



**PhD IN
APPLIED DATA SCIENCE AND ARTIFICIAL INTELLIGENCE
OVERVIEW**

IN BRIEF	
Lines of research	CURRICULUM: Industry 4.0, Smart Cities, Smart Transportation, and Natural Sciences <ol style="list-style-type: none">1 Foundations of machine learning and artificial intelligence. Neuro-symbolic computing and explainable artificial intelligence2 Reinforcement Learning and control for Cyber-Physical Systems and industry 4.03 Machine learning and statistical inference in natural sciences4 HPC methods and algorithms for simulation and (big-) data analysis in physics5 Computer vision and control for smart manufacturing, industry 4.0 and natural sciences6 Mathematical, heuristic and evolutionary optimisation and applications to smart cities and smart transportation7 Big data management and curation and HPC-based artificial intelligence
	CURRICULUM: Medicine, Life Sciences, and Environment <ol style="list-style-type: none">1 Causal Inference methods from Observational Data in epidemiological research.2 Machine Learning for Healthcare: interpretability, explainability and transparency issues.3 Deriving Biomedical Knowledge from EHR (Electronic Health Records)4 Artificial Intelligence and Computer Vision for estimating biodiversity indexes: challenges and opportunities5 Aggregation of biodiversity data: standouts and protocols
	CURRICULUM: Economy and society <ol style="list-style-type: none">1 Statistical and computational methods in social sciences2 Statistical and computational methods in economics and finance3 Artificial intelligence in government and its potential applications from a public policy perspective4 Artificial intelligence and social media5 Artificial intelligence for disaster response6 Network analysis: methods and applications7 Public engagement activities and their impact on participants' attitudes towards artificial intelligence
Administrative location	University of Trieste
Organizing Department	Department of Mathematics and Geosciences
Participating Departments	Department of Medicine, Surgery and Health Sciences Department of Physics Department of Engineering and Architecture

[Department of Economic, Business, Mathematical and Statistical Sciences](#)

[Department of Political and Social Sciences](#)

[Department of Life Sciences](#)

Duration	3 years
Attendance abroad that entitles to a scholarship increase - min. max. of months for each PhD student (over 3 years)	0 - 18
Official language	English
Subject Areas (in alphabetical code order)	01 MATHEMATICS AND INFORMATICS 02 PHYSICS 05 BIOLOGY 06 MEDICINE 09 INDUSTRIAL AND INFORMATION ENGINEERING 13 ECONOMICS AND STATISTICS 14 POLITICAL AND SOCIAL SCIENCES
Macro Research Fields (in alphabetical code order)	01/A MATHEMATICS 01/B INFORMATICS 02/B PHYSICS OF MATTER 02/C ASTRONOMY, ASTROPHYSICS, EARTH AND PLANETARY PHYSICS 05/A PLANT BIOLOGY 06/M PUBLIC HEALTH 09/G SYSTEMS ENGINEERING AND BIOENGINEERING 09/H COMPUTER ENGINEERING 13/D STATISTICS AND MATHEMATICAL METHODS FOR DECISIONS 14/C SOCIOLOGY
Scientific Disciplinary Sectors (in alphabetical code order)	BIO/02 SYSTEMATIC BOTANY FIS/03 PHYSICS OF MATTER FIS/05 ASTRONOMY AND ASTROPHYSICS INF/01 INFORMATICS ING-INF/04 SYSTEMS AND CONTROL ENGINEERING ING-INF/05 INFORMATION PROCESSING SYSTEMS ING-INF/06 ELECTRONIC AND INFORMATICS BIOENGINEERING MAT/06 PROBABILITY AND STATISTICS MAT/09 OPERATIONS RESEARCH MED/01 MEDICAL STATISTICS SECS-S/01 STATISTICS SECS-S/05 SOCIAL STATISTICS SPS/07 GENERAL SOCIOLOGY
Domain European Research Council	PE PHYSICAL SCIENCES AND ENGINEERING LS LIFE SCIENCES SH SOCIAL SCIENCES AND HUMANITIES
ERC Panels	PE1 MATHEMATICS PE6 COMPUTER SCIENCE AND INFORMATICS

LS2	INTEGRATIVE BIOLOGY: FROM GENES AND GENOMES TO SYSTEMS
SH2	INSTITUTIONS, GOVERNANCE AND LEGAL SYSTEMS

WHO'S WHO

Chair	Prof. Francesco Pauli – Department of Economic, Business, Mathematical and Statistical Sciences - University of Trieste - phone 040 558 2518; email francesco.pauli@deams.units.it
Vice	Prof. Luca Bortolussi – Department of Mathematics and Geosciences – University of Trieste - phone 040 558.2630; email lbortolussi@units.it
PhD Academic Board	List of members
Web site	http://adsai.units.it/
Email	dottorato.adsai@units.it

Course description and objectives	<p>The doctorate trains researchers with in-depth scientific preparation in the methodological basis of data science and artificial intelligence (computer science, mathematics, statistics) and its implications in various application domains. The application areas it is focused on are: medicine and life sciences, industry 4.0, society and economy, data driven science, with attention to the effects on the territory.</p> <p>The teaching plan focuses in the first year on the foundations and applications of data science and AI, including some ethical and legal aspects, but also comprise courses on organizational aspects of research and analysis of the state of the art. PhD students will be made aware of the principles of research reproducibility and FAIR data. The teaching plan will be personalized on the basis of the previous study plan and the research topic pursued by the student. Scientific activity will develop in the second and third years, with a possible visiting period at research institutions of international importance.</p> <p>An essential and qualifying aspect of the training is the multidisciplinary approach from a theoretical and experimental standpoint as well as the interaction with the relevant economic sectors.</p> <p>The PhD program is aimed at training professionals in theoretical and applied research of excellent level on the international scene.</p>
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Job placement opportunities	<p>PhDs in "Applied Data Science and Artificial Intelligence" will be able to undertake an academic path of teaching and research in the core areas of the doctorate and more generally contribute with the tools of data science and artificial intelligence in all research fields where they may be relevant.</p> <p>Attention to application aspects, also in close connection with public and private subjects who operate in these fields, will make PhDs able to exploit the tools of data science and artificial intelligence in applied contexts on behalf of public or private organisms: companies, research organizations, public administrations.</p>
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Main cooperating international Universities and Research Institutions	<ol style="list-style-type: none"> 1 University of Oxford, United Kingdom 2 Saarland University, Germany 3 University of Colorado (Anschutz Medical Campus), USA 4 Universidade NOVA de Lisboa, Portugal 5 Institute for Technology Assessment and Systems Analysis/Karlsruhe Institute of Technology (ITAS/KIT), Germany
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