# NOTICE OF THESIS PROPOSAL PRESENTATION

## Geodesy and Geomatics Engineering

Doctor of Philosophy

# Ismael Foroughi

**Thursday, November 9, 2017 @ 9:30 am**
**Head Hall – Room E-11**

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| Co-Supervisors: | Robbie Kingdon, Geodesy and Geomatics Engineering |
| | Petr Vanicek, Geodesy and Geomatics Engineering |
| Supervisory Committee: | Marcelo Santos, Geodesy and Geomatics Engineering |
| Chair: | Emmanuel Stefanakis, Geodesy and Geomatics Engineering |

## Accuracy of the Classical Height System


**ABSTRACT**

The classical and Molodenskij are the two most commonly used height systems in practice. In the Molodenskij system, the normal heights and quasigeoid are used where the components of the classical height system are geoid and orthometric heights. To assess the quality of a height system, the congruency of the system can be measured. The measure of congruence of the classical height system is the norm of the discrepancies between geoid heights and differences between orthometric heights provided by leveling and geodetic heights provided by GNSS. Testing the congruency of Molodenskij system is a similar procedure, except that instead of orthometric heights, normal heights are employed and quasigeoid is used as height datum. Measuring the congruency of the classical height system is investigated in this research. Three values are used to measure the congruency at the control points: geodetic heights, orthometric heights, and geoid heights. Geodetic heights are provided by GNSS observations and have sufficient accuracy. Normal heights are easier to compute and usually provided at control points which need to be converted to orthometric heights. The Helmert approximation of orthometric heights is typically used as the transformation between normal and Helmert's heights is easily done. Although in order to best assess the congruency, the rigorous orthometric heights must be computed. Geoid determination is the remaining part in measuring the congruency. The geoid model can be determined using the Stokes-Helmert technique. Stokes-Helmert technique determines geoid using gravity and topography data in physically meaningful steps. The uncertainties of the geoid heights, estimated from error propagation in Stokes-Helmert technique, can be used in in the assessment of congruence together with the evaluation of the discrepancies and their norm. Estimation of the errors needs error propagation in the steps of geoid determination which is also discussed in the present study.


**Faculty Members and Graduate Students are invited to attend the presentation**