



Date  
June 2019

## **Information to applicants for the position as lecturer within water and environmental engineering**

### *History and organization – NMBU*

[NMBU](#)'s history begins with the establishment of an agricultural college at Ås in 1859. In 1897 the college was promoted to a "research college". In 2005 the college attained full university status and changed its Norwegian name to reflect this, and its current English name was established. In 2014, the university merged with the Norwegian School of Veterinary Science and again changed its Norwegian name. While still a two-campus university, the veterinary school will move into its new buildings at Campus Ås just outside of Oslo in 2020. After the merger, the university now has about 5200 students, 1700 employees (of which 800 in academic positions) and 64 study programs. The university is organized into seven faculties, each with its own governing board.

### *History and organization – Faculty of Science and Technology (REALTEK)*

[The faculty](#) has its origins in a series of smaller engineering institutes that existed under the former agricultural college. Its current name and status as a faculty (instead of an institute) was established in 2017 as part of a reorganization of the university after the merger with the veterinary school. REALTEK currently has about 130 employees, 70 PhD students and 1100 students. There has been a marked rise in student numbers in recent years and the faculty now offers study programs within a broad range of engineering disciplines as well as teaching degrees. In 2018 the faculty's main office building was completely renovated.

### *History and organization – water related disciplines at NMBU and REALTEK*

Water related disciplines – both scientific, environmental and engineering aspects – has a strong history at the university, with special emphasis on water in relation to agriculture. These issues were the responsibility of a dedicated hydraulic institute until 1990, when the non-engineering aspects moved to what is now the Faculty of Environmental Sciences and Natural Resource Management and the engineering aspects remained at what is now REALTEK. In the mid 1990s, the current civil engineering program in water and environmental engineering was established, now including non-agricultural related issues such as transport and treatment of municipal water and wastewater, as well as storm water management.



### About the current water group at REALTEK

The water group at REALTEK is responsible for the water and environmental engineering study program, described in more detail below. The group is called the WESH-group – Water, Environment, Sanitation and Health. It is organized together with the construction/architecture group in a joint section for civil engineering. The current composition of the group is shown in Table 1.

Table 1: List of employees in the WESH-group

Name	Title	Profile
<a href="#">Arve Heistad</a>	Professor	Decentralized WW treatment, water and health, resource recovery
<a href="#">Harsha Ratnaweera</a>	Professor	Conventional W&WW treatment, control of coagulation processes
<a href="#">John Morken</a>	Professor	Solid waste, biogas, life cycle assessments
<a href="#">Peder Tyvand</a>	Professor	Fluid mechanics
<a href="#">Lars Hem</a>	Adj. professor	Conventional W&WW treatment, water hygiene
<a href="#">Oddvar Lindholm</a>	Professor em.	Transport systems, storm water
<a href="#">Knut Kvaal</a>	Professor em.	Chemometrics, multivariate statistics, image analysis
<a href="#">Vegard Nilsen</a>	Postdoctoral fellow	QMRA, hydraulics, urban hydrology
<a href="#">Zakhar Maletskyi</a>	Postdoctoral fellow	Conventional W&WW treatment, membrane filtration
<a href="#">Hans Overgaard</a>	Researcher	Water related entomology/epidemiology (based in Thailand)
This announcement	Lecturer	«Transport systems»
Separate announcement	Prof./assoc.prof.	«Transport systems»
<a href="#">Andreas Högfeldt</a>	Lab. technician	Analytical chemistry
<a href="#">Elisabeth Sundheim Hoff</a>	Project coordinator	Administration

The activity in the group is high and in the very top of the faculty both with respect to teaching, publications and externally funded project activities. The group conducts research related to the topics mentioned in the table above and there are currently about 10 PhD students associated with the group. Several of the group members are involved in or leading large [international research and educational projects](#). The group has its office space in the recently renovated part of the REALTEK building.

The laboratory facilities of the WESH-group have been significantly improved in recent years. There is now a well-equipped lab for water analyses and a pilot plant for drinking water treatment. There is also a wastewater lab that receives black water and greywater from student dormitories. Furthermore, the faculty is a co-owner of a lab for anaerobic treatment of organic materials with both small-scale and pilot-scale facilities as well as thermal pretreatment equipment.



For teaching purposes, there is also a small hydraulics lab, and a small lab for demonstrating storm water concepts is currently being established. The group is a partner in the recently established green roof research infrastructure at Campus Ås. A new national centre for water infrastructure will be located at Campus Ås and is currently being planned. The centre will have a special focus on transport systems for water, wastewater and storm water. The centre will accommodate the water sector's need for training facilities, education and innovation.

#### About the study program

As already mentioned, the [five year study program](#) in water and environmental engineering was established in the mid 1990s, and includes both transport and treatment of water and wastewater, as well as storm water management. The program is organized in a traditional manner with the two – three first years being dedicated to basic mathematics and science courses, while the engineering courses are placed mainly in the last three years of study. The final semester is spent entirely on an MSc thesis (30 ECTS). An example study plan is shown in Figure 1 and an overview of the courses, for which the WESH-group is responsible, is shown in Table 2. Most of the courses listed in Table 2 are taken by water students, while some are primarily taken by students from other study programs (THT200, THT311, THT312). There has been a marked rise in student numbers in recent years – currently there are between 30 and 40 new students admitted each year (Figure 2). The academic year at the university is split into five periods, where intensive courses are taught in August, January and June while the main teaching periods are September – December and February – May.

År	Semester	5 SP	10 SP	15 SP	20 SP	25 SP	30 SP	300 SP	
5.	Juniblokk							60 SP	
	Vårparallell	MASTERGRADSOPPGAVEN							
	Januarblokk								
	Høstparallell	THT300			THT310				
	Augustblokk								
4.	Juniblokk							60 SP	
	Vårparallell	THT271		VANN220	THT280				
	Januarblokk	ECN120							
	Høstparallell	THT261		JUS100 <sup>a</sup>	THT320	GMLM105			
	Augustblokk								
3.	Juniblokk							60 SP	
	Vårparallell	VANN200		TBA201	TMP160	THT201			
	Januarblokk								
	Høstparallell	STAT100		BIO100	BIO130	TPS210			
	Augustblokk								
2.	Juniblokk							60 SP	
	Vårparallell	INF120		FYS210		KJM100			
	Januarblokk	THT100							
	Høstparallell	FYS102		MATH113			TBM120		
	Augustblokk								
1.	Juniblokk							60 SP	
	Vårparallell	FYS101		MATH112		BUS100 <sup>a</sup>			
	Januarblokk	FYS110							
	Høstparallell	PHI100/PHI101		MATH111		INF100			
	Augustblokk	IMRT100							

Grønn:	Obligatorisk grunnpakke
Rød:	Profillemner i VA-teknikk
Oransje:	Profillemner i renseteknikk
Gul:	Utbyttbare og valgfrie emner, se merknader

Figure 1: Example course structure for the water and environmental engineering program (in Norwegian).



Table 2: Overview of courses for which the WESH-group is responsible.

Course code	Course title	ECTS
<a href="#">IMRT100</a>	Introductory Project	5
<a href="#">THT100</a>	Civil Engineering	5
<a href="#">THT200</a>	Water Technology for Landscape Planners	10
<a href="#">THT201</a>	Rapid Methods for Assessing Environmental Parameters, Laboratory Course	5
<a href="#">THT261</a>	Water Supply, Sewerage and Drainage	10
<a href="#">THT271</a>	Treatment of Water and Sewage: Basic Course	10
<a href="#">THT280</a>	On-Site Wastewater Treatment - Planning, Design and Impact Assessment	15
<a href="#">THT291</a>	Solid Waste Handling and Technology	10
<a href="#">THT300</a>	Water Engineering	15
<a href="#">THT310</a>	Treatment of Water and Wastewater: Advanced Course	15
<a href="#">THT311</a>	Water Resources Management and Treatment Technologies	10
<a href="#">THT312</a>	Water management in cold climate	5
<a href="#">THT320</a>	Environmental Analysis	5
<a href="#">TPS200</a>	Fluid mechanics 1: Introduction	10
<a href="#">TPS210</a>	Fluid mechanics 2: Engineering	10

Antall startende

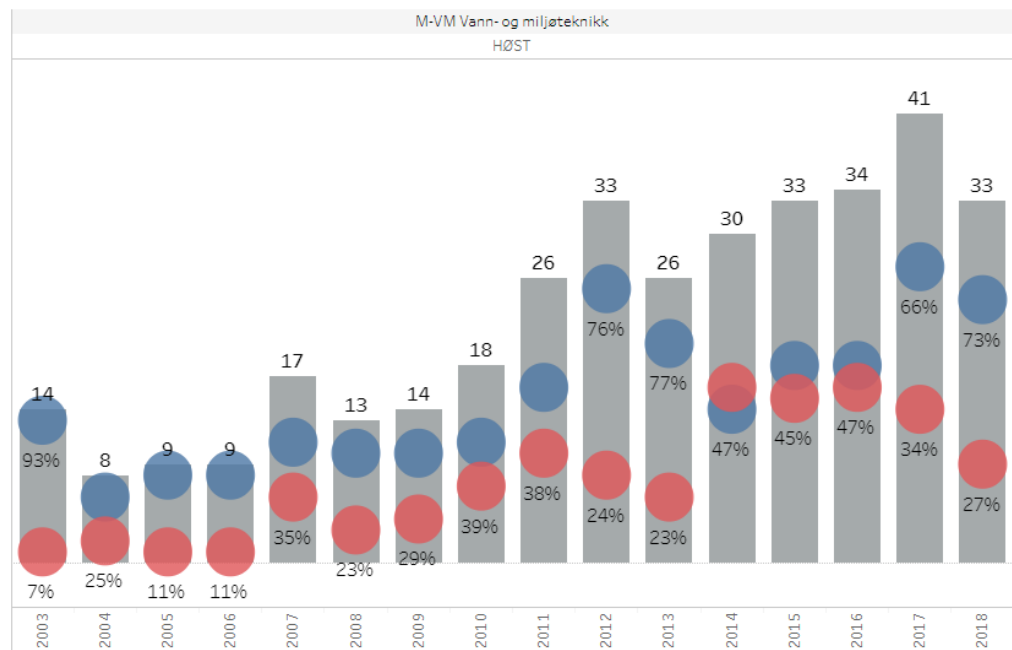


Figure 2: The number of new students admitted to the water and environmental engineering program (sum of first-year students and students admitted to the fourth year based on a bachelor's degree from other institutions). Blue and red dots represent the proportion of male and female students, respectively.



The study program will soon be subjected to an extensive periodic (every 7 to 10 years) internal and external evaluation. The core course structure remains largely unchanged since the program's inception, and it is expected that the periodic evaluation will lead to a revision and modernization of the program structure. Important elements of such a revision will be to provide courses that (1) clearly build on previous courses, that (2) make better use of the basic tools and knowledge that students gain in the first two years of study, that (3) are updated with respect to both content and tools that are important in current engineering practice and (4) ensure sufficient breadth and depth of the study program. There is also an ambition in the WESH group as well as a university strategic point, to make teaching methods more "student active" – i.e. that students are active participants in the teaching.

Overall feedback from students in the program is satisfactory although there are some recurring points of criticism. The teaching and supervision load in the group is high and inevitably affects the quality of teaching. Students are pointing out some omissions in the program, like a dedicated water chemistry course, a larger course offering on storm water management and more practical training in engineering design. The labor market for our students is good and most students quickly find employment towards the end of their studies, with consulting engineering firms, municipalities or suppliers of products to the water sector. The study program has an active and well-functioning student association, [AquariÅs](#).

#### *About the position*

The purpose of the present announcement is to fill an existing vacant position in the "transport" side of the WESH group. Traditionally, there is a division of labor within the group where one side takes care of water quality and water treatment, while the other side takes care of hydraulics, pipe and transport systems and storm water management. Such a division is to some extent artificial and we are obviously looking for candidates who are able make the connection between water quality and water transport. However, for teaching purposes we are fully dependent on recruiting someone who will be able to teach in our transport courses. With our current course structure, that includes the courses TPS200, TPS210, THT200, THT261 and THT300 as listed in Table 2. As mentioned above, we may expect changes to our course structure in the longer term, and the person who is employed will have the opportunity to help shape the structure of the study program.

Teaching is our primary mission and reason for existence at the university, and the tendency in the Norwegian academic sector is to put greater emphasis on quality in teaching, and including teaching merits to a greater extent when evaluating applications for promotion. The successful candidate for this position will have to demonstrate a genuine interest in quality teaching and a motivation for creating an excellent study program in our field. For teaching purposes, it is also necessary that candidates for the position possess some experience with actual engineering practice. Even though engineering MSc programs may be less professionally oriented today than they were previously, our graduates will still enter a world where they will solve very practical and concrete problems. We need teachers who have first hand experience with every day engineering practice and who can bring



this experience into the classroom. This is especially important for the broad introductory courses that aim to provide students with some insight and “feel” for their chosen specialization and what kind of work they may do once they finish.

If we are to single out a subarea where the need for increased and improved teaching and supervision competency is especially urgent, it would be storm water management. Students increasingly want to make storm water the topic of their MSc thesis work, which seems to be in line with the demand for storm water expertise in the labor market. Storm water management is complex, interdisciplinary and subject to an unstructured set of regulations, and we wish to improve our offering to our students in this area. Some examples of storm water topics that could have been better covered in our program are new digital tools and models, more training in actual design of storm water management measures, storm water quality and treatment, and knowledge of storm water in municipal planning processes. We would also like to strengthen the competency in our group on trenchless methods for pipe construction.

Quantitative and digital competency will also be given weight in the evaluation process. The water sector is also subject to digitalization and the water engineers of tomorrow will be expected to master digital tools and quantitative methods. Experience with scientific programming, statistics and mathematics as tools for research and practical problem solving will be considered a great advantage. Knowledge of digital tools that are used in engineering practice, such as GIS and CAD tools and hydraulic modeling software, will also be evaluated favorably.

As the great majority of our students are native Norwegian speakers and the “transport” courses mentioned above are taught in Norwegian, it is a requirement that candidates are fluent in one of the Scandinavian languages, both orally and in writing. Furthermore, it will be a great advantage if the person who is employed is familiar with the Norwegian water sector and the relevant regulations.

Besides meeting the existing need for teaching capacity, we are looking for candidates with expertise that will contribute something to the group beyond our current competency. The person who is employed will have ample opportunity to choose the direction of his/hers further career development.

Finally, we emphasize that the water group wishes to recruit a dedicated team player who takes an interest in making the group and the study program function as good as possible. Cooperative skills and -motivation will therefore carry significant weight in the evaluation of candidates. The water group is looking forward to welcoming a highly motivated new colleague who wants to help build a research group and study program for the future!