CHE404XS2: Industrial minerals, Nanomaterials and material characterizations
(30 Hours of lectures and tutorials)

Objectives:

- Recall the chemistry of industrial minerals
- List the concept of nanotechnology
- Discuss the basic principles in characterization techniques

Syllabus:

- Industrial minerals: Introduction, classification and application of minerals such as Gypsum, Kaolin, Mica, Silica, Talc, Zeolite.
- Nanomaterials: Classification, synthesis, fabrication; application in water purification, catalysis, chemical sensors, energy conversion device, etc.
- Characterization techniques: Use of Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), Electrostatic Force Microscope (EFM), Magnetic Force Microscope (MFM), Scanning Electron Microscope (SEM), Transmission Electron Microscopy (TEM), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) and Thermo-Gravimetric Analysis (TGA) in characterization of above materials.

Evaluation:

- In-course Assessments 30%
- End-of-course Examination 70%

Recommended Readings:

- Barbara H. Stuart, "Polymer Analysis", John Wiley & Sons Ltd., 2002.
- Barry Carter and M. Grant Norton, "Ceramic Materials: Science and Engineering", Springer, Second Edition, 2013.
- Guozhong Cao and Ying Wang, "Nanostructures and Nanomaterials: Synthesis, Properties, and Applications", World Scientific Publishing Co. Ptc. Ltd., Second Edition, 2011.
- Zhen Guo, and Li Tan, "Fundamentals and Applications of Nanomaterials", Artech House, 2009.