

Design Document for the PhD Program in “System Dynamics”

XL Cycle

University of Palermo

(Reference AVA 3 D.PHD.1)

Brief description of the reflections and phases that led 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: to integrate system dynamics with methodologies for the quantitative determination of managerial results from a forecasting, concurrent control, and ex-post evaluation perspective, adopted both in academia and in public and private organizations.

This systemic methodology supports stronger coordination among institutions and public decision-makers and between these and private institutions (e.g., businesses, 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 entails the pursuit of greater capacity for implementing public policies and evaluating their impact. This coordination is therefore understood in both 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 promote 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 widely shared idea 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 founded 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 useful 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 relationships with Roger Hartley, Dean of the College of Public Affairs, where some doctoral students can 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 various types of 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, and that ensure problem-solving remains compatible 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 and, within the PhD Program, has been organized 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 a 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 of such problems 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 the creation of explanatory flow diagrams of the circulation itself and of the success of one model rather than another, beyond obsolete explanations based on “prestige” or presumed “economic efficiency” of the model itself.

At the same time, it 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, and to reconstruct, both at the 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. 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 the success of one model over another, beyond obsolete explanations based on “prestige” or presumed “economic efficiency.”

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 an association of PhD Alumni in order to enhance the identity and sense of belonging of PhD graduates in System Dynamics, creating a network of people and expertise to promote opportunities for meeting and exchange.

Reference AVA 3: D.PHD.1.2

The Board of the PhD Program 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, as highlighted above (D.PHD.1.1), with reference to the cultural and scientific evolution of the different 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 possible activation of joint research initiatives.

From this perspective, the PhD Board positively evaluated the possibility of activating interdisciplinary (and possibly inter-curricular) research “clusters” from year to year, 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 specific 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/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. These teaching activities differ from the educational offerings addressed to undergraduate and master’s degree students, both in content and in innovative methodologies for teaching and research.

More specifically, the curriculum “Models for Improving Performance in the Public Sector” includes the following planned teaching activities:

- **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 (first year).
- **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.

For the curriculum “Dynamics of Legal Systems,” the following planned teaching activities are provided:

- **General Systems Theory:** The course aims to enable students to acquire the foundations of the system dynamics method and, in particular, analytical and diagnostic skills capable of supporting communication, learning, alignment and improvement of mental models, and the adoption of normative systems, rules, and decision-making tools capable of leading to the formulation of “sustainable” policies over time and space. 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 phenomena of production and management of social realities and the normative aspects functional to them. The course includes teaching activities in both Italian and English.
- **Methodology of Legal-Social Comparison:** The course aims to provide students with full mastery of the comparative method applied to legal and social phenomena, together with the methodology 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.

For the curriculum “Dynamics of Historical, Economic and Social Systems,” the following planned teaching activities are provided:

- **Contemporary Economic Issues in Historical Perspective:** The course addresses topics relevant to understanding contemporary economic scenarios using a historical-economic perspective. The main topics concern: 1. the functioning of national and international institutions, with particular attention to central banks; 2. the principal changes underway in defining economic and monetary policy strategies and tools; 3. the analysis of the causes of growing inequalities among and within countries and the debate on economic policy interventions to address this emergency. The aim of the course is to provide suitable tools for developing innovative research projects on the analysis of systemic determinants influencing the international economy. The course includes teaching activities in both Italian and English.
- **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 useful for strengthening understanding of contemporary economic scenarios. The main topics concern: 1. Public intervention under conditions of uncertainty: the relevance of Keynes; 2. Endogenous growth and innovation: the relevance of Schumpeter; 3. Varieties of capitalism from a historical perspective: models of public intervention and economic growth; 4. Welfare and growth: lessons from twentieth-century history. The aim of the seminar cycle is to provide suitable tools for developing innovative research projects on the analysis of systemic determinants influencing the international economy. The course includes teaching activities in both Italian and English.

- **Dynamic Social Systems:** The social track 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.

The main areas will concern topics with significant implications for emerging social problems at transnational, national, and local levels. The course includes teaching activities in both Italian and English.

The educational offering of the PhD Program also includes, based on annual planning:

- **Seminars** Meetings with Italian and foreign scholars for in-depth study of PhD topics, with particular reference to system dynamics theory, the methodology and systemology of political-legal-social models, as well as issues concerning comparison and circulation of the models themselves. The seminars favor an interdisciplinary approach to system dynamics through the participation of scholars from different cultural and disciplinary backgrounds.
- **Language Enhancement Courses** Language enhancement courses for students needing support in English, with particular reference to contextual vocabulary and technical terminology. In particular, these courses, making use of university facilities, aim to provide interested students with the tools necessary for participation and research activities.

The schedule of teaching and seminar activities is published on the PhD website at the beginning of the academic year and is constantly updated in relation to events scheduled during the academic year.

Doctoral students are also constantly encouraged to participate in national and international seminars, conferences, and conventions as speakers and/or discussants; they are also encouraged to publish their contributions to these activities and the preliminary results of their research activities, with preference given to journals ranked in "Class A" and contributions to collective works promoted by scholars of recognized national and international reputation, favoring – where possible – dissemination of research outputs in line with the university's open access policy.

Doctoral students must carry out training activities – including planned teaching activities, seminar and laboratory activities, research activities and publication of research results, as well as supplementary teaching activities (up to 40 hours annually) – in order to obtain 60 CFU per year, for a total of 180 CFU over the three-year period.

CFU credits will be assigned according to the Credit Allocation Table in Annex 1.

It should be noted that the doctoral student selection procedures specified in the admission calls are consistent with the educational objectives of the PhD Program and with the expected cultural and professional profiles.

There is also a commitment to implementing orientation activities aimed at students in the final year of Master's degree programs in order to encourage participation in PhD admission calls.

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; problems that do not lend themselves to a sectoral, mono-disciplinary, and static approach.

Among these problems, a special role is occupied by what the literature defines as “wicked problems,” namely multifaceted issues evolving over time and space that – especially today – pose unprecedented challenges to society and its institutions. Examples include: regulation of migration flows, terrorism, globalization of markets, population aging, crime prevention and control, improvement of quality of life in metropolitan urban areas and suburbs, health and sport, pollution, natural disasters, and social marginalization. Particularly over the last decade, the dynamics generated by this “family” of problems have demonstrated the unpredictability of phenomena to which a plurality of decision-makers operating in different institutions are called upon to respond. In this context, traditional interpretative models, regulations, processes, and decision-making tools have proven obsolete.

Such approaches to governance and decision-making tend to be characterized by a static perspective (i.e., one that does not consider the role of the “time” variable and the trade-offs deriving from it), a sectoral perspective (i.e., mono-disciplinary), and an atomistic perspective (i.e., one that fragments governance within the sole framework of policies and decisions formulated within individual institutions or components thereof, thereby losing sight of the perspective of the system underlying the problems themselves). This situation makes an integrated and multidisciplinary approach 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 ensured adequate visibility on the dedicated website pages, where the curricula of the members of the PhD Board, the organization of the program, and the services available to doctoral students are also published in dedicated sections.

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: Institute of Advanced Legal Studies (London); Jesus College, Cambridge; Swiss Institute of Comparative Law (Lausanne); London School of Economics and Political Science (London); Max Planck Institute (Munich).

The research stay abroad generally takes place during the second year and lasts on average 6 months (minimum 3 months – maximum 12 months).

Annex 1

Credit Allocation Table

Type of Activity	Credits Awarded	Required Certification
Attendance at schools (summer/winter/courses)	1 credit every 6 hours (national) / 0.5 every 3 hours; 1 credit every 4 hours (international) / 0.5 every 2 hours	Certificate of attendance
Participation in conferences/study days/congresses	1 credit every 6 hours (national) / 0.5 every 3 hours; 1 credit every 4 hours (international) / 0.5 every 2 hours	Certificate of participation
Participation in organizing committees	3 credits	
Attendance at planned teaching lessons	1 credit every 6 hours / 0.5 every 3 hours	Attendance register
University seminar activities	1 credit every 6 hours / 0.5 every 3 hours	Declaration from the responsible lecturer
Extra-university seminar activities	1 credit every 6 hours / 0.5 every 3 hours	Certificate of participation endorsed by the tutor
Research periods at other research institutions/companies/institutions	0.5 per day (national); 0.7 per day (abroad)	Certification from the host institution
Participation in national and international research projects (e.g., PRIN/Horizon)	15 credits for national projects; 25 credits for international projects	Certification

Type of Activity	Credits Awarded	Required Certification
Teaching activities in UNIPA courses	1 credit every 2 hours (including lesson preparation) up to a maximum of 40 hours per year; 1 credit every 6 hours of examinations; 3 credits for supervision of master's theses; 1 credit every 6 hours of student tutoring and final exam assistance	Documentation certifying teaching activity
Teaching activities in external courses	1 credit every 2 hours (including lesson preparation) up to a maximum of 40 hours per year	Documentation certifying teaching activity
Tutoring activities	1 credit every 6 hours	Certification
Journal contributions	Article: 15 credits (scientific journal); 25 credits (Class A or international journal indexed in ISI or Scopus). Case note: 10 credits (scientific journal); 15 credits (Class A or international journal indexed in ISI or Scopus). Review in journal: 2 credits (scientific journal); 4 credits (Class A or international journal indexed in ISI or Scopus). Abstract in conference proceedings published in a journal: 5 credits (scientific journal); 7 credits (Class A or international journal indexed in ISI or Scopus). Contribution in conference proceedings published in a journal: 10 credits (scientific journal); 15 credits (Class A or international journal indexed in ISI or Scopus). Poster published in journal: 5 credits (scientific journal); 7 credits (Class A or international journal indexed in ISI or Scopus). Abstract in journal: 3 credits (scientific journal); 5 credits (Class A or international journal indexed in ISI or Scopus)	Reprint or acceptance letter
Contributions in volumes	Chapter or essay: 15 credits. Preface/postface: 7 credits. Short introduction: 7 credits. Entry in dictionary or encyclopedia: 15 credits. Review in volume: 2 credits. Contribution in conference proceedings published in volume: 15 credits	Reprint or acceptance letter
Abstract in conference proceedings published in volume	5 credits	
Poster published in volume	5 credits	
Monograph	40 credits (in Italian); 60 credits (in English)	

Type of Activity	Credits Awarded	Required Certification
Presentations at conferences, congresses, seminars, and study days	5 credits (national); 7 credits (international)	Conference program
Language courses (including Italian language courses for foreign doctoral students)	A2 – 1 credit; B1 – 2 credits; B2 – 3 credits; C1 – 4 credits; C2 – 5 credits	Language certification
Research activity – included in the annual report – approved by the Faculty Board for progression to the following year	25 credits	
Drafting of the doctoral dissertation	30 credits (+20 if written in English)	