

# International Workshop on System Science & System Analysis

GBPUA&T, Pantnagar

(24-26 February, 2025)

## Rationale

There is hardly any scientific discussion today where the words: “system”, “driver”, “complexity”, or “fore-casting, fore-warning, fore-sight” do not appear. All these words come from Systems Science – but what do they really mean? Behind these words lies the main goal of science: to understand. The centre thing to be understood is a system. How does it work? How to understand its behavior? How to anticipate its response to change? Systems analysis is a powerful approach to start addressing such questions.

## Goal and objectives of the Workshop

The goal of the Workshop is to enable participants to use the concepts generated by Systems Science in their own research, so that they can effectively use these concepts to guide their research, be it experimental, survey-based, or data-mining based. Specifically the objectives of the Workshop are:

- To impart the participants about the concepts of Systems Science and discuss them in the context of their own field of investigation.
- To empower the participants with these concepts, enabling them to use them as tools in their own work. This includes building models for the systems participants introduce during open discussions.
- To address the challenges of Systems Science, with a specific emphasis on system definition (boundaries, components, and time characteristics), driving functions, distinguishing between complication and complexity, and evaluating model performance (e.g., simulation and model validation).

## Venue, Audience, and Format of the Workshop

- The workshop will take place in the Conference Hall of College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar, during February 24- 26, 2025 (three full days).
- There is no registration fee for faculty members or students.
- The anticipated audience includes faculty and PG students (Masters and PhD students) of GBPUA&T.
- **Meeting format:** A flexible structure combining lectures followed by discussions and practical group work.
- **Disciplinary fields:** The workshop is open to all scientific disciplines.

## Contents of the Workshop

The final content of the workshop will be determined by the participants themselves to ensure it best meets their needs. The following topics are suggested:

**Lectures:** Formal lectures will be followed by discussions, and PDFs of the lectures will be provided to participants. Topics will include:

- What is a system? What is a process? What are time characteristics and time constants?
- What is a simulation model?
- Why is a simulation model primarily intended to understand phenomena?
- What is the purpose of systems analysis, and in which scientific fields has it been used?
- Why is Systems Science more essential today than ever, across all fields of investigation?
- The fundamental components of systems and models: state variables, processes and flows, parameters, and driving functions.
- Examples of model building in epidemiology, economics, and sociology.
- Examples of simulations.
- Model evaluation: addressing the challenges of model "validation".

**Discussions:** All the above topics will be open for round-table debates among participants and organizers. Discussions will incorporate perspectives from different scientific disciplines.

**Practical Sessions:** Participants are encouraged to attend the workshop with their own research topics in mind. These will be discussed and used as a basis for practical model design.

### Resource Persons:

#### Serge Savary

Serge Savary is an Honorary Professor at GBPUA&T and an Adjunct Professor at IARI. He served as Editor-in-Chief of *Food Security* (the journal of the International Society for Plant Pathology) for four years, overseeing over 3,000 manuscripts across fields such as economics, nutrition, agriculture, poverty, sociology, and value chains. Trained as a field epidemiologist of plant diseases, he will draw on his editorial expertise to guide classes and discussions.

#### Laetitia Willocquet

Laetitia Willocquet is a Senior Scientist at INRAe, France, and an Honorary Professor at GBPUA&T's Department of Climatology, where she teaches regularly. Her expertise spans plant disease epidemiology, crop modeling, and crop loss assessment. She also holds a partial appointment at the University of Toulouse – Mirail, in the Department of Sociology.

Dr. Kiran P. Raverkar  
Dean, PGS

Dr. Ajeet Singh Nain  
Director Research