

**PhD course offered for the PhD Program in Security, Risk and Vulnerability**

# Science of Storms

Syllabus

**Title:**

Science of Storms

**Teacher:**

Dr. Djordje Romanic

**Email:**

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**Abstract:**

Extreme weather phenomena can harm people and cause disasters. In the period 1980–2022, extreme weather caused economic losses of approximately €650 billion in the European Union Member States. Out of this figure, the losses were €59.4 billion in 2021 and €52.3 billion in 2022. Science of Storms is an introductory course to the topics of physical processes associated with severe and hazardous weather affecting the Earth. Most of the topics are taught at a fundamental level to provide a complete and up-to-date understanding of such extreme events as thunderstorms, tornados, flooding, heatwaves, cold waves, hurricanes and extra-tropical cyclones, hail, and lightning. In addition to the physical processes that govern extreme weather, Science of Storms will also introduce the students to the topics of natural hazard modeling, resilience, and risk assessment. While the course will focus on fundamental aspects of extreme weather and hazard modeling, lectures will also present some of the latest advancements in these fields.

**PhD Program:**

Security, Risk and Vulnerability (<https://sicurezza.unige.net/home>)

**Curricula:**

RRENIB (<https://sicurezza.unige.net/curricula/rrenib>) and RCCSD (<https://sicurezza.unige.net/curricula/rccsd>)

**Duration:**

12 hours

**Credits:**

2.5 credits (ECTS)

**When:**

June 2024

- Lecture 1: 4 June, 3-5 p.m. CET
- Lecture 2: 6 June, 3-5 p.m. CET
- Lecture 3: 10 June, 2-4 p.m. CET
- Lecture 4: 11 June, 3-5 p.m. CET
- Lecture 5: 21 June, 3-5 p.m. CET
- Lecture 6: 25 June, 3-5 p.m. CET

**Where:**

University of Genoa

All classes will be at the Department of Civil, Chemical, and Environmental Engineering (DICCA), via Montallegro 1, 16145 Genoa (IT), Room A13.

The course can be attended **online!**

**Program:**

The course will consist of the following six 2-hour lectures:

1. Wind and convection
2. Mid-latitude cyclones
3. Thunderstorms
4. Hurricanes
5. Weather hazards
6. Modeling

**Exam:**

At the end of the course, a final oral examination will be held.

**Registration:**

Please email to Dr. Massimiliano Burlando [massimiliano.burlando@unige.it](mailto:massimiliano.burlando@unige.it)

**References:**

- Ahrens C.D and Henson R. 2021. *Meteorology Today: An Introduction to Weather, Climate and the Environment*. Brooks Cole. ISBN: 0357452070.
- Markowski P and Richardson Y. 2010. *Mesoscale Meteorology in Midlatitudes*. John Wiley & Sons, Ltd. ISBN: 9780470682098.

References to other specific textbooks, journal/conference articles and video resources will be provided during lectures.



### Course instructor biography

Dr. Djordje Romanic is an Assistant Professor in the Department of Atmospheric and Oceanic Sciences at McGill University. He received a PhD in Meteorology from the University of Belgrade (Serbia) and another PhD in Civil and Environmental Engineering from Western University (Canada). Prof. Romanic's research interests are across the fields of thunderstorm winds, such as downbursts and tornados, boundary layer meteorology, natural hazard modelling and applications of atmospheric sciences to wind engineering, energy, and urban sustainability & resilience. As an example of his recent research, his group at McGill University developed the first analytical model of the nonlinear interaction between large-scale atmospheric boundary layer winds and downburst outflows. Furthermore, he provided significant contributions in the field of wind tunnel modeling of the interaction between downburst-like impinging jets and atmospheric boundary layer winds. He has worked on a number of research projects in Canada, Italy, Serbia, Denmark, Barbados, and the United States. He also serves as an Adjunct Research Professor at Western University in Canada. Prof. Romanic published over 45 journal articles with a cumulative *h*-index of 16. His group is also operating a long-range Doppler lidar profiler that is installed in downtown Montreal. Furthermore, Prof. Romanic is a science communicator on his YouTube channel, and he is frequently interviewed in Canadian media to provide his expertise on severe weather, climate as well as their influence on the society.



Website: <https://web.meteo.mcgill.ca/~dromanica/>

YouTube: <https://www.youtube.com/@DjordjeRomanic>