

# Opportunity to conduct your BSc (thesis or internship) or Master project in The Netherlands.

## Internship announcement

2024/2025  
NHL Stenden



university of  
applied sciences

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# 1. Introduction

NHL Stenden University of Applied Sciences has opened some positions for students looking for practical internship, final year (BSc) thesis and/or master thesis in the Netherlands. Bachelor's/HBOs and master's students are welcome to apply for the offered positions. The project(s) will be conducted by the Water Technology Research Group (WTRG) at NHL Stenden (Water Technology Lecoraat)<sup>1</sup>. The selected students will have the opportunity to conduct practical (laboratory) and/or theoretical (model) work, depending on the project. The activities will take place in the Water Application Centre (WAC)<sup>2</sup>, in Leeuwarden. The projects conducted by the WTRG have a close link with different European companies and industries as well as with other research institutes like Wetsus<sup>3</sup>, Centre of Expertise Water Technology (CEW)<sup>4</sup> and other academic institutes, e.g. University of Amsterdam, Wageningen University and Research, HZ University of Applied Sciences, Van Hall Larenstein University of Applied Sciences.

## 2. What we offer/ask:

- 6 to 12 months of academic exchange at NHL Stenden University of Applied Sciences;
- 40 hours per week, from Monday until Friday (9am to 5pm);
- Standard NHL Stenden internship fee (650€/month);
- Opportunity to work in a project with practical (laboratory) research, linked with the Water Technology subject;

## 3. What we ask from you:

- To be regularly enrolled in a higher education institute following an under graduation (bachelor's/HBO/WO) or a graduation (master's) program;
- To be preferably enrolled in one of the following courses: Chemistry, Environmental Engineering, Sanitation Engineering, Chemical Engineering, Electrical Engineering, Mechanical Engineering, Physics or similar areas.
- To have (preferably) previous experience with Water Technology (Drinking Water/Wastewater Treatment);
- The student has to be proactive and work independently at times;
- Laboratory work experience.
- Some experience with the following procedures (techniques) is appreciated: drinking water/wastewater treatment, reactor design, aeration systems, hydraulics, thermodynamics.

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<sup>1</sup> <https://www.nhlstenden.com/onderzoek/watertechnologie>

<sup>2</sup> <https://www.waterapplicatiecentrum.nl/en/>

<sup>3</sup> <https://www.wetsus.nl/>

<sup>4</sup> <https://www.cew.nl/en/>

## 4. Projects

The projects that the applicant can work on are in the following subjects:

### 4.1 BiomEHD

At gas stations, tetrahydrothiophene (THT) is added to odorless biogas (and natural gas) for quick leak detection through its distinctive smell. However, for low bio and natural gas velocities, evaporation is not complete and the odorization process is compromised, causing odor fluctuations and undesired liquid accumulation on the pipeline. Inefficient odorization not only endangers the safety and well-being of gas users, but also increases gas distribution companies OPEX. To enhance THT evaporation during low bio and natural gas flow, an alternative approach involves improving the currently used atomization process. Electrohydrodynamic Atomization (EHDA), also known as Electrospray (ES), is a technology that uses strong electric fields to create nano and micro droplets with a narrow size distribution. This relatively new atomization technology can improve the odorization process as it can manipulate droplet sizes according to the natural and bio gas flow. **BiomEHD** aims to develop, manufacture, and test an EHDA odorization system for applying THT in biogas odorization. Preferable backgrounds: Physics, Chemistry, Chemical Engineering, Control and Automation Engineering, or Electrical Engineering.

### 4.2 NuclePar

Environmental nano- and micro-plastics (NMPs) are highly diverse. Accounting for this diversity is one of the main challenges to develop a comprehensive understanding of NMPs detection, quantification, fate, and risks. Nuclepar proposes the use of Electrohydrodynamic Atomization (EHDA) to generate NMPs (nano- and micro-plastics) coated with nucleic acids of different polymer types, sizes, and shapes, which can be used as support for detection of such particles using PCR-LAMP technology. If proven possible, Nuclepar might become a first step towards an easy NMPs detection tool. This knowledge will certainly impact current risk assessment tools, efficient interventions to limit emissions and adequate regulations related to NMPs.

### 4.3 NanoCatcher

This study aims to investigate the use of submerged drones (w/ membrane systems specially designed) as a sampling collection tool to monitor the

presence of submicrometric polymeric particles in water bodies. The samples collected will be analyzed using FFF+MALS, SEM and Py-GC.

Preferable backgrounds: Chemical Engineering, Chemistry, Environmental Engineering, Sanitation Engineering.

#### 4.4 AECTION

Electrohydrodynamic Atomization (EHDA), also known as Electrospray (ES), is a technology which uses strong electric fields to manipulate liquid atomization. Among many other areas, electrospray is currently used as an important tool for biomedical applications (droplet encapsulation), water technology (thermal desalination and metal recovery) and material sciences (nanofibers and nanospheres fabrication, metal recovery, selective membranes and batteries). A complete review about the particularities of this technology and its applications was recently published in a special edition of the Journal of Aerosol Sciences. Even though EHDA is already applied in many different industrial processes, there are not many controlling tools commercially available which can be used to remotely operate the system as well as identify some spray characteristics, e.g. droplet size, operational mode, droplet production ratio. The AECTION project proposes the development of an innovative controlling system based on the electrospray current, signal processing & control and artificial intelligence to build a non-visual tool to control and characterize EHDA processes.

Preferable backgrounds: Physics, Chemistry, Chemical Engineering, Control and Automation Engineering, or Electrical Engineering.

#### 4.5 BiMESpinning – Development of bipolar membranes by electrospinning

Ion exchange membranes are increasingly important for energy storage and conversion technologies. Among the different classes of IEMs, bipolar membranes (BPMs) have increasingly gained attention in the past decade. Bipolar membranes, which can dissociate water, are used in energy-related devices like acid-base flow batteries and water electrolysis.

Electrospinning is a hydrodynamic technique where a liquid droplet is electrified, stretched, and elongated to produce fibers. This method has been innovatively used to create bipolar membranes with a unique three-dimensional (3D) junction structure.

This project aims to develop an innovative bipolar membrane using the electrospinning technique to advance energy storage technologies.

Preferable backgrounds: Physics, Chemistry, Chemical Engineering, Control and Automation Engineering, or Electrical Engineering.

#### 4.6 WEnComMag

The debate over fossil fueled engines has spurred innovations aiming at enhanced performance and sustainability. Scientific evidence indicates the presence of water in water-diesel emulsions to improve engine performance, attributed to micro-explosions. Explosive vaporization of water droplets break up diesel emulsions into smaller droplets, resulting in shorter combustion times. This project proposes the use of Electrohydrodynamic Atomization (EHDA) and

employment of magnetic fields, to create stable water-diesel emulsions, during which nanobubbles can be formed and stabilized due to the magnetic fields' electric charging action. It is hypothesized that the charged bubbles can further stabilize the water-dieselemulsion and enhance explosive evaporation.

Preferable backgrounds: Physics, Chemistry, Chemical Engineering, Control and Automation Engineering, or Electrical Engineering.

#### 4.7 DesTCheck

Many regions worldwide experience very limited access to drinking water sources. Solaq develops Air-to-Water technology as a feasible solution, generating pure drinking water from air using 100% solar energy without the need for infrastructure. Results indicate water production at lower prices compared to current solutions, with potential for further improvements. The system uses 'wet desiccation', comprising a two-step process with an absorber and distiller. Utilizing solar energy, the system can produce water cost- and energy efficiently. The working principle of the distiller was previously tested at small scale. DesTcheck aims to develop and test the distillation process at full scale.

Preferable backgrounds: Chemical Engineering, Mechanical Engineering.

#### 4.8 SMART Green Houses

The proposed project aims to develop a spraying drone for crop protection in greenhouses, with a focus on protecting gerberas against pests, diseases and weeds. The use of crop protection products is increasingly restricted due to the risks to humans, animals and the environment, leading to protests from growers. Innovation is considered urgent to ensure affordable, healthy and sustainable crop protection.

The project investigates the feasibility of combating pests in greenhouses using a drone that automatically recognizes pests and applies small amounts of pesticides with great precision through the application of Electrohydrodynamic Atomization (EHDA).

Preferable backgrounds: Chemical Engineering, Chemistry, Environmental Engineering, Sanitation Engineering.

#### 4.9 SolidUS

SolidUS is a pilot size study targeting the development of a low-cost ultrasound sensor for real time monitoring of solids concentration in WWTP. SolidUS is an innovative solution as it proposes the development of a sensor, developed by two Dutch technology providers in close cooperation with a Brazilian partner, focused on providing solutions for modernization of the Brazilian WWTP.

Preferable backgrounds: Chemical Engineering, Chemistry, Environmental Engineering, Sanitation Engineering.

## 4.10 IsusMAG

This study aims to investigate the effect that certain magnetic fields have when applied to drinking water microbiome. Preliminary results show that a selective growth boost for bacteria with low nucleic acid content which prevents growth of the high nucleic acid content (HNA) bacteria is promoted. Ground water will be evenly distributed into two (pipe)lines where magnetic treatment will be applied to one. Samples will be taken for microbial population studies and flow cytometric measurements.

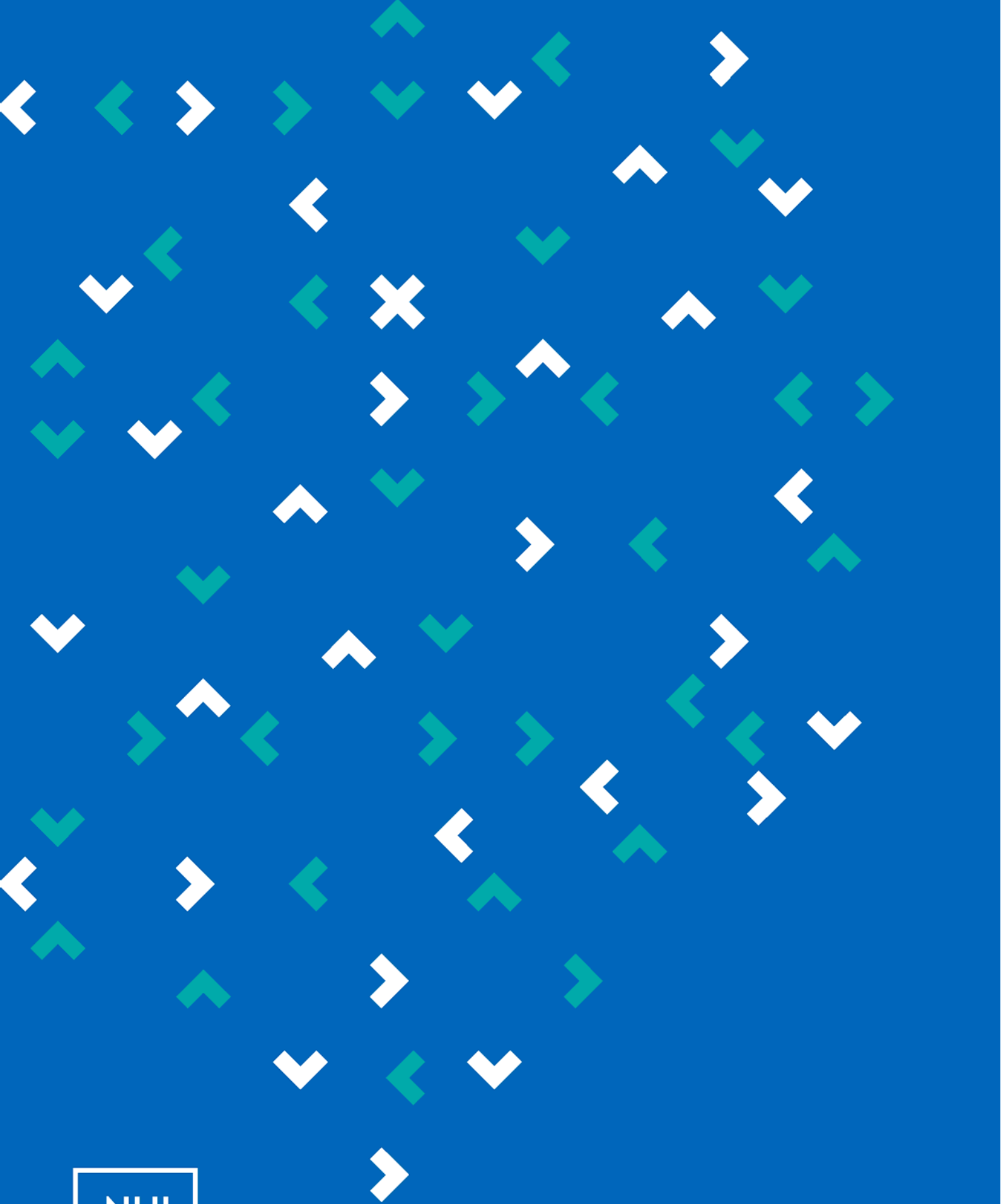
Preferable backgrounds: Chemical Engineering, Chemistry, Environmental Engineering, Sanitation Engineering.

# 5. Application procedure

Please mention which project subject you would like to apply for in your e-mail. The applicants have to submit the following documents to [claudia.sousa@nhlstenden.com](mailto:claudia.sousa@nhlstenden.com) and to [kelly.schneider.moreira@nhlstenden.com](mailto:kelly.schneider.moreira@nhlstenden.com) (please mention in the e-mail's subject "NHL Stenden internship – Your name and academic institution"):

- CV (in English);
- Motivation letter;

If you have any questions, you can reach us by e-mail: [kelly.schneider.moreira@nhlstenden.com](mailto:kelly.schneider.moreira@nhlstenden.com) and [claudia.sousa@nhlstenden.com](mailto:claudia.sousa@nhlstenden.com)



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