



报告人：朱芹芹（滑铁卢大学）

时 间：1月2日(周四)上午10:00

地 点：电信群楼2-412

邀请人：黄晓霖

## Dynamic Latent Variable Regression for Inferential Sensor Modeling and Supervised Monitoring

### ABSTRACT:

This seminar will be on system modeling and process monitoring with multivariate statistical methods. Specifically, the presentation will (1) review some existing multivariate statistical approaches for process modeling and monitoring; and (2) introduce a novel latent variable regression algorithm and its dynamic counterpart.

With the advent of Industry 4.0, which contributes to fostering a "smart factory" nowadays, the volume of collected data has increased explosively with the aid of advanced data sensory technologies. Mining for meaningful information from voluminous data and transforming it to valuable knowledge for smart decision making have become an emerging field. Multivariate statistical analysis has demonstrated its capability and superiority in extracting and interpreting important patterns from process and quality data in many areas, including computer science, biomedical engineering, materials science, chemical engineering and management science. In this presentation, some popular multivariate statistical approaches will be reviewed, such as projection to latent structures (PLS) and canonical correlation analysis (CCA), and their pros and cons will be analyzed as well. Afterwards, the new regularized latent variable regression (rLVR) algorithm will be covered, which employs consistent inner and outer modeling objectives, and it has shown to retain better prediction performance over PLS and CCA. The dynamic version, dynamic rLVR (DrLVR), and its monitoring framework, will also be designed for dynamic data modeling and monitoring.

### BIOGRAPHY:

Dr. Qinqin Zhu is an assistant professor in the department of Chemical Engineering at the University of Waterloo. She is also a faculty member in the Waterloo Artificial Intelligence Institute (Waterloo.AI) and Waterloo Institute for Sustainable Energy (WISE). Dr. Zhu received her master and PhD degrees from the Computer Science department and the Chemical Engineering department respectively, both at the University of Southern California. Prior to UW, she worked as a senior Research Scientist at Facebook Inc. in the United States.

Dr. Zhu's research mainly focuses on developing advanced statistical machine learning methods, process data analytics techniques and optimization algorithms in the era of big data with applications to statistical process monitoring and fault diagnosis. Her research addresses theoretical challenges and problems of practical importance in the area of process systems engineering. By leveraging the power of mathematical modeling and optimization, her group strives to develop advanced multivariate statistical analysis algorithms that enhance decision making in complex engineering systems.