DIPARTIMENTO DI INGEGNERIA
CORSO DI DOTTORATO IN INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE - PHD COURSE IN INDUSTRIAL AND INFORMATION ENGINEERING - 35TH CYCLE

Title of the research activity:	**Geostatistics, reliability and risk analysis for geotechnical systems**.
State of the Art:	Geotechnical engineering deals with large uncertainties compared to other engineering fields. The soil/rock mechanical properties are based on site investigation, and spatial variability is certainly large. From known values at sampled points, geostatistical analysis can be used to predict spatial distributions of properties over large areas or volumes. Hence, reliability and risk approaches are developing rapidly in geotechnical research and reliability-based design is increasingly being applied to complex geotechnical structures. In many cases, the engineering process focuses on the most important aspect of performance, the probability of failure. There are advanced design methods which provide practical procedures to compute the probability of failure handling several random variables including materials, applied loads (also seismic loads), and geometrical properties. Within this framework and in the field of civil/geotechnical engineering, another issue of interest is the assessment of *existing* structures/infrastructures, which, necessarily, must rely on observations, measurements, and monitoring data.
Short description and objectives of the research activity:	Geostatistics, reliability and risk analysis basics applied to geotechnical engineering, as well as an overview of recent applications and developments. The main objective of the research is to assess and, in case, favour the development of reliability concepts in geotechnical engineering practice. Topics covered include probability, geostatistics, reliability and risk analysis, fundamentals and application to different and complex geotechnical systems, such as earth dams and other existing structures whereas the soil/structure interaction plays a fundamental role.
Bibliography:	Ang, A. H. S., Tang, W. H. (2007). *Probability concepts in engineering: emphasis on applications in civil & environmental engineering*. New York: Wiley. Baecher, G. B., Christian J.T. (2003). *Reliability and statistics in geotechnical engineering*. John Wiley & Sons, Chichester (UK). Benjamin, J. R., & Cornell, C. A. (2014). *Probability, statistics, and decision for civil engineers*. Courier Corporation. Chiles, J., Delfiner, P., (1999). *Geostatistics: modeling spatial uncertainty*. John Wiley & Sons, New York. Fenton, G. A., & Griffiths, D. V. (2008). *Risk assessment in geotechnical engineering.* New York: John Wiley & Sons. Melchers, R. E., & Beck, A. T. (2018). *Structural reliability analysis and prediction*. John Wiley & Sons. Phoon, K. K. (Ed.) (2014). *Reliability-based design in geotechnical engineering: computations and applications*. CRC Press

Scientific coordinator (s)	Manuela Cecconi, Giuseppe Saccomandi, Vincenzo Pane
Contact (s)	manuela.cecconi@unipg.it