



# Computer Science Seminar



## Understanding Global Change: Opportunities and Challenges for Data Driven Research

**Dr. Vipin Kumar**  
**University of Minnesota**  
**Tuesday, April 21, 2015 at 9:30 am**  
**Room: Toomey Hall 260**

**Abstract** - The world's population is growing steadily and many countries are simultaneously industrializing. These processes are increasingly straining already scarce natural and food resources, which must scale up to keep pace with growing demand. As a result, scientists are tasked with providing answers to challenging questions such as: What is the effect of urbanization on regional land use and ecology? What is the impact of climate change on global water resources? How does deforestation affect the net carbon balance? How does increased biofuel production impact crop patterns and food availability? Addressing these interconnected, societally-relevant questions requires development of new computational methods that enable monitoring, analysis and understanding of changes in the Earth system, interactions between different processes, and their impacts on factors such as the carbon cycle, hydrology, air quality, and biodiversity.

This talk will present an overview of research being done in a large interdisciplinary project on the development of novel data driven approaches that take advantage of the wealth of climate and ecosystem data now available from satellite and ground-based sensors, the observational record for atmospheric, oceanic, and terrestrial processes, and physics-based climate model simulations. These information-rich datasets offer huge potential for monitoring, understanding, and predicting the behavior of the Earth's ecosystem and for advancing the science of global change. This talk will discuss some of the challenges in analyzing such data sets and our early research results. (Research funded by the NSF Expeditions in Computing Program, NASA, and Planetary Skin Institute).

**Brief Bio** - Vipin Kumar is currently William Norris Professor and Head of Computer Science and Engineering at the University of Minnesota. His research interests include High Performance computing and data mining, and he is currently leading an NSF Expedition project on understanding climate change using data driven approaches. He has authored over 250 research articles, and co-edited or coauthored 10 books including the widely used text book "Introduction to Parallel Computing", and "Introduction to Data Mining" both published by Addison-Wesley. Kumar co-founded SIAM International Conference on Data Mining and served as a founding co-editor-in-chief of Journal of Statistical Analysis and Data Mining (an official journal of the American Statistical Association). Kumar is a Fellow of the ACM, IEEE and AAAS. He received the Distinguished Alumnus Award from the Indian Institute of Technology (IIT) Roorkee (2013), the Distinguished Alumnus Award from the Computer Science Department, University of Maryland College Park (2009), and IEEE Computer Society's Technical Achievement Award (2005). Kumar's foundational research in data mining and its applications to scientific data was honored by the ACM SIGKDD 2012 Innovation Award, which is the highest award for technical excellence in the field of Knowledge Discovery and Data Mining (KDD).