



Advanced Methods for Road Safety Analysis

eng. Filomena Mauriello

Credits: 3 CFU

Number of hours: 18 frontal hours

Date: 2, 9, 16, 23 February; 2 and 9 March 2027

Objectives: The course aims to provide participants with knowledge of advanced methodologies for road safety analysis, based on quantitative methods, in order to implement the road safety management process in accordance with Directive 2008/96/EC.

Course programme: The course will cover road crashes: definition, classification (crash, road and environment characteristics, traffic units and persons involved), crash costs and statistics; safety performance functions: crash prediction models, crash distribution functions, Highway Safety Manual safety performance functions, and estimation models for road safety performance functions; identification of crash contributing factors through crash data analysis, factor matrices, collision diagrams, condition diagrams, dominant crash-pattern analysis for segments and intersections, inferential statistics, parametric and non-parametric estimation models, and clustering. The course will also introduce data-driven and machine-learning methods for road safety analysis, including feature selection, crash prediction and crash-severity classification models, handling of imbalanced crash data, model validation, performance metrics, and interpretation of results through variable-importance and explainable-AI approaches. Exercises will apply the theories introduced in the lectures using SPSS, STATA, R cran and selected machine-learning tools in R and/or Python.

Teaching materials: Lecture slides. AASHTO (2010). Highway Safety Manual, First Edition; Austroads (2015). Guide to Road Safety Part 8: Treatment of Crash Locations, Austroads Report AGRS08-15, Sydney, Australia; World Road Association (2015). Road Safety Manual.

Assessment methods: Final interview

Contact for information:

eng. Filomena Mauriello

Department of Civil, Architectural and Environmental Engineering

Email: filomena.mauriello@unina.it



Lectures Program

N	Date	Schedule	Duration	Topic / Teacher
1	02/02/27	10:30 - 13:30	3 hours	Road crashes: definition, classification, costs and statistics / eng. Filomena Mauriello
2	09/02/27	10:30 - 13:30	3 hours	Crash data and parameters: police reports and ISTAT crash classification / eng. Filomena Mauriello
3	16/02/27	10:30 - 13:30	3 hours	Safety Performance Functions: crash prediction models and crash distributions / eng. Filomena Mauriello
4	23/02/27	10:30 - 13:30	3 hours	Highway Safety Manual SPFs and estimation models for road safety performance / eng. Filomena Mauriello
5	02/03/27	10:30 - 13:30	3 hours	Crash contributing factors: factor matrix, collision diagram, condition diagram and dominant crash patterns / eng. Filomena Mauriello
6	09/03/27	10:30 - 13:30	3 hours	Machine-learning methods for road safety analysis: classification, class imbalance, model validation, variable importance and clustering; software applications / eng. Filomena Mauriello