentation via projected slides (any support).

3. Examination duration: 15 minutes presentation + 10 minutes questions.

4. Examination details: All groups are invited to arrive at 13:30 and wait outside the examination room until their turn (maximum until 17:30), as groups will be called in random order. Any group that does not answer when called will be qualified as absent. It is forbidden to enter the examination room without explicit invitation.
   The examination will consist of two parts:
   a. 15 minutes presentation of your work on the two Jupyter Notebooks. You will be evaluated on how satisfactorily you present each optimal control problem and the achieved results, and on the quality of your scientific analysis of such achieved results. Results must match the ones submitted on April 30, 2025!!!
   b. 10 minutes of questions on your work (presentation, results, and analysis).