



**Politecnico
di Torino**

STATISTICAL METHODS WITH APPLICATION TO CLIMATE VARIABILITY AND CHANGE ASSESSMENTS

PhD in Civil and Environmental Engineering
High level Course (Excellence training)



PROFESSOR

Ramesh
Teegavarapu
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University

DATA

6-10 June 2022

DURATION

20 hours

PLACE

Online and residential

COURSE DESCRIPTION

This course presents a comprehensive review of statistical approaches and methods that are essential for the analysis of hydroclimatic data and for evaluating climate variability and change influences but can also be of widespread interest for a general audience. The course emphasizes three main issues: (1) data analysis, (2) statistical methodologies, and (3) application of techniques. The course provides an exhaustive background and in-depth review of exploratory data analysis, statistical (both parametric and nonparametric), and data mining methods to evaluate changes, trends, anomalies, and extremes detection and appropriate treatment. Applications of statistical methods and practical laboratory work with real-world data for climate change and variability assessments will be part of this course.

The lessons will be provided as an online course, through “Portale della Didattica”. However, students will have the opportunity to attend in course in presence.



Data has a better idea

PROGRAMME

06/06/2022 09:00-13:00

Lesson 1: Understanding Hydroclimatic Data: Climate Change and Variability

Data: Observations and estimates; understanding climate variability and change especially from a data perspective, data scarcity, exploratory data analysis, visual evaluation of time series data, evaluation of spatial data and outliers, handling of data anomalies, summary statistics, univariate and multivariate analysis: basics, smoothing methods and introduction to data mining and assimilation, and time series analysis, development of univariate and multivariate forecasting approaches.

07/06/2022 09:00-13:00

Lesson 2: Parametric Statistical Methods

Introduction. Paired and unpaired tests, assessment of changes in statistical moments, changes in distributions, data transformations (e.g., Box-Cox transformation and others), trends, and changepoint assessments. Detection of homogeneity.

08/06/2022 09:00-13:00

Lesson 3: Non-Parametric Statistical Methods

Introduction to rank-based methods, measures of associations, trends, and changes, changes in data: moments, rank-based methods, assessment of homogeneity, evaluation of persistence, smoothing methods, resampling methods (e.g., bootstrap).

09/06/2022 09:00-13:00

Lesson 4: Climate Variability Evaluation

Introduction to climate variability, manifestations of climate variability, coupled oceanic and atmospheric oscillations, changes in essential climatic variables, assessment of changes in precipitation, temperature, and streamflow, use of parametric and nonparametric methods.

10/06/2022 09:00-13:00

Lesson 5: Climate Change and Stationarity Assessment

Introduction to climate change, downscaling, bias corrections, statistical methods for assessment of climate change, stationarity and its assessment, frequency analysis, hydrologic design, and water resources management under climate change and climate change adaptation.

PROFESSOR'S BIOGRAPHY

Dr. Ramesh Teegavarapu (Dr. T.) is currently a professor and graduate program director & coordinator in the Department of Civil, Environmental and Geomatics department at Florida Atlantic University (FAU), Boca Raton, Florida, and founder and leader of the Hydrosystems Research Laboratory (HRL) in the department. He is a Fulbright Scholar and also a Fulbright Specialist. He has over 25 years of experience in hydrological modeling and water resources systems area. Before his tenure at FAU, he has worked as Assistant Director of Kentucky Water Resources Research Institute (KWRI) and Assistant Professor at the University of Kentucky, and also as Postdoctoral Scholar (Research Engineer) at the University of California, Davis.

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