

International Doctorate in Civil and Environmental Engineering

DOCTORAL COURSE – A.Y. 2021/22

Introduction to least squares adjustment and statistical methods

Teacher: Andrea Masiero

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Calendar	
14/06/2022 – 10:00-12:00	Basics of statistics, estimation and statistical error characterization
16/06/2022 – 10:00-12:00	Linear algebra review
28/06/2022 – 10:00-12:00	Principal component analysis
30/06/2022 – 10:00-12:00	Mathematical modeling, estimation examples, error propagation
05/07/2022 – 10:00-12:00	Linear and conditional least squares adjustment
07/07/2022 – 10:00-12:00	Nonlinear optimization and nonlinear least squares adjustment
12/07/2022 – 10:00-12:00	Examples of LS adjustment: triangulation and trilateration.
14/07/2022 – 10:00-12:00	Monte Carlo methods and bootstrap
Total	16 hours – 8 credits

Program

This course provides an introduction to statistical error modelling, estimation theory, linear and nonlinear least squares adjustment, with a review of certain numerical and statistical methods related to the mentioned subjects. Topics that the course considers include: sources and types of measurement errors, basic hypothesis of error theory, review of basics of linear algebra and univariate/multivariate statistics, error propagation, linear least-squares adjustment, constrained least-squares adjustment, nonlinear least-squares adjustment, numerical methods and considerations, examples of least-squares adjustment (e.g. triangulation and trilateration), principal component analysis, introduction to Monte Carlo methods and bootstrap.