

Advanced Course on Sustainable Optimization

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Presentation. The sustainable managements of energies, of biodiversity, of exhaustible resources, etc. share common features. They are optimization problems for systems which display nonlinear complex dynamics, multiple objectives and actors, and radical sources of uncertainty. In this course, we present a framework – concepts, models, mathematical and numerical methods – allowing to formalize and to tackle such issues. First, compact models are presented, together with practical computer works. Then, guidelines to attack complex large-size problems are detailed.

Key Words. optimality, constraints, uncertainty, sustainability.

Mathematical Modelling, Sustainability and Management of Natural Resources [course]

1. Control of Deterministic Dynamical Systems

Sequential Decision Models [course]

Equilibrium and Stability [course]

[computer session] *Equilibria and Stability in the Management of a Renewable Resource*

Viable Sequential Decisions [course]

[computer session] *Viable Harvesting of a Renewable Resource*

Optimal Sequential Decisions [course]

[computer session] Management of a Renewable Resource. Deterministic and Robust Cases

[computer session] Dam Optimal and Viable Deterministic Management

2. Adaptive Control of Uncertain Dynamical Systems

Sequential Decision Models under Uncertainty [course]

Robust and Stochastic Viable Control [course]

[computer session] *Dam Viable Management under Uncertainty*

Robust and Stochastic Optimal Control [course]

[computer session] *Dam Optimal Management under Uncertainty*

3. Tackling the Complexity of Large-Size Dynamical Uncertain Problems

- Index strategies
- Decomposition-coordination methods
- Evaluation of strategies by simulation