

Design Document for the PhD Program in “System Dynamics”

XLI Cycle

University of Palermo

(Reference AVA 3 D.PHD.1)

Brief Description of the Reflections and Stages Leading to the Establishment of the PhD Program

The PhD program in “System Dynamics” represents the evolution of the doctoral program in “Model Based Public Planning, Policy Design & Management” – corresponding to the current curriculum “Models for Improving Performance in the Public Sector” – originally accredited in 2007 and subsequently enriched through a dual-degree collaboration with Universidad Jorge Tadeo Lozano in Bogotá.

The educational collaboration with the University of Bergen – with which Prof. Carmine Bianchi, the initial coordinator of the PhD Program, maintained a fruitful relationship since 1994 – and subsequently with Radboud University Nijmegen (Netherlands), provided the foundations for the innovative idea underlying the PhD Program: integrating System Dynamics with methodologies for the quantitative determination of managerial performance from a forecasting, concurrent control, and ex-post evaluation perspective, adopted both in academia and in the practice of public and private organizations.

This systemic methodology supports stronger coordination among institutions and public decision-makers and between these and private institutions (e.g., companies, sports organizations, non-profit associations, families) through the formulation and implementation of policies derived from a shared vision of the causal structure underlying the problems to be addressed. Such coordination also implies the pursuit of greater capacity for implementing public policies and evaluating their impact. Therefore, this coordination is intended both in a “vertical” and “horizontal” sense, aimed at overcoming distortive barriers of various kinds (political, administrative, regulatory, linguistic, cultural, and professional).

On these cultural and methodological foundations, the first curriculum of the PhD Program – now called “Models for Improving Performance in the Public Sector” – was established, with the objective of applying the above-described methodology to foster a learning-oriented approach in public sector performance management and governance for the design and implementation of sustainable policies.

The introduction of a second curriculum – called “Dynamics of Legal-Social Systems” – stemmed from the idea, widely discussed in international scholarship, of analyzing and studying legal flows, namely the circulation of legal and social models.

It is well known that the construction of legal norms is based on logic, at least according to the so-called Western Legal Tradition; however, “interpretive emotion intervenes in strict legal logic, individual experience infiltrates the reading of normative logic, so that if the ‘method’ is convenient in daily

repetition, it is 'perception that gives us the right solution' (Brian) and allows us to grasp subtle differences, giving meaning to the concepts of human responsibility and freedom of action."

Thus, it can be observed that the legal system does not represent what the reality of other social systems actually is, but rather what is perceived and, by acting upon it, creates the effectiveness of interaction (Heisenberg); therefore, one speaks of open systems and their interaction according to the rules of expanded general systems theory. Closed systems present mechanisms based on general principles deriving from retroactive logic. Within the internal dynamics of the system, a dynamic interaction of processes intervenes in the realization of order. The difficulty lies not so much in regulating the individual system as in understanding system dynamics. If we add the problems arising from the management of emotions as a further model of adaptability, the picture becomes even more complex. Finding the laws governing the different levels of social organization and intervening upon them therefore becomes extremely complex, considering that the legal system is itself already a complex and open system that must intervene in process dynamics among social systems.

Starting from the current XXXIX cycle, the PhD Program has also been enriched by a third curriculum, "Dynamics of Historical, Economic and Social Systems," specifically focused on studying the theory of the circulation of historical, economic and social systems (including political aspects), assessing whether system dynamics techniques may be employed. Consequently, the curriculum "Dynamics of Legal-Social Systems" was renamed "Dynamics of Legal Systems."

Since September 2022, the program has also benefited from collaboration with the University of Baltimore (USA), particularly thanks to the relationship with Roger Hartley, Dean of the College of Public Affairs, where some doctoral students may carry out part of their dissertation work, experimenting with the Dynamic Performance Governance approach in comparative perspective with Palermo and directly in several neighborhoods of Baltimore, in collaboration with the Baltimore Neighborhood Indicators Alliance.

Over the years, numerous doctoral students and PhD graduates have conducted field research and/or other forms of institutionalized collaboration thanks to significant and continuous relationships with internationally prestigious universities and research institutions, such as the School of Government at the University of North Carolina at Chapel Hill and the University of Pittsburgh (USA).

Reference AVA 3: D.PHD.1.1

The PhD program in "System Dynamics" is based on an integrated multidisciplinary approach. This approach aims to develop research-intervention skills enabling students to acquire an interpretative framework for understanding the relationships between observable dynamics in different social systems and the causal structures underlying them.

This interpretative framework is centered on the use of a methodology called "System Dynamics." This methodology enables students to acquire analytical and diagnostic skills suitable for supporting communication processes, learning, alignment and improvement of mental models, and the adoption of regulatory systems, rules, and decision-making tools capable of leading to the formulation of "sustainable" policies over time and space. In other words, policies that improve results not only in the short term but also in the long term, while ensuring compatibility with outcomes connected to other related problematic areas.

The strategic learning process constitutes the key through which the System Dynamics approach offers concrete advantages for the evolution of knowledge and applied practices from an interdisciplinary perspective. Within the PhD Program, this process has been articulated into three distinct curricula:

- Models for Improving Performance in the Public Sector
- Dynamics of Legal Systems
- Dynamics of Historical, Economic and Social Systems

The curriculum “Models for Improving Performance in the Public Sector” focuses on the application of the System Dynamics methodology to foster a learning-oriented approach in public sector performance management and governance for the design and implementation of sustainable policies.

The program is conducted entirely in English.

By attending the program, doctoral students will learn how modeling the dynamics of complex systems (e.g., corporate, inter-organizational systems, etc.) can support collaborative governance, address “wicked” social issues, and pursue sustainable outcomes for the community.

“Wicked” social problems characterize most governmental planning, with specific concern for social issues. These are complex political problems characterized by high risk and uncertainty and by a high degree of interdependence among the variables involved. Such problems cannot be confined within the boundaries of a single organization or referred to specific administrative levels or ministerial areas. They are characterized by dynamic complexity involving multi-level, multi-actor, and multi-sector challenges.

Examples include traffic congestion, aging societies, unemployment, youth disengagement, education, social cohesion, domestic violence, child abuse, crime, corruption, terrorism, poverty, refugee migration flows, homelessness, climate change, and natural disasters.

The main purpose of the curriculum “Dynamics of Legal Systems” is to seek a new explanation for the theory of the circulation of legal systems, assessing whether system dynamics techniques can be used.

System Dynamics constitutes an approach to understanding the behavior of complex systems over time. It deals with feedback loops and delays that affect the behavior of the entire system. The basis of the method is the recognition that the structure of every system is often as important in determining its behavior as the individual components themselves. The analysis of dynamics in the circulation of models should lead to explanatory flow diagrams of the circulation itself and of the success of one model over another, beyond obsolete explanations based on “prestige” or presumed “economic efficiency” of the model itself.

At the same time, this approach will serve as a way to validate classifications and taxonomies in general, the theory of legal formants, the circulation of legal flows, and the transplantation of systems, also in light of the exportation of legal models within legal development cooperation programs. It will also contribute to reconstructing, at both macro-comparative and micro-comparative levels, the evolution of the principal contemporary legal and social systems in light of the principles of Systematics.

The main purpose of the curriculum “Dynamics of Historical, Economic and Social Systems” is to seek a new explanation for the theory of the circulation of historical, economic and social systems (including political aspects), assessing whether system dynamics techniques can be employed.

In particular, the program aims to deepen the study of the dynamics and socio-economic varieties of capitalism from a historical perspective, also through the use of case studies and international comparisons.

Examples of possible research projects include: varieties of capitalism; welfare and labor market systems; theories of economic growth; national and international economic institutions; integration and globalization processes of markets.

Furthermore, the program aims to train researchers capable of analyzing processes of change based on close integration between sociological theories and empirical research, acquiring both theoretical-conceptual preparation and mastery of the principal methodologies and techniques of social research, both standard and non-standard.

Depending on the curriculum, the proposed PhD Program is mainly oriented toward training experts who may:

- pursue an academic career at qualified national and international universities and research centers and participate in “think tanks”;
- pursue a career within public administrations, both Italian and foreign, such as municipalities, provinces, regions, public service companies, etc.;
- support public administration decision-makers as consultants in the analysis and evaluation of the quality and sustainability of recovery and development policies and strategies;
- work in public administration (e.g., national and local government, public services, healthcare organizations);
- work in NGOs, non-profit organizations, economic sectors, backbone organizations, and community-based organizations;
- work as executives, officers, or managers in the public and private sectors with broad international expertise enabling them to evaluate the quality and sustainability of corporate policies and strategies and implement them effectively;
- work as managers in international trade and business;
- work as executives or officials in international and European organizations.

The PhD Program will also enable students to operate in support of and/or within banks and other financial intermediary institutions, developing relevant competencies and skills.

There is also the intention to establish a PhD Alumni Association in order to strengthen the identity and sense of belonging of graduates in System Dynamics, creating a network of people and expertise to promote opportunities for discussion and collaboration.

Reference AVA 3: D.PHD.1.2

The PhD Board has formally defined a vision of the educational objectives, also in relation to the available financial, economic, and human resources, the results of which have been published on the web pages dedicated to the PhD Program.

The vision developed by the Board takes into account the educational objectives and the development and updating potential of the educational and research project of the PhD Program, with reference to the cultural and scientific evolution of the different disciplinary areas involved.

A central aspect of this educational path is the interdisciplinarity, multidisciplinary, and transdisciplinarity of the process of study, analysis, and learning of System Dynamics. The multiplicity of fields of knowledge involved therefore justified the creation of three distinct curricula – more closely aligned with the specific areas of knowledge involved from time to time – while remaining closely interconnected, both within the educational path through common training activities and in the sharing of results and/or the activation of joint research initiatives.

From this perspective, the PhD Board positively evaluated the possibility of activating interdisciplinary and inter-curricular research clusters on an annual basis, with the aim of achieving innovative scientific results.

Reference AVA 3: D.PHD.1.3

The training activities (both collective and individual) proposed for doctoral students are consistent with the educational objectives of the PhD Program and with the expected cultural and professional profiles. The training activities are balanced between highly specialized topics related to the research project and more general aspects aimed at filling educational gaps through multidisciplinary, transdisciplinary, and interdisciplinary elements.

The training program also includes language enhancement activities and training aimed at the dissemination and communication of research activities.

The planned teaching activities – intended for students in the first two years – consist of at least 20 hours of lectures for each curriculum.

Curriculum: Models for Improving Performance in the Public Sector

- **Dynamic Performance Management**

The course aims at learning the basic principles of the Dynamic Performance Management method. The course is entirely taught in English.

- **Dynamic Performance Management for Public Sector Organizations**

The course aims at learning and applying the Dynamic Performance Management method to public organizations. The course is entirely taught in English.

- **Dynamic Performance Governance**

The course aims at learning the principles and implementation techniques of Dynamic Performance Governance. The course is entirely taught in English.

- **Fundamentals of Dynamic Social Systems**

The course aims at learning the basic principles of the System Dynamics methodology. The course is entirely taught in English.

- **Model-based Analysis and Policy Design**

The course aims at learning quantitative modeling for scenario simulation in public policy analysis. The course is entirely taught in English.

- **System Dynamics Modelling Process**

The course aims at learning advanced quantitative modeling techniques supported by the System Dynamics methodology. The course is entirely taught in English.

Curriculum: Dynamics of Legal Systems

- **General Systems Theory**

The course aims to enable students to acquire the foundations of the System Dynamics method and analytical-diagnostic skills capable of supporting communication, learning, alignment and improvement of mental models, and the adoption of regulatory systems and decision-making tools leading to sustainable policies. The course includes teaching activities in both Italian and English.

- **Legal-Social Systemology**

The course aims to provide mastery of the foundations of systemology and its applications to the production and management of social realities and related normative aspects. The course includes teaching activities in both Italian and English.

- **Methodology of Legal-Social Comparison**

The course aims to provide students with mastery of comparative methodologies applied to legal and social phenomena, together with the methodologies of System Dynamics and the circulation of models, including through the study of their hybridization. The course includes teaching activities in both Italian and English.

Curriculum: Dynamics of Historical, Economic and Social Systems

- **Contemporary Economic Issues in Historical Perspective**

The course addresses topics relevant to understanding contemporary economic scenarios using a historical-economic perspective.

- **The Legacy of Keynes and Schumpeter; the History of Welfare States and the Varieties of Capitalism**

The course consists of a cycle of seminars dedicated to major issues in twentieth-century economic history.

- **Dynamic Social Systems**

The social track aims to train researchers capable of analyzing processes of change through close integration between sociological theories and empirical research.

Additional Educational Activities

Winter School: “Ethics of Research in the Humanities”

As part of the educational activities common to the three curricula, a Winter School on “Ethics of Research in the Humanities” will be organized, with the objective of developing in doctoral students a critical and responsible approach to research, including through the use of new technologies while respecting scientific integrity and intellectual property.

The Winter School will take place over two weeks during February/March 2026, for a total of 30 hours of lectures in Italian and English, delivered by distinguished Italian and international scholars and experts.

Sustainability Seminars

In line with the objectives outlined by the United Nations Agenda 2030, scientific reflection will be promoted on the relationship between sustainable development, the environment, and human rights through “The Sustainability Days,” a cycle of seminars dedicated to sustainability-related issues from different scientific perspectives.

These seminars will take place from March to October 2026 for a total of 30 hours.

Seminars

Meetings with Italian and foreign scholars will deepen the themes of the PhD Program, with particular reference to System Dynamics theory, methodologies and systemology of political-legal-social models, and issues related to comparison and circulation of models.

Language Enhancement Courses

Language enhancement courses will be organized for students requiring support in English, with particular reference to technical terminology and contextual vocabulary.

The calendar of teaching and seminar activities is published on the PhD website at the beginning of the academic year and is constantly updated.

Doctoral students are also encouraged to participate in national and international seminars, conferences, and conventions as speakers and discussants and to publish their contributions and preliminary research results, preferably in Class A journals and collective works promoted by scholars of recognized national and international reputation.

The PhD series published by Unipa Press has also been relaunched in order to disseminate research results and promote interdisciplinary reflection.

Doctoral students are required to complete training activities corresponding to 60 ECTS credits per year, for a total of 180 ECTS credits over the three-year period.

Reference AVA 3: D.PHD.1.4

One of the most significant distinctive features of the educational project in System Dynamics is the interdisciplinarity, multidisciplinary, and transdisciplinarity of the process of studying, analyzing, and learning System Dynamics.

Common to the different curricula is the objective of training scholars capable of responding to systemic and global problems that cannot be addressed through sectoral, mono-disciplinary, and static approaches.

Among these problems, a special role is occupied by the so-called “wicked problems,” namely multifaceted issues evolving over time and space that pose unprecedented challenges to society and its institutions.

Examples include migration flows, terrorism, globalization of markets, aging populations, crime prevention and control, quality of life in metropolitan and suburban areas, health and sport, pollution, natural disasters, and social marginalization.

Traditional interpretative models, regulations, and decision-making tools have proven obsolete in addressing such challenges. Therefore, an integrated and multidisciplinary approach is necessary, reflected within the PhD Program both within each curriculum and at the inter-curricular level.

Reference AVA 3: D.PHD.1.5

The educational and research project of the PhD Program is given adequate visibility on the dedicated website pages, where the curricula of faculty members, program organization, and services available to doctoral students are also published.

Website: <https://www.unipa.it/dipartimenti/dems/dottorati/dinamicadeisistemi/>

Reference AVA 3: D.PHD.1.6

The PhD Program pursues objectives of mobility and internationalization.

It is part of a consortium with Hanoi University, Vietnam.

Prof. Isaac Dyner Rezonzew of Universidad Jorge Tadeo Lozano in Bogotá is a member of the PhD faculty board.

Students are required to undertake research periods abroad at renowned international research institutions such as the Institute of Advanced Legal Studies (London), Jesus College Cambridge, the Swiss Institute of Comparative Law (Lausanne), the London School of Economics and Political Science, and the Max Planck Institute (Munich).

The research stay abroad generally takes place during the second year and lasts on average six months (minimum three months – maximum twelve months).

Annex 1

Credit Allocation Table

Type of Activity	Credits Awarded
Attendance at schools (summer/winter/ courses)	1 credit every 6 hours (national); 1 credit every 4 hours (international)
Participation in conferences/study days/ congresses	1 credit every 6 hours (national); 1 credit every 4 hours (international)
Participation in organizing committees	3 credits
Attendance at planned teaching activities	1 credit every 6 hours
University seminar activities	1 credit every 6 hours
Extra-university seminar activities	1 credit every 6 hours
Research periods at research institutions/ companies	0.5 credits per day (national); 0.7 credits per day (abroad)
Participation in national and international research projects	15 credits (national projects); 25 credits (international projects)
Teaching activities in UNIPA courses	1 credit every 2 hours
Teaching activities in external courses	1 credit every 2 hours
Tutoring activities	1 credit every 6 hours
Journal article	15 credits (scientific journal); 25 credits (Class A or indexed international journal)
Monograph	40 credits (Italian); 60 credits (English)
Conference presentations	5 credits (national); 7 credits (international)
Language courses	A2 = 1 credit; B1 = 2 credits; B2 = 3 credits; C1 = 4 credits; C2 = 5 credits
Annual research activity approved by the Faculty Board	25 credits
Drafting of the doctoral dissertation	30 credits (+20 if written in English)