

INTERNATIONAL RELATIONS



INTERNSHIP SUBJECT

2899 - Design and Implementation of a Multi-Market Transport Simulation

This internship aims to design and implement a modular Python-based transport simulator capable of modeling multiple levels of the supply chain — from international maritime cargo to urban last-mile delivery.

The simulator will reproduce realistic market settings involving agents (e.g., shippers, carriers, couriers), infrastructure (e.g., ports, hubs, city zones), and operations (e.g., task assignment, routing, scheduling). Each agent must act with its own logic and constraints (time windows, capacity, bundle requirements, etc.).

Inspired by open-source tools such as MABLE, FleetPy, or MaaSIm, the intern will first study how such tools handle agent logic and decision structures. Then, they will build their own simulator focused on extensibility, realism, and interfacing with optimization algorithms (e.g., MILP solvers, reinforcement learning agents). This includes the ability to:

- Generate structured decision instances from the simulation (bidding, scheduling, dispatch)
- Accept allocation decisions from an external solver or API
- Reintegrate these decisions into the simulated environment dynamically

The final simulator should support different market layers (e.g., long-haul shipping vs. last-mile delivery) and enable experimentation with optimization logic across the supply chain.

Required Skills


Competences:

- Strong Python programming
- Understanding of transport systems, logistics, or supply chains
- Interest in simulation, agent-based modeling, or optimization
- Familiarity with structured data formats (JSON, CSV)

Experience with simulation tools (Mesa, SimPy), solver APIs, and ML frameworks could be an advantage

General Information

- **Research Theme :** Optimization, machine learning and statistical methods
- **Locality :** Villeneuve d'Ascq
- **Level :** Master
- **Period :** 1st February 2026 -> 30th April 2026 (3 months)

 *These are approximative dates. Please contact the training supervisor to know the precise period.*

- **Deadline to apply :** 1st July 2025 (midnight)

Contacts

- **Training Supervisor :** Luce Brotcorne / Luce.Brotcorne@inria.fr
- **Second Training Supervisor :** Wolf Nathalia / nathalia.wolf@inria.fr
- **Team Manager :** Luce Brotcorne / Luce.Brotcorne@inria.fr

More information

- **Inria Team :** INOCS
- **Inria Center :** Centre Inria de l'Université de Lille