

BME, Department of Geodesy and Surveying  
Rédey Seminar

# Special lectures on GNSS methodology



## Lecturer: Prof. P.J.G. Teunissen,

Professor of Mathematical Geodesy and Positioning at the Faculty of Civil Engineering and Geosciences at the Delft University of Technology, Vice President of the International Association of Geodesy

Prof. Peter Teunissen is recognized as one of the most influential researcher in the field of Global Navigation Satellite Systems (GNSS) and their applications. He has groundbreaking contributions to the algorithmic foundations of satellite positioning, including the invention of the LAMBDA (Least Squares Ambiguity Decorrelation Algorithm) method which revolutionized high precision GNSS positioning capabilities and realtime applications. He laid down the mathematical and algorithmical foundation of reliability theory, anebing the proper understanding of the quality of ambiguity resolution and thus, the quality of position solutions. His contributions are fundamental to new applications areas of GNSS, such as safety-of-life applications, autonomous driving, precision agriculture, etc.

The work of Prof. Teunissen was recognized by several awards. Recently, he has recieved the Johannes Kepler Award of the Institute of Navigation (ION) and the Vening-Meinesz Medal of the European Geoscience union (EGU).

**April 11, 9:00-11:00**

## Geodetic Quality Control, Positioning for the Future

Our everyday life relies increasingly on the services of the navigation satellite systems. Can we trust in the coordinates they provide? Would you let an airplane be landed with GPS guidance alone? Or an autonomous car? The lecture introduces the foundation of geodetic quality control of satellite positioning and the trends in positioning services.

**April 11, 14:15-16:00**

## Mixed-Integer Estimation of GNSS Models

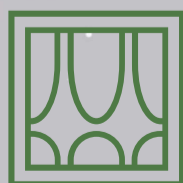
Albeit phase observations can provide high accuracy in GNSS positioning, they provide an ambiguous satellite-receiver range observation. In the estimation process coordinates and phase ambiguities must be solved as rational or integer numbers, respectively. The lecture introduces the mathematical theory and algorithms of cm-level GNSS positioning.

**April 12, 10:15-12:00**

## Rank-Defect Mixed-Integer Models and Frequency-Varying Estimability

The mathematical models of GNSS positioning are usually rank deficient, since the value of many parameters can be lumped into other parameters. Furthermore, GLONASS satellite, LEO communication satellites or other emerging positioning signal (e.g. LTE) use different carrier frequencies. To fully exploit these signals, the Integer Ambiguity Resolution model needs to be extended for the frequency varying case. The lecture will introduce the related concepts and algorithms.

**Lectures will be held at:**



Budapest University of Technology and Economics  
Faculty of Civil Engineering  
Department of Geodesy and Surveying  
Budapest, Műegyetem rkp. 3.  
Central building, mezzanine 26.

