**Biomanufacturing Sciences –**

**Challenges and Opportunities**

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**Abstract:** The biopharmaceutical industry has grown rapidly over the last two decades. One mission gaining more and more urgency in biopharmaceutical today is to possess in-depth knowledge and technology to make production faster and safer. In the recombinant protein area, mammalian cells are mainly used as the hosts for synthesizing and secreting products. Several parameters known to be important to bioprocess quality include cell line stability, productivity and protein quality. The mechanism how cells are responsive to culture environment and affected on its paths to the product amount and quality is elusive. Traditionally, optimization to bioprocesses is made based on imperial observation. Complementarily, systems biology emerges as an approach to gain an understanding of cellular mechanism by seizing ‘omics at multiple levels including metabolome, transcriptome, proteome and fluxome. Systems biology enables to make the cellular behavior predictable by mechanistic models so bioprocess optimization and control can be carried out using *in-silico* simulation. In the presentation, discussed are a few case studies showing systems biology approach being applied to investigate problems related with productivity, product quality and cell line stability: 1) A CHO genome-scale model integrated with ‘omics to predict cell growth, production and N-linked glycan profile; 2) Glycosylation control by medium supplementation guided by a mathematical model; 3) Understanding and controlling epigenetic changes in long-term continuous cell cultures for biotherapeutic antibody production; 4) Trace-metal impact; 5) Continuous Biologics Manufacturing.

**Bio-sketch**: Dr. Seongkyu Yoon is a Professor in the Department of Chemical Engineering, and the Ward Endowed Professor in Biomedical Sciences, at the University of Massachusetts Lowell. Currently he is working as a NSF/IUCRC, AMBIC (Advanced Mammalian Biomanufacturing Innovation Center) UMass Site Director, and leading Biomanufacturing Innovation Institute. He runs systems biology group conducting research in systems biotechnology, life science informatics, and regulatory sciences with goals to develop an innovative biomanufacturing platform of protein/cell/gene biotherapeutics. Dr. Yoon worked at Umetrics (Now Satorius) and Biogen before he joined UMass. He has PhD from McMaster University (Hamilton Canada).

**When: Tuesday, September 24, 2019 at 4-4:50 pm**

**Where: CBEC 2228**