Recherche & Innovation

Date de l'offre :19/07/2017

CIFRE PhD THESIS PROPOSITION / OFFRE DE THESE CIFRE

PhD thesis subject: **Optimization of WWTP operation by modelling interactions of carbon, nitrogen, phosphorus and sulfur cycles.**

__Veolia__ est le leader mondial des services à l'environnement. Présent sur les cinq continents avec plus de 170 000 collaborateurs.

__Veolia__ apporte des solutions sur-mesure aux industriels comme aux collectivités dans quatre activités complémentaires : la gestion de l'eau, la gestion des déchets et la gestion énergétique.

Veolia Recherche et Innovation est doté de 2 principaux centres de recherche : Limay et Maisons-Laffitte.

La Recherche a comme principales missions : la gestion et la préservation des ressources naturelles, la limitation des impacts sur les milieux naturels, la préservation de la santé et du cadre de vie, le développement des sources d'énergies alternatives.

a) SUBJECT DESCRIPTION

Project partners (Who is involved)

Veolia Research and Innovation (VERI) is Veolia's corporate research entity with projects in the water, waste and energy domains. Thinking that smart ideas can have their part in climate change mitigation and resource preservation for this planet, we provide innovative solutions to these key challenges.

At VERI, the Digital Innovation Department is a nodal center when it comes to renewing our business with smart and digital initiatives. Acting as a catalyst in constant connection with our business units, the department put its mission on the fast delivery of high value and user-oriented services. Spectrum for interventions ranges from bringing performance jumps to our core processes for water or waste treatment, enabling operation excellence by better planning or decisions, fostering new digital services to extend our traditional activities and business models.

Université de Lyon (INSA and Irstea)

INSA Lyon is a famous French technical university and engineering school delivering Master of Science (diplôme d'ingénieur) and PhD degrees. The DEEP research center (http://deep.insa-lyon.fr/) is currently working on waste, water, environment and pollution issues by combining skills in chemistry, chemical engineering and environmental engineering. DEEP is associated to Irstea Lyon through the Re-SEED joined research center with the aim of developing a resource oriented approach for waste and wastewater treatment systems.

GHENT UNIVERSITY (UGENT)

Ghent University is a top 100 university and one of the major universities in Belgium. It distinguishes itself as a socially committed and pluralistic university, offering a broad spectrum of high-quality research-based educational programmes.
(www.ugent.be/en/ghentuniv/mission.htm).

The "Biosystems Control" research unit, headed by Prof. Eveline Volcke, focuses on efficient and sustainable process design and process control. Process optimization is realized through physical-based modelling and numerical simulations, complemented with lab-scale experiments and full-scale monitoring campaigns. Eveline Volcke has a specific expertise in wastewater treatment, including innovative biological nitrogen removal processes, greenhouse gas emissions and plant-wide assessment.
http://www.ugent.be/bw/biosysteemtechniek/en/research/biosystems-control/overview.htm

The context (What you will contribute to)

While we develop and demonstrate increased expertise in our operation regarding water quality sent back to the environment, air pollution is now a central challenge to address our clients with zero emission solutions. Hydrogen sulfide is today a main concern (toxic and corrosive gas, foul odour) and its treatment becomes a key point of a wastewater treatment plant.

As a PhD student in the Digital Innovation Department, you will be in charge of a project dedicated to hydrogen sulphide treatment and its consequences on carbon, nitrogen and phosphorus treatments and recovery, regarding performances of water and sludge lines.

The project aims to complement water and solids treatment lines for wastewater systems with integrated water control strategies, where we will consider innovations for sulphide treatment as well as source control schemes to avoid reduction of treated water and sub-products qualities (sludge and biogas). Through the project, we will develop new knowledge of the bio-chemical models involved in processes and along the treatment line and we will capture this into operational models for simulation and decision making.

Your mission (What you will do)

As part of your thesis, you will:

- understand the fate of sulfur species in a wastewater treatment plant;
- review existing literature and write state of the art reports on specific phenomena integrating sulfide, carbon, nitrogen and phosphorus cycles;
- participate in one or more experimental campaigns: understand measuring chain and possible limitations or drawbacks, propose new experimental design;
- analyze the field test results for quality check, data validation and reconciliation and perform preliminary exploratory analysis to discuss with domain experts (VERI, INSA, Irstea, UGENT);
- set-up and implement a general model approach (ASM-like or ADM-like) for sulfur transformations and associated mechanisms, including interaction between biologically, chemically and physically driven processes, to take advantage of both the experimental knowledge gathered in the study along with the state of the art models;
- run simulation to validate model behavior, at the system level (mass and energy balance, consistency tests, qualitative and quantitative check, …);
- evaluate the fate of sulfur species under different scenarios / consequences on operations / identification of best practices for sulfur monitoring;
- develop an optimization methodology of wastewater treatment and sub-products value according to wastewater characteristics and sulfide level
- write studies report, scientific communications, and present findings to various audiences.
- Close collaboration with internal and Technical Management expert is expected.

Expected Profile (Who we are looking for)

We are looking for people who are smart and determined, and we favor ability over experience.

Competencies

- You hold a MSc degree in a relevant discipline e.g. Chemical, Process or Environmental Engineering
- You have a good knowledge of or you show a strong interest in mathematical modelling, numerical simulation, computer programming, environmental technology and/or process optimisation
- You are eager to learn and you have a critical spirit
- You are able to work independently but you are also a team player
- You demonstrate good communication skills

You are a Master graduate student from university or engineering school. You think that simulations and models are key tools in our day to day job and can help solve critical challenges for a better environment. You have demonstrated capability to be efficient in some programming or scripting languages (e.g., Matlab- Simulink, C), and you are willing to develop new skills in modelling and data processing. Previous experience in relevant field (water treatment, biological and chemical engineering, simulation …) is an asset.

You have a clear and efficient communication style, orally as well as written.

Attitude

You have fun thinking the world in concepts and using equations and simulations to test ideas and solve concrete problems. You are curious and willing to learn when it comes to discovering new methods or new application fields. You are not shy to try. Your open mind will make it easy for you to integrate smoothly and contribute efficiently to multidisciplinary project teams. You are self-driven and a team player at the same time, as you think that great ideas come where personal intuition meets group emulation.
Does this sound familiar to you?
This is good news then: we are looking for someone like you.

(What we offer)

You can count on a stimulating environment to perform excellent research, profiting from

- the partners's vast expertise in the research topics and methodologies that are part of the proposed project
- high-quality guidance, including regular follow-up meetings
- interaction with highly competent and motivated colleagues
- access to unique experimental data
- the possibility to build up a large network, including both scientists and industrial partners
- self-development through participation in courses, workshops and conferences.

JOB TITLE: Thesis Researcher
SITE : Maisons-Laffitte (FRANCE) / Lyon(FRANCE) / Gent (BELGIUM) – the selected candidate will work alternately at all partner institutes ; the exact duration and time of these stays will be set by mutual agreement.
Starting date: From October 2017 to January 2018.
Contract: fixed-term contract of a maximum 3 years.
Application:
Must be sent before the 1st of November 2017 in English or in French with the following:
-Curriculum vitae
-Cover letter
-Master thesis description
Contacts:
VERI:
Daniel JUNG; daniel.jung@veolia.com; +33(1)34938167
Sofiane MAZEGHRANE; sofiane.mazeghrane@veolia.com; +33(1)34938244
INSA/ IRSTEA:
Pierre BUFFIERE; pierre.buffiere@insa-lyon.fr ;+33 (0)472 43 84 78)
Ghent University:
Eveline VOLCKE; eveline.volcke@ugent.be