ELE874 – Biomedical Instrumentation

• **Course Outline**
  
  http://www.ee.ryerson.ca/undergraduate/dcd/ele874.html

• **Key Knowledge to Be Acquired**
  
  This course deals with the application and design of medical instrumentation systems for which the source of the signals is living tissue or energy applied to living tissues. The major emphasis will be on, transduction principles, sensors, detectors, electronic signal conditioning and processing techniques, and electrical safety standards for medical instrumentation. Some of the major topics include: sensors and transducers - e.g. displacement, resistive, inductive, capacitive, piezoelectric, temperature, radiation thermometry, optical etc.; special-purpose amplification and signal processing techniques; ECG-EMG-EEG biopotential electrodes and amplifiers; non-invasive blood pressure, flow-rate and volume sensing and measurement techniques; respiratory plethysmography; electrochemical biosensors and laboratory instruments; medical imaging systems; and designs for electrical safety. Important instrumentation design concepts are illustrated through design labs, a project, and use of circuit simulation tools.

• **Key Skills to Be Mastered**
  
  In-depth understanding of various sensors, special purpose signal processing/conditioning as well as isolation/grounding/noise reduction techniques from a biomedical perspective should allow the student to be able to make informed design choices for effective design of biomedical systems. Important instrumentation design concepts will be reemphasized through design labs where students will design a biomedical signal acquisition system and interface it with microcontroller (PIC) and LabVIEW.

• **Potential Careers**
  
  Career as hardware/software Biomedical Design Engineer for development of Medical Devices and especially in research intensive hospitals.

• **Potential Employers**
  
  Medical Device/Imaging Companies (Medtronic, St. Jude Medical, GE, Philips, Simens, Brucker, Toshiba etc), Medical Insurance Companies, Medical Regulatory Organizations, and all research intensive Hospitals.

• **Graduate Studies**
  
  The knowledge/skill acquired will be a valuable asset for students planning for Graduate Studies in developing novel biomedical materials/hardware/sensors etc