

PhD Program in Security, Risk and Vulnerability

Course Offerings

Cross-Curricula Courses

Academic Year 2024-25



**Università
di Genova**





Cross-Curricula Course

Offered to all Curricula

Risk Management

Title: Risk Management

Teacher: Riccardo Minciardi and the Speakers of the Thematic Lectures

Email: riccardo.minciardi@unige.it, serena.cattari@unige.it

Duration: 6 hours (theoretical part) + 9 Thematic Lectures (around 18 hours)

Credits: 5 CFU

When: End of January-March 2024

Where: in person (DIBRIS)

Exam: only the active participation to the lessons is required.

Curriculum: All curricula

Abstract: The course provides a general introduction to the various concepts regarding risk management. The various time phases relevant to risk management are considered in detail. The problems related to each phase are generally formalized as optimization problems concerning the assignment of scarce resources to tasks characterized by different level of urgency, possibly within a stochastic environment and in a dynamic setting. The course is arranged in two parts:

- A theoretical part aimed to introduce the basic concepts related to risk management
- A second part arranged in thematic lectures focusing on examples of risk management studies from various perspectives

Program of the theoretical part:

- Basic concepts related to hazard, risk and exposed elements.
- Natural risks and industrial risks.
- The various time phases of a risk management procedure: long-term planning, pre-operational planning, operational management, post-operational management, restoration. Identification of the information available and of the optimization criteria for each of such phases.
- Physical vulnerability of exposed elements. Systemic vulnerability.
- The specific case of wildfire risk management. Determination of hazard maps. Identification of the exposed elements. Long-term planning. Pre-operational resource planning based on dynamic hazard maps. Operational management (dynamic resource assignment). Post-operational phase and restoration.
- The role of uncertainty and the multi-criteria nature of the decision problems.

Course material (notes and slides) will be made available to the students.

Tentative list of thematic lectures:

From the managerial perspective

to be defined

From the engineering perspective

- ***Flood hazard assessment and management: principles, data sources, models and open questions (2 hours)***

Giorgio Boni - Full Professor (DICCA- University of Genova)

- ***Seismic risk: the management of emergency and recovery phase***

Serena Cattari - Associate Professor (DICCA- University of Genova)

- ***Risk management of industrial processes***

Bruno Fabiano - Full Professor (DICCA- University of Genova) and Tommaso Vairo (ARPA)

From the climate-change and sustainability perspective

- ***Multi-risk management in the Sub-Saharan area in Africa***

Roberto Rudari – Research Director (CIMA Research Foundation)

- ***Drought Risk management in Bolivia***

Fabio Castelli – Full Professor (University of Florence)

From the cyber-security and AI perspective

- ***Cyber-risk Management***

Alessandro Armando – Full Professor (DIBRIS – University of Genova)

- ***How to handle the risk of using AI in real world applications (1 hour)***

Luca Oneto – Associate Professor (DIBRIS - University of Genova)

From the socio perspective



- ***Risk Communication: from perception to protection***

Fabrizio Bracco – Researcher (DISFOR - University of Genova)



Cross-Curricula Course

Offered to all Curricula

**The resilience assessment of complex systems
as a multidisciplinary approach for the
prevention and disaster management**

Title: The resilience assessment of complex systems as a multidisciplinary approach for the prevention and disaster management

Teacher: Serena Cattari and the Speakers of the Thematic Lectures

Email: serena.cattari@unige.it

Duration: 3 hours (theoretical part) + 9 Thematic Lectures (around 18 hours)

Credits: 5 CFU

When: end of June - October 2024

Where: via TEAMS platforms

Exam: a literature review on the state-of-the art on resilience studies on the specific research area of the student is required. The outcomes of such literature review will be presented in a collegial seminar to be scheduled at the end of the course.

Abstract:

The aim of the course is to analyze the resilience concept from different perspectives involving various research areas and interests of applications of the multidisciplinary PhD program in “Security, Risk and Vulnerability”.

The course comprises:

- A theoretical part aimed to introduce the basic formulations, definitions, indicators and dimensions that typically characterize a “resilience study”.
- Thematic lectures focusing on examples of resilience studies from various perspectives (engineering, social, economic, law, cyber-security) and related to different hazardous events (e.g. seismic action, extreme meteorological events, cyber-attacks to mention a few). The seminars will also illustrate the types of actions that may be carried out to improve the resilience of a system in various phases, i.e.:
 - *before the disastrous event*, that is in the ordinary period in which preparedness interventions should be made in order to reduce the vulnerabilities and increase the community inclusion in the preparation process;
 - *during the disastrous event*, that is a hot period just after the occurrence of a catastrophic event, which may last for few days or even months, depending on the type of event and its intensity;
 - *after the disastrous event*, that is the period needed to recover a new ordinary period. The recovery/reconstruction period may be faster and more

effective through the adoption of appropriate solutions and the direct involvement of the community and societal stakeholders.

Program of the theoretical part:

Resilience is a broad and multidisciplinary subject and measuring it is one of the most challenging tasks due to the complexity involved in the process. In the seminar, the terminology, indicators, dimensions and metrics usually adopted in resilience studies are introduced to establish a unified framework, applicable to various research area, and introduce the concepts of “community resilience”. Various applications from available literature studies will be presented (including infrastructure networks, portfolio of buildings, strategic functions) that are the basis of life and economy of every community.

Tentative list of thematic lectures (*the titles and speakers are updated every year - The one presented is that carried out in 2021 and 2022*):

[Resilience: an engineering perspective](#)

Monte-Carlo Modelling of Tornado Losses and Resilience of Residential Homes (2021)

Djordje Romanic, Assistant Professor, McGill University, Canada

Innovative solutions to support the urban flood resilience (2021-2022)

Ilaria Gnecco, Associate Professor and Anna Palla, Researcher, DICCA

Natural slopes exposed to landslide risk: how to make them resilient? (2021-2022)

Riccardo Berardi, Associate Professor and Rossella Bovolenta, Researcher, DICCA

Modelling and quantifying tomorrow's risks from natural hazards (2022)

Carmine Galasso, Full Professor, University College of London

Natural Hazards: a Never-ending moving target (2022)

Vitor Silva, Associate Professor, University of Porto (Portugal)

[Resilience: a law perspective](#)

Unforeseeable change of circumstances and the duty to contract renegotiation (2021-2022)

Giorgio Afferni, Associate Professor (DIGI)

[Resilience: a socio-political perspective](#)

Resilience and the EU Global Strategy (2021- 2022)

Fabrizio Coticchia (DISPO)

[Resilience: a managerial perspective](#)



Organizational Resilience

Prof. Diego Campagnolo – University of Padova, Prof.ssa Martina Gianecchini – University of Padova (2021)

Rob Britton – Airlearn, Georgetown University's McDonough School of Business (2022)

Resilience: a Cyber-security perspective

Resilience of Cyber-Physical Systems (2021- 2022)

Prof. Armando Tacchella (DIBRIS)

Resilience in the Avionics and Aerospace Domains (2021- 2022)

Marco Bozzano (Fondazione Bruno Kessler, Trento, Italy)



Cross-Curricula Course

Offered to all Curricula

Dual use policies in research applications

Title: Dual Use policies in research applications

Teachers: Fabrizio Barberis

Email: fabrizio.barberis@unige.it

Duration: 8 hours

Credits 2 CFU

When: september 2025, 2 days with 4 hrs meeting

Where: TBD

CV: Cybersecurity & Reliable AI

Link:

Exam: Presentation on a sample case

Abstract:

Dual-Use items are goods, software and technologies that even being created for civilian duties could eventually be misapplied to military out-of-control applications. EU take care about the export, transit, brokering and technical assistance of Dual-Use items so that it can contribute to international peace and security and prevent the proliferation of Weapons of Mass Destruction (WMD).

Goods control is even more complex when the items are non-physical issues like software, programs and related stuff. Their control is an important issue of the regulatory framework, driving industrial productions, export and market positions.

EU stated a specific law apparatus focused not to block science but indeed to control illegal exports as well as risky or dangerous technology transfer operations. High Tech engaged Corporates as well as SMEs have to take care of these limitations. Universities and Research Centers play a very important role in this process and researchers have to be aware of their duties. Exempla will be discussed within their applications during the programmed lessons.

Program:

- The Export scenario and the EU position on Dual Use
- Dual Use goods and services: risks assessments
- Regulatory purposes
- The Eu Regulatory Framework on Dual Use Items: EC 821/2021

- Academy and Research risks related to Dual Use items
- Dual Use and non-physical assets
- The Internal Compliance Program

- Exempla and Unige activity

References:

- Australia Group, Wassenaar arrangement, MTCR, NSG.
- EC 821/2021
- BIS
- Brexit
- Dual use references distributed during the Course



Cross-Curricula Course

Offered to all Curricula

Climate change and extreme events

Title: Climate Change and Extreme Events

Teacher: Antonio Parodi, Fabio Castelli

Email: antonio.parodi@cimafoundation.org, fabio.castelli@unifi.it

Duration: 8 hours (theoretical part) + 4 hours hands-on training

Credits: 3 CFU

When: March 2024

Exam: discussion on a case study.

Curriculum: All curricula

Abstract: One of the most visible consequences of human-induced global climatic modifications is an increase in the intensity and frequency of extreme weather events. The integration between observational and modelling data is of paramount importance to gain a deeper understanding of the underlying physical processes. This course will offer an introduction to statistics of extreme events and how these can be detected from time series of limited extent. Basic principles of climate dynamics and global warming will be also provided with particular emphasis on complex interactions among components of the Earth system, on natural and human-made climate variability, as well as observations, theoretical studies, and modelling studies concerning climate change. Finally evidences of trends in extreme events and disasters in different areas of the globe, and how these can be related to global warming will be discussed.

The course is arranged in two parts:

- A theoretical part aimed to introduce the basic concepts of extreme, weather induced events and how their occurrence may be modified by climate change.
- A second 'hands-on' part where some reference datasets on the occurrences of extreme events of different kinds will be used to detect the effects of global warming on natural disasters in specific areas of the globe. Students will be required to organize the results of this part in a presentation to be discussed at the exam.

Program of the theoretical part:

- Standard statistics of extreme events under ergodicity hypothesis



- Statistics of extreme events for non-stationary processes
- Hypothesis testing and trend identification
- Basic principles of climate dynamics and its sensitivity to green-house gases
- Observational and modeling evidences of global warming
- Climate predictions and extreme events

Course material (notes and slides) will be made available to the students.

Cross-Curricula Course

Offered to all Curricula

**Strategic Choices: Games and Team
Optimization**

Title: Strategic Choices: Games and Team Optimization

Teachers: Lucia Pusillo, Marcello Sanguineti

Email: pusillo@dima.unige.it marcello.sanguineti@unige.it

Duration: 20 hours

Credits: 5 CFU

When: TBD

Where: Via Dodecaneso 35

CV: All CVs

Link:

Exam: To be agreed with the students

Abstract: Game and Team Theory study strategic interactions among two or more agents, which have to take decisions in order to optimize their objectives. They have various links to disciplines such as Economics, Engineering, Computer Science, Political and Social Sciences, Biology, and Medicine. These links provide incentives for interdisciplinary research and make the role of Game and Team Theory invaluable in a variety of applications. The main goal of this course consists in providing students with the basic mathematical tools to deal with interactive problems and illustrating them via case-studies.

Program:

- Non-cooperative games
- Strategic games and extended-form games
- Incomplete-information games
- Well-posedness problems for Nash equilibria
- Repeated games
- Evolutionary stable strategies
- Multiobjective games and solution concepts

- Cooperative TU-games
- Solutions for cooperative games
- Partial cooperative games
- Team optimization with stochastic information structure.
- Examples of applications in contexts such as:
 - environment models;
 - nonverbal communication & social interactions; - medicine and biology;
 - optimal production;
 - telecommunication networks;
 - transportation networks.

References:

- Course notes/slides.
- A. Dontchev, T. Zolezzi. "Well-Posed Optimization Problems". Lecture Notes in Math., vol. 1543. Springer, 1993.
- D. Fudenberg, J. Tirole. "Game Theory", MIT Press, 1991
- G. Gnecco, M. Sanguineti. "Team Optimization Problems with Lipschitz Continuous Strategies", Optimization Letters, vol. 5, pp. 333-346, 2011.
- G. Gnecco, M. Sanguineti. "New Insights into Witsenhausen's Counterexample", Optim. Let. 6:1425-1446, 2012. G. Gnecco, Y. Hadas, M. Sanguineti, "Some Properties of Transportation Network Cooperative Games". Networks 74:161–173, 2019.
- G. Gnecco, M. Sanguineti, G. Gaggero. "Suboptimal Solutions to Team Optimization Problems with Stochastic Information Structure". SIAM J. on Optimization 22:212-243, 2012.
- Y. Hadas, G. Gnecco, M. Sanguineti. "An Approach to Transportation Network Analysis Via Transferable Utility Games". Transportation Res. Part B: Methodological, vol. 105, pp. 120-143, 2017.
- K. Kolykhalova, G. Gnecco, M. Sanguineti, G. Volpe, A. Camurri, "Automated Analysis of the Origin of Movement: An Approach Based on Cooperative Games on Graphs". IEEE Trans. on Human-Machine Systems 50:550-560, 2020.
- H. Peters. "Game Theory- A Multileveled Approach". Springer, 2008.
- L. Pusillo. "Evolutionary Stable Strategies and Well Posedness Property", Appl. Math. Sc. 7:363-376, 2013.
- L. Pusillo, S. Tijs. "E-equilibria for Multicriteria Games ". In: R. Cressman and P. Cardaliaguet. The Annals of the Int. Society of Dynamic Games (ISDG). vol. 12, pp. 217-228, Birkhauser, 2012.
- R. Zoppoli, M. Sanguineti, G. Gnecco, T. Parisini. "Neural Approximations for Optimal Control and Decision".



- Springer, Communications and Control Engineering Series. London, 2020.

Cross-Curricula Course

Offered to all Curricula

Risk Management and Performance



Title: Risk management and performance

Teachers: Laura Nieri, Marco Di Antonio, Francesca Querci, Giulia Leoni, Cristina Florio

Contact: laura.nieri@unige.it

12 hours (2 credits)

Teaching period: 2025

CV: all

Exam: discussion participation and in-course group work

The course is aimed at providing PhD students with an understanding of the Enterprise Risk Management (ERM) framework, including international dimension, intended as an integrated and holistic view of risk management. As such, risk management is not just a distinct business function, but it is a complex process supporting the implementation of corporate strategies, which significantly affects business performance. The components of the ERM framework will be depicted: risk governance and culture; risk, strategy and objectives (setting); risk in execution; risk information, communication & reporting; monitoring risk management performance. A specific attention will be devoted to the risks associated with international business.



Cross-Curricula Course

Offered to all Curricula

Qualitative research methods



Course coordinators: Giulia Leoni and Lorenzo Mizzau

Contacts: giulia.leoni@unige.it; lorenzo.mizzau@economia.unige.it

12 hours (2 credits)

Teaching period: March-April 2024 (or later)

CV: all

Exam: discussion participation and in-course group work

This course provides an overview of qualitative research methods in academic research, with a special focus on social science. Students will learn how to select the appropriate methods to apply to their research projects, the benefits and limits of these methodologies.

By the end of the course, students will become familiar with a range of data collection and analysis techniques from main qualitative research methods. They will be able to implement different qualitative research methods, including – but not limited to – interviewing, grounded theory, case studies, document/thematic analysis, direct observation, ethnography and netnography.

Topics	Hours
Case-based methodology	4
Grounded Theory	4
Ethnography	4



Cross-Curricula Course

Offered to all Curricula

Research design and comparative methods

Title: Research design and comparative methods

Teachers: Fabrizio Coticchia (DISPO, reference teacher and coordinator), Andrea Ruggeri (University of Oxford, andrea.ruggeri@politics.ox.ac.uk) TBC, Valerio Vignoli (University of Milan, Valerio.Vignoli@unimi.it).

Email: fabrizio.coticchia@unige.it

Duration: 18 hours

Credits: 3 credits

When: December 2023 – February 2024

Abstract:

- Research design and methods
- Research Questions
- Theory
- Comparative Research Methods
- Case, mechanisms and process tracing
- Introduction to statistics and multivariate analysis

Module 1 (6 hours):

Fabrizio Coticchia (UNIGE) - December 2023– January 2024

1. **Intro on Research Methods in Political Science and International Relations, 12 December 16-18, sala A, DISPI**
2. **Comparative Research Methods, 18 December 16-18, sala A, DISPI**
3. **Cases and Mechanisms. Process Tracing. Debate on Papers, 9 January, TBC**

Required Readings

- Beach, D. e Brun Pedersen, R. (2013) Process-Tracing Methods. Foundations and Guidelines, Ann Arbor, The University of Michigan Press. Selected Chapters
- Morlino, L. (2018). Comparison: A Methodological Introduction for the Social Sciences. Budrich. Selected Chapters
- Pennings, P. and Keman H. (2020), “Comparative Research Methods”, in D. Caramani, Comparative Politics, OUP 2020

- Schmitter, P.C. (2016), The Design of Social and Political Research

Suggested Readings

Bennett, A. e George, A.L. 1997
Process Tracing in Case Study Research, Working Paper, MacArthur Foundation.
Bennett A. 2015
“Using Process Tracing to Improve Policy Making: The (Negative) Case of the 2003 Intervention in Iraq”, *Security Studies*, 24:2, 228-238.
Collier, D. 2011
Understanding Process Tracing, in «PS-Political Science», ottobre, pp. 823-830.
Collier, D. e Mahon, J.E. Jr. 1993. Conceptual Stretching Revisited: Adapting Categories in Comparative Analysis, in «American Political Science Review», LXXXVII, pp. 845-855.
Eckstein, H. 1975
Case Study and Theory in Political Science, in F.J. Greenstein e N.W. Polsby (eds), *Handbook of Political Science*, vol. 6: Strategies of Inquiry, Reading (MA), Addison-Wesley, pp. 79-137.
Evangelista, M. 1986
“Case Studies and Theories of the Arms Race”, *Bulletin of Peace Proposals*, Vol. 17, No. 2, pp. 197-206
George, A.L. e Bennett, A. 2005
Case Studies and Theory Development in the Social Sciences, Cambridge (MA)-London, The MIT Press.
Gerring, J.
2004 What Is a Case Study and What Is It Good for? *APSR*, 98(2)
2007 Case Study Research. Principles and Practices, Cambridge, Cambridge University Press.
2010 “Casual Mechanisms...Yes, But”, *Comparative Political Studies*, 1499-1526
2012 “Mere Description. British”, *Journal of Political Science*, 42, pp 721-746
King, G., Keohane, R.O. e Verba, S. 1994
Designing Social Inquiry. Scientific Inference in Qualitative Research, Princeton (NJ), Princeton University Press.
Lasswell, H.D. 1968. The Future of the Comparative Method, in «Comparative Politics», I, pp. 3-18.
Levy, J. S. 2008
“Case Studies: Types, Designs, and Logics of Inference”, *Conflict Management and Peace Science*, 25:1–18.
Lijphart, A. 1971
Comparative Politics and the Comparative Method, in «American Political Science Review», LXV, pp. 682-693.
1975 The Comparable-Case Strategy in Comparative Research, in «Comparative Political Studies», VIII, pp. 158-177.

Ragin, C.C. e Zaret, D. 1983

Theory and Method in Comparative Research. Two Strategies, in «Social Forces», LXI, pp. 731-754.

Sartori, G. 1970

Concept Misformation in Comparative Politics, in «American Political Science Review», LXIV, pp. 1033-1053.

Schmitter, P.C. (ed) 2009

The Nature and Future of Comparative Politics, in «European Political Science Review», I, 1, pp. 33-61.

Tilly, C. 2001

Mechanisms in Political Process, in «Annual Review of Political Science», 4, pp. 21-41.

Yin, R.K. 1985

Case Study Research: Design and Methods, Thousand Oaks (CA)-London, Sage Publications

Module 2 (6 hours)

A. Ruggeri, TBC, January/February 2024

1. Posing and Drafting Research Questions in IR
2. What is a theory in IR? How to build it and what to make of it?
3. How would you know if you were wrong? Research Design

Module 3 (6 hours):

Valerio Vignoli (UNIMI) – January/February 2024 TBC

1. Introduction to statistics and multivariate analysis in IR (I)

During the class, all the most essential concepts of both descriptive and inferential statistics to read a quantitative paper in IR will be covered, by guiding the students through the analysis of a dataset with the software R Studio.

2. Introduction to statistics and multivariate analysis in IR (II)

A handful of articles from top IR journals will be thoroughly discussed by the teacher as to show how to structure a quantitative research in the field and assess how the students have assimilated the concepts explained in the previous class.

3. Introduction to statistics and multivariate analysis in IR (III) – Paper presentation

Each of the students is asked to prepare a presentation of an article concerning his/her research interest that employs statistics and multivariate analysis as a method. The students are expected to critically engage with the article.

Readings Class I

On statistics (Recommended)

Norris, G., Qureshi, F., Howitt, D., & Cramer, D. (2014). Introduction to statistics with SPSS for social science. Routledge.



On quantitative research in IR (mandatory)

Braunmoeller B. F., & Sartori A. E. (2004) The Promise and Perils of Statistics in International Relations. In Sprinz D. F. & Wolinsky-Nahmias Y. (eds.) Models, Number, and Cases: Methods for Studying International Relations

Mansfield E. D., & Pevehouse J. C. (2008) Quantitative approaches. In Reus-Smit C. & Snidal D (eds.) The Oxford Handbook of International Relations

Dataset (elective)

Di Salvatore, J. (2020). Obstacle to peace? Ethnic geography and effectiveness of peacekeeping. British Journal of Political Science, 50(3), 1089-1109.

Readings Class II

Articles to be presented and discussed in class (mandatory)

Büthe, T., & Milner, H. V. (2008). The politics of foreign direct investment into developing countries: increasing FDI through international trade agreements?. American journal of political science, 52(4), 741-762.

Cederman, L. E., Wimmer, A., & Min, B. (2010). Why do ethnic groups rebel? New data and analysis. World Politics, 62(1), 87-119.

Gartzke, E., & Gleditsch, K. S. (2006). Identity and conflict: Ties that bind and differences that divide. European Journal of International Relations, 12(1), 53-87.

Further articles (elective)

Bremer, S. A. (1992). Dangerous dyads: Conditions affecting the likelihood of interstate war, 1816-1965. Journal of Conflict Resolution, 36(2), 309-341.

Martin, L. L. (1993). Credibility, costs, and institutions: Cooperation on economic sanctions. World Politics, 45(3), 406-432.

Neumayer E. (2002). Do democracies exhibit stronger international environmental commitment? A cross-country analysis. Journal of peace research, 39(2), 139-164.

Cross-Curricula Course

Offered to all Curricula

Research Methods - advanced: text analysis and field research

Title: Research methods- Advances

Teachers: Valerio Vignoli (reference teacher and coordinator) (UNIMI, Valerio.Vignoli@unimi.it); Juan Masullo, TBC (Leiden University, j.masullo@fsw.leidenuniv.nl), Matteo Casiraghi (Groningen)

Email:

Duration: 18 hours

Credits: 3

When: September 2024

Where: TBC

Exam:

Abstract:

Program:

Module 1: Text as Data Methods in International Relations (Vignoli)

Class 1 – Introduction to Text as Data Methods

Literature reviews on text as data methods

Benoit K. (2020) Text as data: an Overview. In Curini L. and Franzese R. (2020) The SAGE Handbook of Research Methods in Political Science and International Relations, 461-497

Grimmer, J., & Stewart, B. M. (2013). Text as data: The promise and pitfalls of automatic content analysis methods for political texts. Political analysis, 21(3), 267-297.

Presentation and analysis of corpora in International Relations

Amicarelli, E., & Di Salvatore, J. (2021). Introducing the PeaceKeeping Operations Corpus (PKOC). *Journal of Peace Research*, 0022343320978693.

Baturo, A., Dasandi, N., & Mikhaylov, S. J. (2017). Understanding state preferences with text as data: Introducing the UN General Debate corpus. *Research & Politics*, 4(2).

Class 2 – Scaling methods: wordfish and wordscores and more

Foundational texts for wordfish and wordscores

Laver, M., Benoit, K., & Garry, J. (2003). Extracting policy positions from political texts using words as data. *American political science review*, 311-331.

Slapin, J. B., & Proksch, S. O. (2008). A scaling model for estimating time-series party positions from texts. *American Journal of Political Science*, 52(3), 705-722.

Comparisons between wordscores and wordfish

Egerod B.C.K. and Klemmensen (2020) Scaling political positions from Text: assumptions, methods and pitfalls. In Curini L. and Franzese R. (2020) *The SAGE Handbook of Research Methods in Political Science and International Relations*, 498-521

Hjorth, F., Klemmensen, R., Hobolt, S., Hansen, M. E., & Kurrild-Klitgaard, P. (2015). Computers, coders, and voters: Comparing automated methods for estimating party positions. *Research & Politics*, 2(2).

Applications in IR

Barnum, M., & Lo, J. (2020). Is the NPT unraveling? Evidence from text analysis of review conference statements. *Journal of Peace Research*, 57(6), 740-751.

Carmody, P., Dasandi, N., & Mikhaylov, S. J. (2020). Power plays and balancing acts: The paradoxical effects of Chinese trade on African foreign policy positions. *Political Studies*, 68(1), 224-246

Class 3 – Topic models: Latent Dirichlet Allocation, Structural Topic Models and more

Foundational texts for topic models

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. *the Journal of machine Learning research*, 3, 993-1022.

Roberts, M. E., Stewart, B. M., & Tingley, D. (2019). Stm: An R package for structural topic models. *Journal of Statistical Software*, 91(1), 1-40.

Roberts, M. E., Stewart, B. M., Tingley, D., Lucas, C., Leder-Luis, J., Gadarian, S. K., ... & Rand, D. G. (2014). Structural topic models for open-ended survey responses. *American Journal of Political Science*, 58(4), 1064-1082.

Applications in IR

Baerg, N., & Lowe, W. (2020). A textual Taylor rule: estimating central bank preferences combining topic and scaling methods. *Political Science Research and Methods*, 8(1), 106-122.

Bagozzi, B. E., & Berliner, D. (2018). The politics of scrutiny in human rights monitoring: evidence from structural topic models of US State Department human rights reports. *Political Science Research and Methods*, 6(4), 661-677.

Module 2 Survey Experiment: Professor Matteo M. C. Casiraghi (6 hours)

- 1. Experimental method and survey I**
- 2. Experimental method and survey I II**
- 3. Experimental method and survey I III**

Module 3 Field Research : Professor Juan Masullo (6 hours)

- 1. Ethnography and fieldwork I**
- 2. Ethnography and fieldwork II**
- 3. Ethnography and fieldwork III**

Cross-Curricula Course

Offered to all Curricula

Circular approach and models for risks prevention



Title: Circular approach and models for risks prevention

Teachers: Francesca Pirlone (contact teacher), Renata Dameri, Costanza Di Fabio, Ilenia Spadaro, Teresina Torre

Email: Francesca.pirlone@unige.it

Duration: 16 hours

Credits: 3

When: April- May 2025

Where: in person (DICCA)

Exam: discussion of the waste management plan elaborated during the workshop

Abstract:

The course aims to explore the concepts of circularity, circular economy, and circular approach to processes in various contexts. Being this approach can cross different areas and activities, this course takes a strong interdisciplinary approach. First the circular approach and the concept of circular economy are introduced. Then various contexts that can be positively affected or changed by a circular approach are examined: the city, the urban waste, small businesses, and social enterprises. Real-world cases and examples are provided, and students will be challenged with various simulations where to apply a circular approach. The course will also report some research experiences and results developed in various European projects.

Program:

Topics	Hours	Lecturer
Circular approach and risk prevention: an introduction	1	Francesca Pirlone
Circular economy towards circular cities	3	Renata Dameri
Urban waste: definitions, issues and strategies at global and local level Waste regulation in Europe	2	Francesca Pirlone Ilenia Spadaro
Future challenges and european experiences	1	Francesca Pirlone Ilenia Spadaro
The circular approach in urban waste management for risk prevention and circular city	1	Francesca Pirlone

The role of accounting system in circular waste management in SMEs	2	Costanza Di Fabio
Circularity for charitable purposes: the case of Banco Alimentare	2	Teresina Torre
Workshop: elaboration of a waste management Plan	4	Francesca Pirlone Ilenia Spadaro

References:

Spadaro I., Pirlone F., Candia S. (2021), "Waste management: new policies for EU port cities", *International Planning Studies*, DOI: 10.1080/13563475.2021.1883421, ISSN 1469-9265, pp 1-13

Pirlone F., Spadaro I., Candia S. (2020), "More Resilient Cities to Face Higher Risks. The Case of Genoa", *Sustainability*, 12, 4825; ISSN 2071-1050, MDPI: Basel, Switzerland, doi:10.3390/su12124825, pp. 1-21

Bruzzone, M., Dameri, R. P., & Demartini, P. (2021). Resilience Reporting for Sustainable Development in Cities. *Sustainability*, 13(14), 7824.

Cross-Curricula Course

Offered to all Curricula

Digital identity: enrollment, authentication, and all that

Title: Digital identity: enrollment, authentication, and all that

Teachers: Roberto Carbone, Silvio Ranise, Giada Sciarretta (FBK and University of Trento)

Email: carbone@fbk.eu silvio.ranise@unitn.it giada.sciarretta@fbk.eu

Duration: 20 hours

Credits: 5 CFU

When: April 4, 6, 8, 11, 12 (from 10:00 to 12:00 and from 14:00 to 16:00, CEST).

Where: University of Trento (and remotely)

Curriculum: All CVs

Link: https://st.fbk.eu/teaching/PhDCourse2022_IdM

Exam: small project or seminar about relevant literature

Abstract: The course introduces the basic notions underlying the various aspects of digital identity management with a focus on a security-by-design approach complemented with the use of automated formal analysis techniques for security. First, it is explained why identity is the building block of any security strategy for current and future applications and services. Then, the various phases of the life cycle of digital identities are explained and the main security issues are highlighted. The interdependencies among the design and implementation choices performed in the various phases are also discussed. Finally, solutions for enrollment and authentication are described together with threat models and the most important mitigation techniques. During the various topics, the security goals and the security analysis problems are formalized so that automated analysis techniques based on constraint solving and model checking can be used to assist designers in the various phases of the development. Digital identity management solutions taken from the real world are considered to illustrate the various notions and techniques.

Program:

- Basics of digital identity management: the life cycle of digital identity, standards (SAML 2.0 and OpenID Connect), some scenarios (SPID and Carta Identità Digitale 3.0)
- Security issues and mitigations: direct and indirect attacks, types of attackers and their capabilities, security analysis at different level of abstractions (authentication factors or cryptographic protocols)
- Security analysis at work: Carta Identità Digitale 3.0

References:

- Giada Sciarretta, Roberto Carbone, Silvio Ranise, Luca Viganò. Formal Analysis of Mobile Multi- Factor Authentication with Single Sign-On Login. To appear in ACM Transactions on Privacy and Security (TOPS), 2020.
- Marco Pernpruner, Roberto Carbone, Silvio Ranise, Giada Sciarretta. The Good, the Bad and the (Not So) Ugly of Out-of-Band Authentication with eID Cards and Push Notifications: Design, Formal and Risk Analysis. 10th ACM Conference on Data and Application Security and Privacy, CODASPY20. Pages 223–234. ACM 2020.
- Federico Sinigaglia, Roberto Carbone, Gabriele Costa and Silvio Ranise. MuFASA: a Tool for High-level Specification and Analysis of Multi-factor Authentication Protocols. Proc. of the 2nd International Workshop on Emerging Technologies for Authorization and Authentication, ETAA. Lecture Notes in Computer Science 11263, Springer 2019.



Cross-Curricula Course

Offered to all Curricula

Security and Technology

Title: Security and Technology

**Military Technology and Operations: Implications for International Politics, May 2022
(TBC)**

Coordinator: M. Gilli (ETH Zurich, mauro.gilli@sipo.gess.ethz.ch),

Teachers: M. Gilli (ETH Zurich), A. Calcara (Antwerp University)

Duration: 18 hours

Credit: 3 credits

Military Technology and Operations: Implications for International Politics

Evolution of Warfare

- Evolution of Air Warfare
- Evolution of Submarine Warfare
- Evolution of Land Warfare
- Procuring Weapon Systems
- Developing Weapon Systems
- Imitating Weapon Systems
- Weapons Systems and World Power

Abstract

Military-technological competition is a key component of Great Power's rivalry and an often-neglected aspect in the fight between insurgents and central governments. In the years ahead, the competition for superior and/or for more effective technologies is going to intensify further, and it is expected to become what the pursuit for land, strategic ports/routes, and natural resources represented in the agricultural, mercantilist and industrial era. This course is intended to provide students with an intermediate understanding of the evolution of military technology over the past 150 years, by focusing on the challenges and constraints that states and non-state actors face when trying to develop and employ effectively new military technologies, and on how technology affects the distribution of power in the international system. More precisely, the first part of the course looks at how international competition, together with other material and immaterial factors, affects the development of tactics, operations, strategies and technologies, with particular attention to radar and air warfare, sonar and submarine warfare, and automatic guns and land warfare. The second part of the course looks at the attempts to copy, steal and replicate the most advanced military innovations; at the effects of the diffusion and non-diffusion of military technology for the distribution of power in the international system; at the employment of advanced weapon systems in modern combat; and at the tactics that weaker actors such as rebel groups and technologically less advanced states can devise and employ when fighting more advanced states.

The course is intended for Master/PhD students in the social sciences and in engineering. The course aims at providing the former with a knowledge and understanding of the dynamics driving military technology, so that they can independently pursue academic and policy research on this topic. For the latter, the course aims at putting the design, development and production of advanced weapon systems in perspective, by connecting it to strategic, economic and political considerations. Students interested in pursuing a career in the private sector, in the public sector,

or in non-governmental organizations where knowledge about military conflict is required or desired will find this course particularly useful.

1. Evolution of Air Warfare

- Rebecca Grant, “The Radar Game,” Air Force Magazine (2008), <https://www.airforcemag.com/article/0299radar/>
- Franz-Stefan Gady, “Selling the F-35 to Countries Operating the S-400 Is a Bad Idea,” The Diplomat (July 3, 2019), <https://thediplomat.com/2019/07/mauro-gilli-selling-the-f-35-to-countries-operating-the-s-400-is-a-bad-idea/>.
- Rebecca Grant, The Radar Game (Arlington, VA: Mitchell Institute, 2010), pp. 1-40, <https://sobchak.files.wordpress.com/2010/10/radargame.pdf>
- Barrett and Carpenter, Survivability in the Digital Age: The Imperative of Stealth (Arlington, VA: Mitchell Institute, 2013), http://docs.wixstatic.com/ugd/a2dd91_cd5494417b644d1fa7d7aacb9295324d.pdf.

Additional readings:

- Bill Sweetman, “Unconventional Weapon: What we learned about stealth technology from the combat career of the F-117,” Air & Space Magazine (January 2008), <https://www.airspacemag.com/military-aviation/unconventional-weapon-23371597/?all>.
- John Stillon, Trends in Air-to-Air Combat: Implications for Future Air Superiority (Washington, DC: Center for Strategic and Budgetary Assessment, 2015), <https://csbaonline.org/uploads/documents/Air-to-Air-Report-.pdf>.

- John Stillion, Bryan Clark, What it Takes to Win: Succeeding in 21st Century Battle Network Competitions (Washington, DC: Center for Strategic and Budgetary Assessment, 2015), 1-4, 47-92, <https://csbaonline.org/uploads/documents/What-it-Takes-to-Win.pdf>.

2. Evolution of Submarine Warfare

- Owen R. Cote, “Invisible nuclear-armed submarines, or transparent oceans? Are ballistic missile submarines still the best deterrent for the United States?” Bulletin of Atomic Scientists, pp. 30-35.

- Edward C. Whitman, “SOSUS: The "Secret Weapon" of Undersea Surveillance,” Undersea Warfare Vol 7, N0. 2 (Winter 2005), https://www.public.navy.mil/subfor/underseawarfaremagazine/Issues/Archives/issue_25/sosus.htm

- Paul Forsythe Johnston, “The Taming of the Screw,” Fast Attacks and Boomers (2000), <https://americanhistory.si.edu/subs/anglesdangles>

- Bryan Clark, The Emerging Era in Undersea Warfare (Washington, DC: Center for Strategic and Budgetary Assessment, 2015), [https://csbaonline.org/uploads/documents/CSBA6292_\(Undersea_Warfare_Reprint\)_web.pdf](https://csbaonline.org/uploads/documents/CSBA6292_(Undersea_Warfare_Reprint)_web.pdf)

Additional readings:

- Owen Coté, The Third Battle: Innovation in the U.S. Navy's Silent Cold War Struggle with Soviet Submarines (Newport, RI: Naval War College, 2003), <https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1015&context=newport-papers>

- John Stillion, Bryan Clark, What it Takes to Win: Succeeding in 21st Century Battle Network Competitions (Washington, DC: Center for Strategic and Budgetary Assessment, 2015), 5-46, <https://csbaonline.org/uploads/documents/What-it-Takes-to-Win.pdf>.

- Bryan Clark, The Emerging Era in Undersea Warfare (Washington, DC: Center for Strategic and Budgetary Assessment, 2015), [https://csbaonline.org/uploads/documents/CSBA6292_\(Undersea_Warfare_Reprint\)_web.pdf](https://csbaonline.org/uploads/documents/CSBA6292_(Undersea_Warfare_Reprint)_web.pdf)

3. Evolution of Land Warfare

- Stephen Biddle, "The Past as Prologue: Assessing theories of future warfare," Security Studies Vol. 8, No. 1 (1998), pp. 1-74.

Additional readings:

- Stephen Biddle, "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict," International Security Vol. 21, no. 2 (1996), pp. 139-79.

- Stephen Biddle, Afghanistan and the Future of Warfare: Implications for Army and Defense policy (Carlisle, PA: Strategic Studies Institute, 2002), <https://www.comw.org/rma/fulltext/0211biddle.pdf>.

- Stephen Biddle, "Speed kills? Reassessing the Role of Speed, Precision, and Situation Awareness in the Fall of Saddam," Journal of Strategic Studies Vol. 30, No. 1 (2007), pp. 3-46.

- Stephen Biddle and Jeffrey Friedman, The 2006 Lebanon Campaign and the Future of Warfare: Implications for Army and Defense Policy (Carlisle, PA: Strategic Studies Institute, 2008), <https://www.files.ethz.ch/isn/92152/PUB882.pdf>.

- Jonathan House, *Toward Combined Arms Warfare: A Survey of 20th-century Tactics, Doctrine, and Organization* (Fort Leavenworth, KS: U.S. Army Command and General Staff College 1984), <https://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/house.pdf>.

4. Procuring Weapon Systems

- Sophie-Charlotte Fischer, Andrea Gilli and Mauro Gilli, “Technological Change and Grand Strategy,” in Thierry Balzacq and Ron Krebs, *Oxford Handbook of Grand Strategy* (Oxford, UK: Oxford University Press, 2020).

- Andrew F. Krepinevich and Robert C. Martinage, *Dissuasion Strategies: Thinking Smarter About Defense* (Washington, DC: Center for Strategic and Budgetary Assessments, 2008), 1-16; <https://www.files.ethz.ch/isn/162559/2008.05.06-Dissuasion-Strategy.pdf>

- Jacob Neufeld, *The F-15 Eagle Origins and Development: The Official US Air Force Declassified History 1964-1972* (Office of Air Force History, 1974), pp. 1-32. <https://media.defense.gov/2012/May/16/2001330012/-1/-1/0/AFD-120516-036.pdf>

Additional readings:

- Eric Hehs, “Father of the F-16: Hillaker Talks – Interview Part I,” *Code One* Vol 6., no. 1 (April 1991), http://www.codeonemagazine.com/article.html?item_id=37.

- Eileen Bjorkman, “The Outrageous Adolescence of the F-16 The Viper Was Small, Fast, and in Your Face,” *Air and Space Magazine* (March 2014), <https://www.airspacemag.com/military-aviation/outrageous-adolescence-f-16-180949491/?all> .

- Owen Coté, “The Trident and the Triad: Collecting the D-5 Dividend,” *International Security* 16, no. 2 (1991): 117-45,

<https://www.jstor.org/stable/pdf/2539062.pdf?refreqid=excelsior%3A88c86d0d8d3e3f058f7e271c3de1ae69>.

5. Developing Weapon Systems

- John A. Alic, "Managing U.S. Defense Acquisition," *Enterprise & Society*, Vol. 14, No. 2 (March 2013), pp. 1-36.
- Stephen B. Johnson, "Three Approaches to Big Technology: Operations Research, Systems Engineering, and Project Management," *Technology and Culture* 38, no. 4 (1997): 891-919.
- Stefano Brusoni, Andrea Prencipe and Keith Pavitt, "Knowledge Specialization, Organizational Coupling and the Boundaries of the Firm: Why Firms Know More Than They Make?," *Administrative Science Quarterly*, Vol. 46, No. 4 (December 2001), pp. 597 –621.

Additional readings:

- Peter J. Dombrowski and Eugene Gholz, *Buying Military Transformation: Technological Innovation and the Defense Industry* (New York: Columbia University Press, 2006), pp. 1-33.
- Lee S. Langston, "Each Blade a Single Crystal," *The American Scientist* Vol. 103, NO. 1 (Jan-Feb 2015), p. 30, <https://www.americanscientist.org/article/each-blade-a-single-crystal>.
- Misty Davies and Lyle N. Long, "Special Issue on Software Challenges in Aerospace," *Journal of Aerospace Information Systems* Vol. 11, No. 10 (2014).
- Andrea Prencipe, Andrew Davies, and Michael Hobday, eds., *The Business of Systems Integration* (New York: Oxford University Press, 2003).

6. Imitating Weapon Systems

- Andrea Gilli and Mauro Gilli, “Why China Has Not Caught Up Yet: Military-Technological Superiority and the Limits of Imitation, Reverse Engineering, and Cyber Espionage,” *International Security* Vol. 43, No. 3 (Winter 2018/2019), pp. 141-189, https://www.mitpressjournals.org/doi/pdf/10.1162/isec_a_00337.
- “Soviet Supersonic Technopolitical Disaster,” *Studies in Intelligence* Vol. 28 (Winter 1984), https://www.cia.gov/library/readingroom/docs/DOC_0000620493.pdf.
- Jonathan V. Last, “The Fog of War: Forgetting What We Once Knew,” *Weekly Standard*, May 18, 2009, pp. 10–11, <https://www.washingtonexaminer.com/weekly-standard/the-fog-of-war>.

Additional readings

- Emily O. Goldman and Richard B. Andres, “Systemic Effects of Military Innovation and Diffusion,” *Security Studies* Vol. 8, No. 4 (Summer 1999), pp. 79– 125;
- Robert L. Paarlberg, “Knowledge as Power: Science, Military Dominance, and U.S. Security,” *International Security*, vol. 29. no. 1. (Summer 2004): 122-151, <http://www.mitpressjournals.org/doi/abs/10.1162/0162288041762959#.WMHUilUrKUk>.
- Donald MacKenzie and Graham Spinardi, "Tacit Knowledge, Weapons Design, and the Uninvention of Nuclear Weapons," *American Journal of Sociology* 101, no. 1 (1995), pp. 44-99, <https://www.jstor.org/stable/pdf/2782506.pdf?refreqid=excelsior%3A9cbe55dd6f54df5ad2d9633ebd116969>.
- See Kristie Macrakis, “Does Effective Espionage Lead to Success in Science and Technology? Lessons from the East German Ministry for State Security,” *Intelligence and National Security* Vol. 19, n. 1 (2004), pp. 52-77.

7. Weapons Systems and World Power

- Barry R. Posen, “Command of the Commons: The Military Foundation of U.S. Hegemony,” *International Security*, Vol. 28, No. 1 (Summer 2003), pp. 5-16.
- Eugene Gholz, “Military transformation, political economy pressures and the future of trans-atlantic national security space cooperation,” *Astropolitics* Vol 1, No. 2 (2003), pp. 26-49.
- Jonathan D. Caverley, “United States Hegemony and the New Economics of Defense.” *Security Studies* 16, no. 4 (October–December 2007), 597–613, <https://www.jonathancaverley.com/uploads/2/9/7/2/29726853/caverleyhegemony.pdf>.

Additional readings

- Harvey M. Sapolsky and Eugene C. Gholz, “Calm Down, Folks: Enemies Still Fear US Military Tech Innovation,” *Defense One* (May 17, 2018), <https://www.defenseone.com/ideas/2018/05/us-military-innovation-doing-just-fine-thanks/148287/>.
- Stephen G. Brooks and William C. Wohlforth. “The Rise and Fall of the Great Powers in the Twenty-First Century: China’s Rise and the Fate of America’s Global Position.” *International Security* vol. 40. no. 3. (Winter 2015/16): pp. 7–53, https://www.belfercenter.org/sites/default/files/files/publication/isec_a_00225.pdf.

8. Employing Weapon Systems

- Stephen Biddle and Ivan Oelrich, “Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. AirSea Battle, and Command of the Commons in East Asia,” *International Security*, vol. 41. no. 1. (Summer 2016), pp. 7-48, https://www.mitpressjournals.org/doi/pdf/10.1162/ISEC_a_00249.

- Rebecca Grant, The Radar Game (Arlington, VA: Mitchell Institute, 2010), pp. 40-56, <https://sobchak.files.wordpress.com/2010/10/radargame.pdf>.

Additional readings

- Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," International Security, Vol. 41, No. 4 (Spring 2017), pp. 9–49, https://www.belfercenter.org/sites/default/files/files/publication/isec_a_00273_LieberPress.pdf.
- Keir A. Lieber, "Grasping the Technological Peace: The Offense-Defense Balance and International Security," International Security Vol. 25, No. 1 (Summer 2000), pp. 71-104.
- Justin Bronk, Modern Russian and Chinese Integrated Air Defence Systems The Nature of the Threat, Growth Trajectory and Western Options (London, UK: RUSI Occasional Paper, January 2020), https://rusi.org/sites/default/files/20191118_iads_bronk_web_final.pdf
- Owen R. Cote Jr., "Assessing the Undersea Balance Between the U.S. and China," SSP Working Paper (February 2011), <https://www.files.ethz.ch/isn/127154/Undersea%20Balance%20WP11-1.pdf>.
- Tong Zhao, Tides of Change: China's Nuclear Ballistic Missile Submarines and Strategic Stability (Washington, DC: Carnegie Endowment for International Peace 2018), https://carnegieendowment.org/files/Zhao_SSBN_final.pdf.

9. Countering Weapons Systems

- Barry R. Posen, "The War for Kosovo: Serbia's Political-Military Strategy," International Security, vol. 24, no. 4. (Spring 2000), pp. 39-84, https://www.belfercenter.org/sites/default/files/files/publication/posen_bary_v24n4.pdf

- Ivan Arreguin-Toft, "How the Weak Win Wars: A Theory of Asymmetric Conflict," International Security Vol. 26, No. 1. (July 2001), pp. 93-128.

Additional Readings

- Thomas J. Christensen. "Posing Problems without Catching Up: China's Rise and Challenges for U.S. Security Policy," International Security, vol. 25. no. 4. (Spring 2001): 5-40, <https://www.belfercenter.org/sites/default/files/files/publication/christensenvol25no4.pdf>.
- Robert O. Work and Greg Grant, Robert Work, Beating the Americans at their Own Game An Offset Strategy with Chinese Characteristics (Washington, DC: CNAS 2019), <https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Report-Work-Offset-final-B.pdf?mtme=20190531090041>
- Michael Russel Rip and James M. Hasik, The Precision Revolution: GPS and the Future of Aerial Warfare (Annapolis, MD: Naval Institute Press, 2002), Chapter on Serbia.
- Alexander Lanoszka, "Russian Hybrid Warfare and Extended Deterrence in Eastern Europe," International Affairs, vol. 92, no. 1 (2016): 175-195, <http://www.alexlanoszka.com/LanoszkaIAHybrid.pdf>.

Cross-Curricula Course

Offered to all Curricula

Normative Investigations in Climate Change

Title: Normative Investigations in Climate Change

Teachers: levgeniin Kopytsia

Email: evgeniya.kopitsa@gmail.com

Duration and credits: 20 hours, 6 CFU (asynchronous)

When: March - April, 2023

Deadline for applications: January 31, 2023

CV: Cross-curricula

Exam: The course is organised in three units, for each of which you are required to write and submit an essay. Further details on the tasks, deadlines and assessment criteria will be given during the course.

Abstract: Unprecedented changes in the Earth's climate is being observed in every region and across the whole climate system, which presents both an imminent threat to the humankind and a fascinating set of legal puzzles. Internationally, nationally, regionally, we are still in the early stages of developing legal responses, even as the problem accelerates. Meanwhile, progress on tackling climate change often proceeds with one step forward, two steps back, in a manner that highlights the interplay of law and politics. The aim of this course is to give a basic overview of the normativity of climate change. Having conducted the study of the international legal framework addressing climate change, we will analyse its effectiveness, impacts and structural challenges, discuss why climate change is intensifying despite all the existing legal tools and how such legal tools can be improved, advanced, amended or changed.

Program:

- (Unit 1) Realization of climate action: 1972 Stockholm Declaration and 1992 United Nations Framework Convention on Climate Change
- (Unit 2) 1997 Kyoto Protocol: Success or Failure?
- (Unit 3) 2015 Paris Agreement: Too Ambitious?

Course readings:

Bodansky, Daniel. (2001). The History of the Global Climate Change Regime. *International Relations and Global Climate Change*.
<https://www.pik-potsdam.de/en/output/publications/pikreports/.files/pr21.pdf>

Bodansky, D. (2016). “The Paris Climate Change Agreement: A New Hope?” 110 *Am. J. Int’l L.* 288.

Fisher, P. (2011). Climate change and human security in Tuvalu. *Global Change, Peace & Security*, 23, 293-313. DOI: 10.1080/14781158.2011.601852.

Proposal from Tuvalu for amendments to the Kyoto Protocol.
https://unfccc.int/sites/default/files/20090612_nv_further_amend_tuvalu.pdf

Rosen, Amanda. (2015). The Wrong Solution at the Right Time: The Failure of the Kyoto Protocol on Climate Change. *Politics & Policy*, 43. DOI: 10.1111/polp.12105.

Additional bibliography:

Bodansky, D. et al., *International Climate Change Law* (2017), pp. 1-34.

Gach, E. (2019). Normative Shifts in the Global Conception of Climate Change: The Growth of Climate Justice. *Social Sciences*.

Leach, M. (2021). Negotiating the descriptive-normative frontier of complexity research in law in the Anthropocene. *Frontiers in Physics*, 9(June), 1-5. [665727]. <https://doi.org/10.3389/fphy.2021.665727>

Purdey, S. J. (2012). The Normative Root of the Climate Change Problem. *Ethics and the Environment*, 17 (2), 75–96.



Cross-Curricula Course

Offered to all Curricula

Introduction to Violations of the Rule of Law

Title: Introduction to Violations of the Rule of Law

Classification, Measurement, Proof and Remedies

Teacher: Andrej Kristan

Email: andrej.kristan@unige.it

Duration and credits: 2 hours, 1 CFU (synchronic)

When: April 2023

Deadline for applications: February 28, 2023

CV: Cross-curricula

Exam: Only the active participation to the lessons is required

Abstract: Violations of the rule of law are among the most controversial issues in the European Union. Although the rule of law was enshrined as one of the EU's founding values, disagreements over violations of the rule of law have only come to the forefront of European governance in 2019, when the Parliament and Council adopted a 'rule of law conditionality' for access to EU funds. Most pressing are disagreements over what constitutes a violation of rule of law principles. Indeed, some member states have announced their intention to establish a new Rule of Law Institute to show "that there could be an alternative interpretation" to that of the EU institutions. In this context, this introductory course aims to promote understanding not only of the limits that rule of law principles place on the actions of legal and political authorities, but also of the nature of disputes over those limits.

References:

Fuller, L (1964). The morality that makes law possible. In *The Morality of Law* (ch. 2), Yale University Press.

Jakab A, Kirchmair L (2021). How to Develop the EU Justice Scoreboard into a Rule of Law Index: Using an Existing Tool in the EU Rule of Law Crisis in a More



Efficient Way. German Law Journal 22, 936–955.
<https://doi.org/10.1017/glj.2021.46>

Cross-Curricula Course

Offered to all Curricula

Moving towards Safety 4.0 and machine learning applications



Title: Moving towards Safety 4.0 and machine learning applications

Teachers: Fabiano - Vairo

Email: brown@unige.it – Tomaso.vairo@edu.unige.it

Duration: 15 hours

Credits: 3 CFU

When: January-March 2023

Where: DICCA Polytechnic School via Opera Pia 15 – 16145 Genova

CV: CROSS

Link:

Exam: The final exam will consist in developing a Machine Learning model on an industrial applicative case. The date will be announced by the teacher at the end of the course

Abstract: The course aims at providing to PhD students notions on novel approaches in process and personnel safety and the use of data driven approaches in industrial safety assessment and management, for identifying, locate and intercept significant precursors of disruptive situations.

Program:

The course will cover the following topics:

- Process vs. personnel risk and basics of risk assessment
- Evolution towards Safety 4.0 and dynamic risk assessment
- Machine Learning Fundamentals
- Data generation
- K-Nearest neighbours
- Bias-Variance Trade-offs
- Error function



- Machine Learning families
- The ladder of causation
- The Bayes theorem and Bayesian Networks and Neural Nets
- Decision trees and Gradient boosting
- Designing a predictive model: test and validation



Cross-Curricula Course

Offered to all Curricula

Civil protection, administrative legislation, and risk



Civil protection, administrative legislation, and risk

Course coordinator: Matteo Timo, CIMA Foundation

Contact: matteo.timo@unige.it

4 hours (1 CFU)

Teaching period: April-May 2024

CV: Security and Law

Exam: Only the active participation to the lessons is required

Abstract:

The course deals with the European civil protection mechanism in the light of the European Union regulation and administrative law. Particular attention will be paid to the type of risks subject to prevention by civil protection.

Course material will be shared with the students.



Cross-Curricula Course

Offered to all Curricula

Threats, violations and deficiencies of the rule of law

Threats, Violations and Deficiencies of the Rule of Law

Course coordinators: M. Victoria Inostroza with Matija Žgur and other guest lecturers

Contact: victoria.inostroza@pf.uni-lj.si

8 hours (2 CFU)

Teaching period: February - June 2024

CV: Security and Law

Exam: Only the active participation to the lessons is required

Abstract:

The course approaches one of the major challenges that the Rule of Law confronts today in Europe and worldwide: its threats, violations and deficiencies. It will approach this challenge by touching upon two major topics in legal and political philosophy: 1. What constitutes a violation to the Rule of Law? Does every threat to the rule of law lead to a deficiency or to a violation? 2. In case of serious violations of the Rule of Law, is illegal state action an appropriate means of restoring legitimacy? If so, under what conditions? As it will arise during the course, the second answer is dependent of what we understand by violations of the Rule of Law, its contours and limits. In the course, we will first explore a typology of threats, violations and deficiencies based on the work of some of the leading legal and political theorist, such as Bard, Celano, Fuller, Postema, Sajo, and Schepelle. By approaching this typology, we will pave the way for the discussion on the questions concerning the restoration of the rule of law.

References:



- P. Bárd. "In courts we trust, or should we? Judicial independence as the precondition for the effectiveness of EU law." *European Law Journal* 27.1-3 (2021): 185-210.
- B. Celano. "Law as power. Two Rule of Law requirements." *Philosophical Foundations of the Nature of Law*. Vol. 2013. Oxford: Oxford University Press, 2013. 129-151.
- L. Fuller. "*The Morality of Law*." Yale University Press, 1964.
- G. Halmai, Gabor. "Populism, Authoritarianism, and Constitutionalism" (2019) 20 *German LJ* 296, 302.
- G. Postema. "*Law's Rule: The Nature, Value, and Viability of the Rule of Law*". Oxford University Press, 2022.
- "Constitutional Norms— Erosion, Sabotage and Response", *Ratio Juris* 35, 2022.
- A. Sajó. "*Ruling by Cheating: Governance in Illiberal Democracy*" Cambridge University Press, 2021.
- K. L. Scheppele, "On being the subject of the rule of law." *Hague Journal on the Rule of Law* 11 (2019).
- "Autocratic legalism." *The University of Chicago Law Review* 85.2, 2018.
- "The Rule of Law and the Frankenstate: why governance checklists do not work." *Governance* 26.4 (2013)

Cross-Curricula Course

Offered to all Curricula

A gateway course to modelling complex systems



Title: A gateway course to modelling complex systems

Teachers: Mara Baudena CNR-ISAC <https://www.isac.cnr.it/en/users/mara-baudena>

Email: mara.baudena@cnr.it

Duration: 12 hours

Credits: 3 CFU

When: April-June 2024

Where: TBD

Curricula: CROSS

Link: TBD

Exam: Group (2 students) report(s) and a short presentation (10' + 10' questions) about a modelling activity performed.

Abstract:

Social, ecological or economic systems are examples of complex systems characterized by multi-agent and non-linear dynamics, with the potential for tipping points. The inherent unpredictability of these systems underscores the critical role of models in scientific inquiry, especially when assessing potential risks and vulnerabilities.

Traditionally, modeling has been accessible primarily to students with a strong quantitative background. However, this course aims to engage with students from diverse backgrounds and varying levels of experience. We will open the “modelling” Pandora’s box to explore the different types of models, the insights they can offer, and their inherent strengths and limitations. Student from all backgrounds will gain proficiency in creating and running simple models of complex systems. Along the way, they will learn what to expect from these models, how to interpret their results, and how to apply them to interdisciplinary applications. Recognizing the diverse backgrounds of our students, the course offers flexibility, allowing for



exploration of model extensions that range from basic to advanced. Additionally, students may apply the concepts to specific cases they bring to the course.

References

Mulligan, M. and Wainwright, J. (2013). Modelling and Model Building. In Environmental Modelling (eds J. Wainwright and M. Mulligan). <https://doi.org/10.1002/9781118351475.ch2>

<https://plato.stanford.edu/entries/models-science/>

<https://docs.google.com/document/d/1xAtwmFzYv94Ct9oYuH65grnebGTP3HkO/edit#heading=h.gjdgxs>

Cross-Curricula Course

Offered to all Curricula

Different methodological approaches and tools for the risk assessment in the safe, sustainable, and efficient logistic chain of dangerous goods transportation in a space area and in a time window of global transitions



Title: Different methodological approaches and tools for the risk assessment in the safe, sustainable, and efficient logistic chain of dangerous goods transportation in a space area and in a time window of global transitions.

Teachers: Angela Maria Tomasoni, Enrico Zero

Email: angela.maria.tomasoni@unige.it, enrico.zero@dibris.unige.it

Duration: 25 hours

Credits: 6 CFU

When: TBD - please contact the instructors

Where: Via all'opera Pia Pad. E and/or Savona Campus, palazzina Gina Lagorio

CV: CROSS-curricula course

Link: -

Exam: Small oral presentation with three or more pages of writing elaboration in a .pdf format (# course activities) in presence and/or by teams in English language (max 30 min) at the end of the course, summarizing the n. 5 phases of project developed during the presented course, which the PhD student has elaborated/used/extended during his/her PhD experience.

Abstract: The PhD course has an interdisciplinary and intersectoral vision of the Transport and logistic of Dangerous Goods management (DGT management). To face the new emerging challenges linked to climate change, the dangerous goods transportation and its logistic chain must always allow and guarantee a certain level of safety, security, and sustainability, to not lose the resilience and capacity of businesses, for territories, people (workers-citizens) and environment, discretized by different categories, generally named "territorial elements exposed to potential risk".

Starting from not only consolidated, but also experimental methodologies at National, European and International level on DGT topics, the safety, sustainability and efficiency of this kind of system will be faced in this PhD course to provide an overall framework of experiential training contents and actions, which have to be elaborated by the candidate, who give rise to his/her PhD student preparation of new transversal skills, both technical and relational (soft-skills) which allow the candidate to tackle a problem (system of systems) with a renewed approach, which takes into account not only the engineering of the system, but also the cultural, social and economic context in which the engineering aspect is identified and takes shape.

This approach is useful to plan and manage DGT projects in an interdisciplinary teams of experts, the PhD candidate will be able to act and provide possible decision-making tools to support civil society, for the governance of territories, to provide possible solutions or possible solution's tools at tables of public and private decision makers, whose objective is the care and protection of common goods, the health and safety of people, the emergency response to an accident, or the protection of environment and terrestrial and marine protected areas (biodiversity, wildlife and environmental matrices).

Program:

- Monday from 8:30 to 12:30 CEST: Dangerous goods risk management. Definition, taxonomy, regulations and laws, key elements of Risk Management, LPHC events and Major risks.
PhD Candidate presentation to the PhD course mates (phase n.1).
- Tuesday from 8:30 to 12:30 CEST: Methodological approaches and tools to DGT risk definition (safety and security). What the DGT Project is: Case study, rules, constraints, objectives strengths, weaknesses, challenges/opportunities, and critical issues/threats.
Construction of "Individual/Team Project definition" (phase n.2).
- Wednesday from 8:30 to 12:00 CEST: Case study application applied to risk management (assessment, estimation, and evaluation).
Wednesday from 12:00 to 12:30 CEST: "Individual/Team PhD candidate group constitution, mission and goal".
Team working activity (phase n.3).
- Thursday from 8:30 to 11:30 CEST: Example of well-assessed DGT projects according to a specific method and tool applied to risk assessment, estimation, and evaluation.
Thursday from 11:30 to 12:30 CEST: Plenary speech of "Individual/Team Project presentation". Oral Exposition of PhD students (individually or in a team from 2 to 10 minutes each/group).
Team working activity and restitution (phase n.4).
- Friday from 8:30 to 10:30 CEST: Classification of DGT Models and literature review. Friday from 10:30 to 12:30 CEST: Team working groups about "Researchers can find additional important references".
Team working activity and restitution. (phase n.5).

References:

1. Tomasoni, A. M. et al. "Toxic Release Damage Distance Assessment Based on the Short-Cut Method: A Case Study for the Transport of Chlorine and Hydrochloric Acid in Densely Urbanized Areas in the Mediterranean Region", (2023). ACS Chemical Health & Safety 2023 30 (4), 165-172. DOI: 10.1021/acs.chas.2c00095
2. Soussi, A. et al. "An ICT-Based Decision Support System (DSS) for the Safety Transport of Dangerous Goods along the Liguria and Tuscany Mediterranean Coast". (2023). In: Nagar, A.K., Singh Jat, D., Mishra, D.K., Joshi, A. (eds) Intelligent Sustainable Systems. Lecture Notes in Networks and Systems, vol 579. Springer, Singapore. https://doi.org/10.1007/978-981-19-7663-6_59

3. Tomasoni, A.M. et al. "ICT based system to monitor hazmat road transportation and a rapid mapping technique for accident scenarios". Chem. Eng. Trans. (2021)
4. Soussi, A. et al. "Oil spill trajectory: A comparison between 2D and 3D models", (2021). www.witpress.com, ISSN 1743-3509 (on-line) WIT Transactions on The Built Environment, Vol. 204, Pag. 117-128, © 2021 WIT Press. doi:10.2495/UT210101
5. Bersani, C. et al. "Emergency resource allocation problem: Hazardous material accident scenarios in the ports of Northern Italy". Conf. Control Autom. MED 2020, 1093–1098 (2020). <https://doi.org/10.1109/MED48518.2020.9183135>.
6. De Nadai et al., "Enhancing safety of transport by road by on-line monitoring of driver emotions", 2016. 11th System of Systems Engineering Conference (SoSE), Kongsberg, Norway, pp. 1-4, doi: 10.1109/SYSESE.2016.7542941.
7. Tomasoni, A.M. et al. "Risk evaluation of real-time accident scenarios in the transport of hazardous material on road", (2010). ISSN: 1477-7835 , 1758-6119; DOI: 10.1108/14777831011067962. Management of environmental quality. , 2010, Vol.21(5), p.695-711.
8. Tomasoni, Angela M. (2010). Models and methods of risk assessment and control in dangerous goods transportation (DGT) systems, using innovative information and communication technologies.
9. Bersani, C. et al. "Risk averse routing of hazardous materials with scheduled delays BT—Security and Environmental Sustainability of Multimodal Transport". pp. 23–36 (2010)
10. Bersani, C. et al. "OPTIMAL CONTROL OF HAZARDOUS MATERIALS TRAFFIC FLOW - The Case of Transport through a Critical Infrastructure". DOI: 10.5220/0002249003110316 In Proceedings of the 6th International Conference on Informatics in Control, Automation and Robotics (ICINCO 2009), page 311-316, ISBN: 978-989-8111-99-9. Copyright c 2009 by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.
11. Bersani, C. et al. "An Integrated System for the Hazardous Materials Transport in a Sub-Regional Scale Area", (2008). Pp. 261 – 283, NATO Science for Peace and Security Series - E: Human and Societal Dynamics. Volume 45: Advanced Technologies and Methodologies for Risk Management in the Global Transport of Dangerous Goods. DOI 10.3233/978-1-58603-899-1-261
12. Garbolino, E. et al. "A Spatial Decision Support System Prototype for Assessing Road Hazmat Accident Impacts on the Population in a Dense Urban Area: a Case Study of the City of Nice, French Riviera." Chemical engineering transactions 11 (2007): 413-418.
13. Benza, M. et al. "A distributed information system prototype to detect and monitor the Hazardous Material Transport on the road in the territory of Nice-Imperia-Ventimiglia". WIT Transactions on the Built Environment. 10.2495/SAFE070321 (2007).
14. Giglio, D. et al. "Towards a Decision Support System for Real Time Risk Assessment of Hazardous Material Transport on Road", (2004). Computer Science. International Congress on Environmental Modelling and Software. 95. <https://scholarsarchive.byu.edu/iemssconference/2004/all/95>.

PhD Program in Security, Risk and Vulnerability



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