# Chemical and Petroleum Engineering

KU

SEMINAR NOTICE

# Prasad Dhurjati

**Professor of Chemical & Biomolecular Engineering**
Joint appointment as Professor of Mathematical Sciences
and Professor of Biological Sciences
University of Delaware

**Prasad S. Dhurjati** received his Bachelor's in Chemical Engineering from the Indian Institute of Technology, Kanpur, India and his Ph.D. from Purdue University, also in Chemical Engineering. His research interests include: Systems Medicine and Systems Biology, Autism-Spectrum Disorders, BioProcess Engineering, Artificial Intelligence, On-Line Process Fault Diagnosis, Modeling and Simulation of Systems in Engineering, Biology, and Medicine.

His team's current research combines nearly four decades of expertise in biotechnology and artificial intelligence. This research has resulted in over a hundred publications that have been cited over 3200 times with an H-index of 32 and an i-10 index of 58. The top four papers have been cited over 1000 times. The research has also resulted in the training of nearly 40 graduate students and postdoctoral research fellows (who are currently well placed in industry and academia) and over 100 undergraduate research students. The key research accomplishments are in the fields of Biochemical engineering and "On-line fault diagnosis". Current research is in the area of Systems Biology and Modeling of Engineering Systems. In biotechnology, we are currently applying mathematical models and knowledge-based approaches to convert biological and medical data to useful knowledge. In chemical process systems, we have analyzed on-line data using hybrid mathematical-heuristic approaches to diagnose faults. Common to both these application areas are the use of dynamic models, qualitative domain knowledge and artificial intelligence approaches for data interpretation and knowledge integration.

## *"Systems-Level Model-Based Diagnosis of the Human Gut Microbiome"*

Abstract

The human gut is host to a diverse and complex ecosystem of over a thousand microorganisms that are collectively known as the "gut microbiome". The gut microbiome has already been correlated with over a hundred diseases and has created a revolution in medical science. These microbes play a major role in providing nutrition for our body and maintaining a strong immune system. Modeling of the spatiotemporal dynamics of the microbes is useful to investigate how the gut microbiome may influence "disease progression". The models could also help in designing strategies to dynamically manipulate the system trajectory away from a "disease" state to a "healthy" state. The importance of microbial dynamics will be illustrated in the context of our research on Autism Spectrum Disorders (ASD). System level modeling approaches using connectivity maps, rules, and mathematical equations have provided insights into the dynamic changes in the gut microbiome in ASD. Such system-level approaches can potentially be used for personalized and predictive diagnoses and for preventive nutritional recommendations.

## Tuesday, April 23rd

## 1:00 – 1:50PM | Spahr Auditorium