

November 2017

Funding for a PhD and MScEng Study: Chemical and Biochemical characterisation of faecal sludge for design of treatment processes

It is estimated that between 2.1 – 2.6 billion people in low- and middle-income countries rely on onsite technologies that produce tons of untreated faecal sludge (FS) every day. When septic tanks and pit latrines become full, the sludge that is collected is often disposed of in ways which pose serious public health and environmental risks. Effective design of treatment processes to render faecal sludge safe for disposal, or for beneficial use, requires adequate characterisation of the sludge properties. These vary widely from city to city due to local factors such as the type of latrine, usage patterns, collection systems, geography and climate. The eThekweni municipality has a range of onsite latrine systems, including pit-latrines, urine diversion latrines and septic tanks, which require emptying and disposal systems, and provide opportunities for relevant case studies; however the problem occurs world-wide.

The Pollution Research Group, School of Engineering (Howard College Campus, University of KwaZulu-Natal, Durban, South Africa), has secured funds from the Bill & Melinda Gates Foundation for a research and development project on faecal sludge management and the field testing of reinvented toilet prototypes. Under this funding, there are positions available for **one PhD student** and one **MScEng student** to undertake studies into the chemical and biochemical characterisation of faecal sludge for the design of treatment processes. These projects have the potential for collaboration with overseas research organisations.

The **PhD study** will focus on understanding the data requirements for designing faecal sludge treatment plants, and will include, but is not limited to, the following activities:

- From the literature establish what technologies are effective in treating faecal sludges, what methods are used in their design, and what characteristics of the sludge need to be determined in order to design a reliable and cost-effective process.
- Coordinate and interpret the data from associated MSc projects that investigate the characteristics of eThekweni faecal sludges.

The **MScEng study** will focus on measuring the extents of aerobic and anaerobic degradation in pit-latrine. Previous studies have noted the presence of an aerobic zone at the sludge surface in a pit-latrine, which contributes significantly to the biological degradation of the faecal material before it becomes covered over and anaerobic. The aerobic stage is not well understood because of the uncertainties about the surface conditions and the time that material remains aerobic.

Both positions will require versatile and self-motivated candidates who have a background in engineering (chemical or environmental) and the ability to programme in R. The research will involve laboratory and field work in communities situated in informal settlements and rural areas, and the handling faecal sludge and fresh human excreta (faeces and urine). For health and safety reasons, the successful applicant will need to undergo the necessary inoculations.

The positions will start from January 2018. A total bursary of **R 120 000** will be provided for the **masters** student (over 1 to 2 years) and **R 450 000** for the **PhD position** (over 3 to 4 years). Payment is made on set deliverables being achieved. The project will also cover the cost of a computer, tuition fees and all research operating expenses for conducting field work.

If you are interested in this position, please submit an electronic copy of your transcript, degree certificates and a CV with two referees and a covering letter explaining your motivation to **Ms Susan Mercer** (mercerc@ukzn.ac.za). Only shortlisted applicants will be contacted and the deadline for applications is **31st January 2018**.

Pollution Research Group Discipline of Chemical Engineering, School of Engineering

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