Announcing the Final Examination of Alaa Alanezi for the degree of Master of Science

Time & Location: June 28, 2018 at 10:30 AM in BIO 212
Title: Cost and Environmental Impacts of Leachate Nitrogen/Phosphorus Management Approaches

Landfill leachate is a challenging wastewater to discharge into municipal wastewater treatment plants (WWTPs), the most common approach for leachate management, due to the presence of contaminants that may affect the performance of the treatment plant. Treatment, disposal, and transportation of leachate are expensive and therefore a concern.

Currently, sidestream treatment is becoming increasingly common in WWTPs prior to returning the liquid to the plant influent. For this research, a new treatment scheme is introduced combining centrate and leachate to reduce contaminants, recover phosphorus and nitrogen through struvite precipitation, and reduce energy requirements through anaerobic ammonium oxidation (Anammox). By combining the two waste streams, the respective limited nutrients (nitrogen in centrate and nitrogen in leachate) can be removed in a low cost chemical treatment resources can be recovered. Carbon contaminants and remaining nutrients can be removed in subsequent innovative biological treatment units.

The objective of this thesis is to conduct a cost analysis and environmental assessment of the proposed novel treatment approach and to compare it to more traditional landfill on-site leachate treatment approaches (e.g., membrane bioreactors (MBR) and sequencing batch reactors (SBR)). The study was completed with the use of spreadsheet-based models. Spreadsheets have been developed to evaluate treatment costs (Capital + O&M) for both the proposed nutrient recovery/biological and traditional on-site leachate treatments. Transportation costs of leachate to the WWTP have been studied and analyzed by the use of a spreadsheet model as a function of distance.

Major: Environmental Engineering

Educational Career:
Bachelor’s of Environmental Engineering, BS, 2016, Wilkes University

Committee in Charge:
Dr. Debra Reinhart, Chair, Civil. Environmental, and Construction Engineering
A H M Anwar Sadmani, Dr
Andrew Randall, Dr

Approved for distribution by Dr. Debra Reinhart, Committee Chair, on June 10, 2018.

The public is welcome to attend.