



IHE Delft Institute for Water Education

Education and Training Guide **2022**

**MSc Programmes
PhD Programme
Online & Short Courses**

10 Reasons to Study at IHE Delft

- Actionable, interdisciplinary programmes tailored for you
- All programmes work towards achieving SDGs
- 64 years of experience in graduate water education
- Personal guidance and mentoring
- Internationally renowned lecturers and professors
- A truly international environment
- The largest global water alumni network
- Close ties to UN system
- Gateway to Dutch water know-how
- Live and study in a friendly, vibrant city in the heart of Europe

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Join us to help resolve global and local water challenges



The recently issued 6th IPCC report confirms the increase of extreme climate events, many of which involve excess water or lack of it. Meanwhile, the 2030 target date for achieving the Sustainable Development Goals, including the availability of clean water and sanitation, is fast approaching and accelerated action is needed by all countries if they are to be attained.

We strongly believe that capacity development, including education and training, is key to addressing today's water challenges. Together with our partners, we continuously develop our curricula and methods of delivery; online, on-campus and blended, to meet the diverse needs of water professionals worldwide. The new MSc in Water and Sustainable Development builds on your background and interest, giving you the skills, knowledge and confidence to address the water challenges in your country or region. The programme, based on the latest scientific insights, is designed for those who want to act to resolve water-related challenges. The course, including the research period, is practical and applicable to any water-related challenges you want to address. Flexibility enables you, supported and guided by a coach, to build a programme that will help you achieve your goals.

If you are keen to pursue a career in research or academia, consider choosing our Research MSc in Water and Sustainable Development. Mostly similar for the first eight modules, it then offers in-depth training in academic and research skills and ample time to conduct your research, equipping you for your future career. The Research MSc will start in October 2023, but you can register now to receive further information.

Because today's water challenges require a holistic approach, we offer you an interdisciplinary setting in which you can actively work with and learn from staff and students in other disciplines.

Why is IHE Delft the place for you? It is part of the UN system: a member of UN-Water, the institute works under the auspices of UNESCO. This means that we are involved in high-level discussions about solving global water problems and in applying solutions at a local scale. Our world-class staff and guest lecturers, are - like our students - from very diverse backgrounds. Their vast experience from project work worldwide provide real examples for students. IHE Delft is small and friendly, with a big reputation worldwide and the largest alumni network of water professionals in the world. You will be part of that family after you graduate.

Do you need any more reasons to come and join us at IHE Delft? If you want to contribute to solving global water problems and enhance your career prospects at the same time, IHE Delft is the place for you.

Professor Eddy Moors, Rector



Delft, Netherlands, Europe

IHE Delft is located in the historical centre of Delft, a city of great charm characterized by ancient canals, beautifully kept monuments and historic squares. It is also a young, vibrant city with a large student population and an ideal starting point to explore the Netherlands and Europe.

A home in the heart of Europe

Delft is known for its historic town centre with canals, Delft Blue pottery, painter Johannes Vermeer and scientist Antony van Leeuwenhoek and its association with the royal House of Orange-Nassau.

Since Delft is a university city, there are plenty of cultural events and an abundance of cafés and restaurants, catering to every taste and making time spent away from your studies enjoyable and relaxing.

Safe cycle paths throughout Delft and the Netherlands provide recreation, exercise and a free means of commuting to IHE Delft from your student accommodation, none of which is far from the Institute.

Water has always played an important role in both the Netherlands' and Delft's history and continues to do so today. Therefore, it is no surprise that many science and technology organizations related to water have chosen Delft as their home base. IHE Delft maintains close working relationships with various Delft-based research and education institutes, such as the Delft University of Technology, Deltares and the Delfland Water Board.

Delft is well connected to the efficient Dutch public transport system, making The Hague, Rotterdam, Schiphol International Airport and Amsterdam easily accessible. It is a great location to start exploring other places of interest, both within the Netherlands and Europe.



Water has always played an important role in both the Netherlands' and Delft's history.

Housing

Delft is a university city, and therefore accommodation is scarce and expensive. This is why IHE Delft provides fully furnished accommodation in Delft for all students of the Institute's Delft-based programmes, available upon arrival and for the duration of the study period. Advice and assistance will be provided to students of all other programmes.

Your international experience

Staff at the Institute simplify your transition to the Netherlands by organizing the annual 'Introduction Days'. In these two weeks, they help you deal with various formalities such as residence permits, health insurance and bank accounts. Other activities during this period offer opportunities for new students to meet each other and receive the friendship and advice of senior students and the Institute's staff.

Throughout your study period, IHE Delft organizes social, cultural and sports events, allowing you to get the most out of your free time. You are eligible for a pass to use TU Delft's sports facilities, including the gym, and to take part in numerous sports and cultural classes. Every year, trips are organized that stimulate you to discover Dutch culture, Delft, the Netherlands and Europe.

The institute's facilities and services

- Modern teaching and research laboratories in the field/treatment of: wastewater; faecal sludge; drinking water; process technology; aquatic ecology; analytical techniques, including molecular- and microbiological, equipped with state of the art instrumentation;
- A library with online connections to national and international resource centres, and a reading room containing many international journals and magazines;
- Modern classrooms and multifunctional lecture theatres;
- A fully equipped auditorium seating 300 and a videoconferencing studio;
- Laptops for all participants, strong Wi-Fi and extensive computing facilities;
- Flexible and group work-spaces;
- A restaurant offering a wide variety of meals and snacks;
- Social and cultural activities, sports facilities and events;
- International student health and counselling services;
- An in-house prayer and meditation room.

A Network for Life

Many alumni say 'it transformed my life' when describing their experience of studying at IHE Delft. They talk about learning from each other, as well as from the world-renowned teaching staff. They loved their exposure to other cultures and disciplines among the staff and student body and the fact that they built a network for life - the largest water professional network in the world.

Today, several ministers, heads of water-related institutions and top scientists around the globe are IHE Delft graduates.

Alumni network

After graduation, you will be part of the largest network of water professionals in the world. IHE Delft will continue to facilitate the communication between you, your former classmates, and the Institute. You will receive news about the Institute and the water sector on a regular basis through e-newsletters. You are encouraged to join the IHE Delft Alumni group in your country, where you can meet fellow alumni and enjoy social and professional activities.

With an IHE Delft degree you will have taken a major step in your professional career. Many alumni reach prominent positions in which strategic, managerial, policy and decision-making components become major responsibilities of their functions. You will, over time, wish to keep your skills and knowledge refreshed, to stay up to date with changing professional demands. As part of their lifelong learning programme, IHE Delft offers online and face-to-face courses and seminars, covering themes of direct relevance to different regions. Alumni are entitled to discounts on the tuition fee for attending IHE Delft short and online courses and purchasing publications.



Make IHE Delft your network

IHE Delft acts as a hub for partnerships and networks across the globe, linking global knowledge to local sector agendas. The Institute collaborates with a wide range of public and private partners, comprising a wide range of fields and technical cooperation in human and institutional capacity building. These partners, at the international, United Nations, EU and national levels, include education and research centres, the (Dutch) Water Sector, funding agencies, NGOs and governmental organizations. These partnerships add value to many of the Institute's activities. The Institute maintains close working relationships

with many regional and local networks, which facilitates the transfer of scientific and technical expertise, and strengthens the capacity of water professionals and institutions. Many of these networks are thriving professional communities, encouraging joint research, knowledge sharing and the development of sustainable water solutions.

As a student, you profit from the professional contacts the Institute has made since its inception. When studying at IHE Delft, you can expect to learn from leading figures from the international water arena. Your professors and lecturers will put your study in the context of global dialogues and targets such as the Sustainable Development Goals.



MSc Programmes

Everyone who decides to study at IHE Delft has their individual motivation, but all wish to contribute to solving water challenges in some way. How you achieve this and meet your career goals will depend on your disciplinary background and professional interests. Our two unique MSc Programmes can help you get there.



MSc in Water and Sustainable Development

The one-year (68 EC) MSc in Water and Sustainable Development is designed so that you can either focus on your chosen subject within one of the four thematic tracks: Water Hazards, Risks and Climate; Water and Health; Water, Food and Energy; and Water Resources and Ecosystem Health and study it from different perspectives (profiles): Engineering and Hydrology, Governance and Management, Environment or Digital Innovation. Alternatively, you can combine profiles from different tracks to build your customized programme, to meet your specific interest and needs.

You will write a thesis to complete your MSc – a mentor will help you develop the proposal and support you through the writing process. Interwoven throughout the programmes is a series of professional skills sessions, such as science communication, group dynamics and leadership, which will further support you in your career development.

Research MSc in Water and Sustainable Development

If you are interested in a career in research or academia, you may prefer the two-year (120 EC) Research MSc in Water and Sustainable Development. It follows a similar trajectory for the first year, with a variation in course work, to reflect the emphasis on accumulating research skills. In the second year, you will focus on conducting your research, with additional training in science philosophy, research techniques and academic writing, amongst other relevant topics.

The Research MSc will start in 2023.
For more information and instructions on how to pre-register, see page 20 and 21.



KEY FEATURES

Customized study trajectories

The programmes offer maximum flexibility to customize study trajectories to individual learning needs and career opportunities.

Active coaching

Coaches support students in building their customized programme and provide study advice throughout the programme.

Interdisciplinary

Learning activities within the programmes encourage multidisciplinary collaborations and engage students with interdisciplinary approaches.

Problem-orientated curricula

The programme offers problem-orientated curricula based on actual water-related challenges that engage students in critical and innovative thinking, to be able to handle future challenges.

Professional skills

The programme stimulates the development of (inter)personal and cognitive competences, necessary to create a well-rounded professional, confident in communicating, persuading and providing leadership.

Lifelong learning

Continued learning after graduation is encouraged through online courses, webinars, refresher courses and other activities provided for alumni.

**Graduate education
at IHE Delft is
science-based and
highly relevant for
those interested
in water and
development.**



MSc in Water and Sustainable Development

If you seek a science-based MSc degree that is anchored in professional practice, the MSc in Water and Sustainable Development is ideal for you.

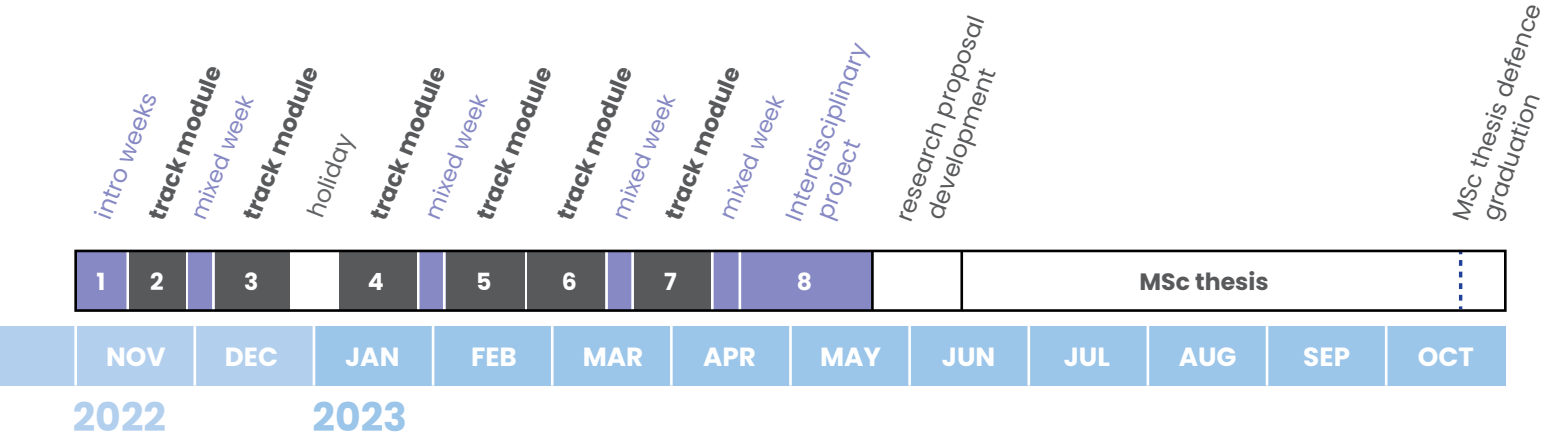
This programme targets early and midcareer water professionals with a recognized Bachelor's degree, who have the ambition to gain knowledge and skills to tackle water challenges while enhancing their career opportunities within the water sector or related organizations.

The one-year duration keeps the time away from work and home to a minimum. The programme

allows you to stay connected with the sector and/or your employer through the option of co-designing the thesis topic. The programme's curriculum consists of common parts, thematic track modules and a thesis research part. The contents of the common parts are the same for all students, whereas the thematic track modules and MSc thesis research are part of a customized learning trajectory based on your personal learning ambitions.

Academic calendar

Master of Science in Water and Sustainable Development



Common parts

An important characteristic of the MSc Programme is its orientation towards professional practice. Besides disciplinary and interdisciplinary knowledge of the water field, the programme emphasises the development of transferable skills, academic as well as non-academic.

The track modules are interspersed with so-called mixed weeks, in which one or two days are reserved for exams, half a day for portfolio development and coaching, while the remaining days are dedicated to skills training.

In the interdisciplinary project (module 8), you make a preliminary analysis, from an interdisciplinary perspective, of a water-related problem, work in teams to formulate possible solutions and propose measures to address the identified problems, threats and opportunities.

This programme will start in November 2022 – for more information and instructions on how to apply visit www.un-ihe.org/master

THEMATIC TRACK	DISCIPLINARY PROFILE
Water, Food and Energy	engineering
	governance and management
	environment
	digital innovation
Water Hazards, Risks and Climate	engineering and hydrology
	governance and management
	digital innovation and hydroinformatics
Water and Health	engineering
	governance and management
	sanitation
Water Resources and Ecosystem Health	engineering and hydrology
	governance and management
	environment
	digital innovation

Thematic track modules

After the joint start in module 1, you follow six modules based on your personal learning objectives and academic background. For the ease of guiding students, these modules are grouped in four closely connected and partly overlapping thematic areas. The broad thematic areas are based on societal water challenges and build on the available teaching and research expertise within IHE Delft. Within the thematic track, you can choose a disciplinary profile.

Water, Food and Energy

Food and energy production requires substantial amounts of water. At the same time, water scarcity and the decline of ecosystems threaten equitable access to food and energy.



What will I learn?

You will examine water related linkages between food and low-carbon energy production, critically assessing possible trade-offs and synergies. Integrated approaches for land and water management will be considered in the broader context of land tenure and water reform processes, relating this to markets, technologies and social justice. You will learn to critically analyse how changes in water and land allocation, to produce food and energy, shape processes of rural transformation and livelihoods of different groups in society. Depending on the profile you choose, you will learn to develop appropriate governance mechanisms and digital innovations; plan, design, operate and maintain irrigation infrastructure or develop and integrate new and existing forms of water-based energy, amongst many other subjects. In summary, this track aims for society's transformation to more sustainable and equitable practices.

Is it right for me?

Whether your goal is to excel as an irrigation or energy engineer, to work in policy development, as a computer modeller for water or energy use or to pursue many other careers in the field of water, food and energy, this track will give you a head start.

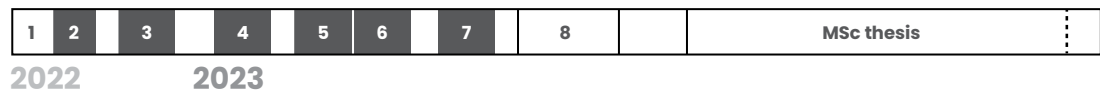
Helped by your coach, you choose from disciplinary profiles (see diagram below), allowing you to focus on a specific aspect of the track or to mix and match (also across tracks), to give you a broader view of the topic.

Check our website to see a list of eligible bachelor degrees and the recommended preparatory courses.



“ Access for all to water, food and energy, while safeguarding the environment, is a big challenge.”

Charlotte de Fraiture
Professor of Land and Water Development



MODULE 2

Introduction to Water, Food and Energy

MODULE 3 OPTIONS

- Water-energy nexus
- Water in agriculture
- Rethinking water
- Introduction to digital innovations

MODULE 4 OPTIONS

- Energy sourcing in the urban landscape
- Enhancing irrigation performance and monitoring
- Organizing water
- Hydrological monitoring, data collection, analysis and assessment

MODULE 5 OPTIONS

- Marine renewable energy sources
- Irrigation system management, design and modernization
- Institutional analysis of water use practices
- Food system transformation
- Artificial intelligence for water systems

MODULE 6 OPTIONS

- Hydraulic design of structures
- Water conflict management and tools for water diplomacy
- Policy analysis
- Wetlands for livelihoods and conservation
- Remote sensing for agricultural monitoring

MODULE 7 OPTIONS

- Dams and hydropower
- Operational management of water systems
- Change and advocacy
- Reuse of wastewater for agriculture
- Sensing and geo-processing for precision agriculture
- Integrated modelling of water, environmental and social systems

- engineering
- governance and management
- environment
- digital innovation

Water Hazards, Risks and Climate

Climate change and related exceptional weather conditions are here to stay. Whether it concerns droughts, floods or any of the other climate extremes, the world urgently needs to adapt to ‘the new normal’



What will I learn?

There are three main components to this track: describing and quantifying spatiotemporal climate risks; developing fit-for-purpose adaptation pathways and associated measures and defining appropriate approaches in governance, engineering and information. Depending on your interest, you might focus on cities, river basins, coastal or dryland areas, that all come with their own particular climate challenges. Depending which profile you choose, amongst a wide range of other topics, you will learn about water sensitive cities and sustainable urban drainage; climate adaptation politics, water conflicts and financing; drought and flood management; artificial intelligence and decisions support systems or about sea level rise and coastal adaptation in rapidly urbanizing deltas.

Is it right for me?

Whether your dream is to become a chief resilience officer, an adaptation expert in a water agency or consultancy, an expert on nature-based solutions, a policy advisor, a risk modeller or a designer of participatory adaptation approaches, this track will give you a head start.

Helped by your coach, you choose from disciplinary profiles (see diagram below), allowing you to focus on a specific aspect of the track or to mix and match (also across tracks), to give you a broader view of the topic.

Check our website to see a list of eligible bachelor degrees and the recommended preparatory courses.



“Climate change dominates the headlines. To adapt, you need to understand the scale and the characteristics of affected regions and people. Join us in this important task.”

William Veerbeek
Senior Lecturer in Flood Resilience
Water Hazards, Risks and Climate track lead

1	2	3	4	5	6	7	8		MSc thesis	
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MODULE 2

Introduction to Water Hazards, Risks and Climate

MODULE 3 OPTIONS

- Waves, tides and sediment budget
- Drainage and sewerage
- Hydrology and ecosystems
- Rethinking water
- Modelling, programming and computational hydraulics

MODULE 4 OPTIONS

- Coastal processes and morphology
- Analysis of climatic and hydrological variability and change
- River basin modelling
- Organizing water

MODULE 5 OPTIONS

- Modelling coastal hazards
- Geoprocessing in urban water
- Drought management
- Water conflict and cooperation (incl. law)
- Finance and implementation
- Artificial intelligence for water systems

MODULE 6 OPTIONS

- Design of risk reduction measures in coastal zones
- Sustainable urban drainage systems
- Flood risk management
- Water conflict management and tools for water diplomacy
- Policy analysis

MODULE 7 OPTIONS

- Climate change adaptation in lowland areas
- Strategic planning and design
- Urban ecosystems in a changing climate
- Decision support systems in water domain

- engineering and hydrology
- governance and management
- environment
- digital innovation and hydroinformatics

Water and Health

Safe water and sanitation are the primary drivers of public health and are human rights. Improving service levels towards safely managed drinking water and sanitation such as regulated piped water and a complete sanitation service chain, can dramatically improve public well-being.



What will I learn?

This track engages with the direct and indirect linkages between water and health. You will learn how wastewater, drinking water and sanitation relate to urbanization, climate change, human behaviour and aspirations. You will be introduced to the key management and governance dimensions, challenges and solutions. Depending on the profile you choose, you will learn to adequately evaluate, develop, design, and manage sanitation or drinking water provision, including treatment and re-use, transport and distribution, or learn more about the broader technological, socio-economic and public health issues, including management and governance.

Is it right for me?

If your ambition is to become a drinking water expert, or an expert in sewerage and non-sewerage sanitation, a hygiene or reuse expert, this track will be your springboard. Depending on the profile you choose, you can work for instance in the humanitarian sector, a consultancy firm, water board, drinking water company, environment agency, water inspectorate, or government.

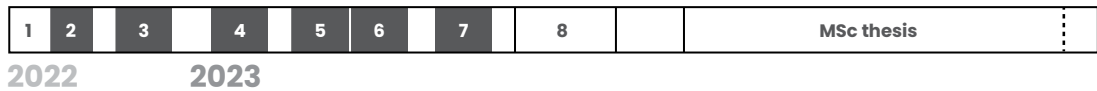
Helped by your coach, you choose from disciplinary profiles (see diagram below), allowing you to focus on a specific aspect of the track or to mix and match (also across tracks), to give you a broader view of the topic.

Check our website to see a list of eligible bachelor degrees and the recommended preparatory courses.



“ The statistics are grim, yet huge progress has been made in improving health through clean water and sanitation provision.”

Tineke Hooijmans
Associate Professor of Sanitary Engineering
Water and Health track lead



MODULE 2

Introduction to Water and Health

MODULE 3 OPTIONS

- Surface water treatment
- Drainage and sewerage
- Rethinking water
- City-wide inclusive sanitation

MODULE 4 OPTIONS

- Groundwater treatment
- Wastewater treatment processes and technologies
- On-site sanitation and treatment
- Organizing water

MODULE 5 OPTIONS

- Water transport and distribution
- Sludge treatment and resource recovery
- Institutional analysis of water use practices
- Finance and implementation

MODULE 6 OPTIONS

- Drinking water treatment plant design
- Wastewater treatment design
- Policy analysis
- Humanitarian WASH

MODULE 7 OPTIONS

- Desalination and water reuse
- Operational management of water systems
- Industrial water and resource management
- Experimental methods for water, sanitation and environmental technology
- Change and advocacy

- engineering
- governance and management
- sanitation

Water Resources and Ecosystem Health

Globally, ecosystems and the water resources they support are in perilous decline. Maintaining healthy ecosystems is the basis for delivering resources equitably and efficiently to support people’s health and well-being and is the basis for sustainability.

Pantanal Wetlands, Brazil

What will I learn?

You will learn about the movement of water through the landscape and how to apply this knowledge to support sustainable management of river basins. You will study the basic concepts and interlinkages in the biosphere, the role of biodiversity, the hydrological cycle, their relationship with ecosystem health and how this underpins human health and wellbeing. Depending on the profile you choose, you will learn about measuring and monitoring, data analysis, GIS and remote sensing, simulation modelling, the value of open access data and software, river basin development and environmental management policy processes, and methods for planning and managing. Ultimately you will be able to apply your expertise to achieve sustainable Water Resources and Ecosystem Health in an interdisciplinary setting.

Is it right for me?

If your ambition is to become a water resources or river basin manager, hydrologist, aquatic ecosystem scientist, modeller or GIS and Remote Sensing expert, or pursue a related career, studying this track will be your springboard.

Helped by your coach, you choose from disciplinary profiles (see diagram below), allowing you to focus on a specific aspect of the track or to mix and match (also across tracks), to give you a broader view of the topic.

Check our website to see a list of eligible bachelor degrees and the recommended preparatory courses.



“ Water doesn’t just come from a tap: healthy ecosystems provide the resources society needs to survive.”

Graham Jewitt
Professor of Hydrology
Water Resources and Ecosystem Health track lead



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MODULE 2

Introduction to Water Resources and Ecosystem Health

MODULE 3 OPTIONS

River basin monitoring and management

Hydrology and ecosystems

Rethinking water

Introduction to digital innovations

MODULE 4 OPTIONS

Hydraulics for engineering applications

River basin modelling

Organizing water

Water quality assessment and management

Hydrological monitoring, data collection, analysis and assessment

MODULE 5 OPTIONS

River morphodynamics

Surface water and groundwater flow dynamics

Finance and implementation

Aquatic ecology and bioassessment

Artificial intelligence for water systems

MODULE 6 OPTIONS

Hydraulic design of structures

Hydrochemistry and hydrological tracers

Environmental impact assessment (incl. law)

River and floodplain rehabilitation

Water resources assessment and allocation using spatio-temporal data

MODULE 7 OPTIONS

Dams and hydropower

Operational management of water systems

Water conflict and cooperation (incl. law)

Strategic planning and design

Hydrological modelling

Integrated modelling of water, environmental and social systems

engineering and hydrology

governance and management

environment

digital innovation

Entry Requirements

To get admission to the programme, you should have a Bachelor's or equivalent degree in a field relevant to the study programme. The degree should be at least equivalent to a UK Upper Second-Class Honours degree or a GPA score of at least 75% of the scale maximum. Relevant work experience can compensate for a slightly lower academic entry level. For each track/profile combination a list of accepted Bachelor's degrees is available on our website. The admission procedure also includes an English language proficiency check.

In consultation with their coach, students may choose one of the predefined profiles within a thematic track or compose their own tailormade multi-disciplinary trajectory within or across the thematic tracks. The students below demonstrate how it can work.

Juan has a background in hydrology and is interested in floods in urban areas, hydroinformatics tools and design of climate adaptation measures. He could combine modules of the engineering and digital innovation profiles within the Water Hazards, Risks and Climate track.

Introduction to the theme Water Hazards, Risks and Climate
Analysis of climatic and hydrological variability and change
Geoprocessing in urban water
Flood risk management
Modelling, programming and computational hydraulics
Decision support systems in the water domain



Salma has a background in environmental sciences and agriculture and is interested in developing and implementing sustainable water resources management solutions with a focus on ecosystems which produce food. She could follow the environmental profile within the Water Resources and Ecosystem Health and Water, Food and Energy tracks.

Introduction to the theme Water Resources and Ecosystem Health
Hydrology and ecosystems
Water quality assessment and management
Food systems transformation
Wetlands for livelihoods and conservation
Reuse of wastewater for agriculture

Students are academically admitted to the programme based on their initial preference for a track and profile. Engineering and digital innovation profiles will require a more technical background, whereas environment and governance profiles will accept students from a wider range of disciplines.

Once the admission is final, students interact with a coach to explore which individual study trajectory best fits their learning ambitions. The scope of modules students can choose from depends on their background. Preparatory courses are available online to fill knowledge gaps so as to expand their options.

Although work experience is not a pre-requisite, it is an asset. Preference will be given to candidates with at least two years of relevant work experience and clear ideas of how the study will open up career perspectives.

Once the admission is final, students interact with a coach to explore which individual study trajectory best fits their learning ambitions.



Rose has a background in public administration and wishes to discover pathways for more equitable and sustainable agricultural and energy policies. This water governance and management profile within the Water, Food and Energy track prepares her to contribute to socially inclusive and environmentally sustainable strategies related to agriculture and/or low-carbon energy.

Introduction to the theme Water, Food and Energy
Rethinking water - irrigation and energy
Organizing water - water users associations, decentralized systems
Institutional analysis of water use practices - land tenure water reform
Policy analysis - agrarian change, biofuels, water reuse
Change and advocacy - grassroot initiatives

Sajid has a background in civil engineering and wishes to explore the linkages between drainage and sewerage, treatment processes and technologies and the planning, management including financing of treatment plants. This interdisciplinary path within the Water and Health track prepares him to formulate and critically assess inclusive and sustainable management of waste water treatment interventions.

Introduction to the theme Water and Health
Drainage and sewerage
Wastewater treatment processes and technologies
Finance and implementation - value chains
Policy analysis - WatSan and health policies
Change and advocacy - water and sanitation



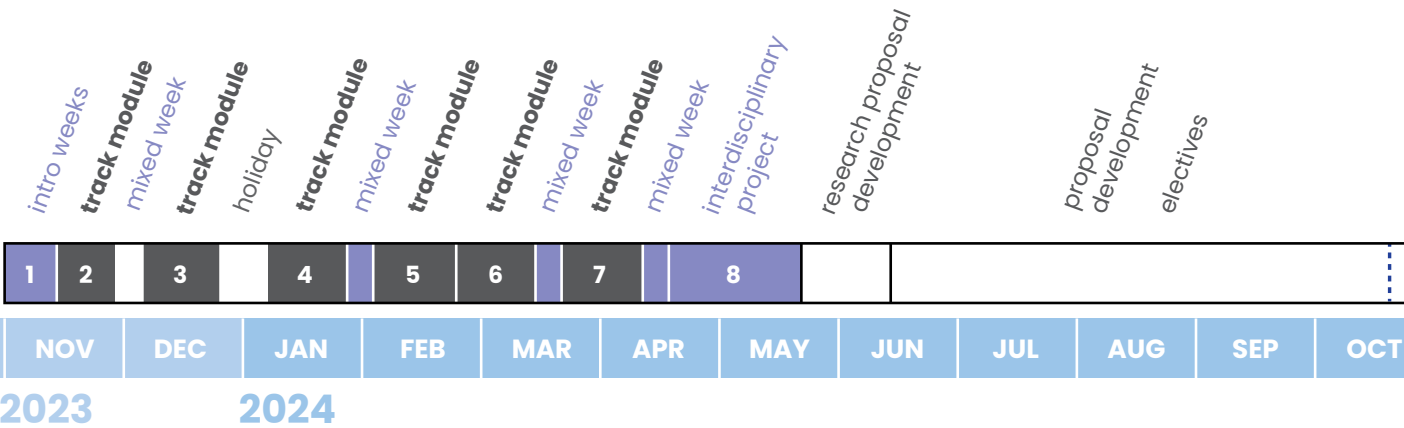
Research MSc in Water and Sustainable Development

The Research MSc in Water and Sustainable Development will equip and prepare you for a career in research, academia or to pursue a PhD.



Academic calendar

Research Master of Science in Water and Sustainable Development



This programme targets early and mid-career water professionals with a recognized bachelor degree who are primarily interested in a career in research or academia and/or would like to pursue a PhD in a water-related area.

During the course of the two-year programme, you will develop academic and cognitive competences to create new knowledge and solutions needed to address complex water challenges in inclusive and sustainable ways.

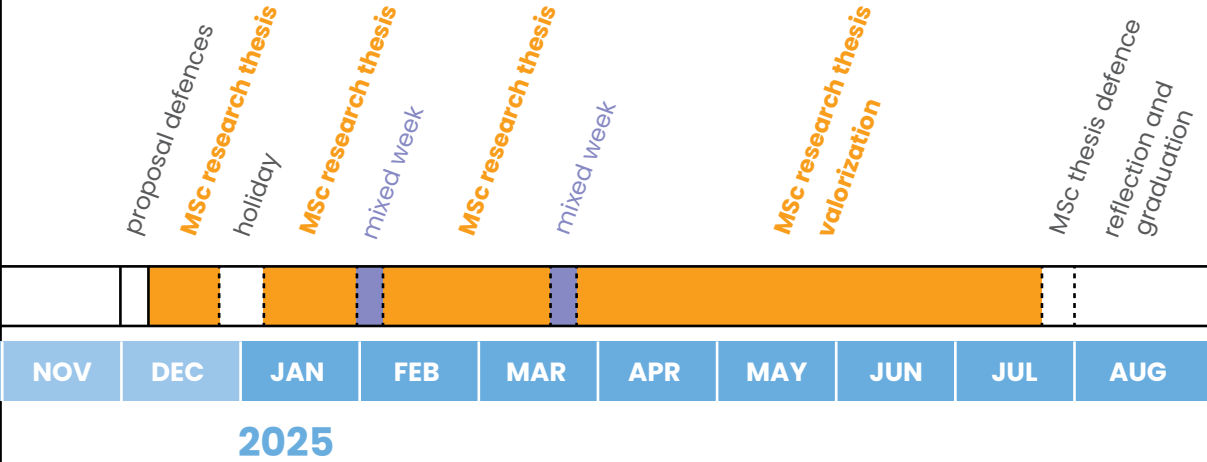
Because most water problems transcend a single discipline, the programme adopts a multi- and interdisciplinary approach, whilst building a depth of knowledge in your own field of interest. Thus, to prepare you for a career in research or a PhD, solid

knowledge and expertise in your own field of study is combined with academic and non-academic skills development. The goal is to enhance personal attributes, such as critical thinking, research methodology, data analysis, ability to collaborate effectively with key stakeholders and professional peers in other fields, oral and written communication for different purposes and audiences, and the ability to work independently.

The first year of study follows a similar trajectory to the one-year MSc, with a variation in course work, to reflect the emphasis on accumulating research skills. In the second year, you will focus on conducting your research, with additional training in science philosophy, research techniques and academic writing, amongst other relevant topics.

Research skills such as critical thinking, critical reading, scientific writing, intellectual openness and science ethics are part of the curriculum.

This programme will start in November 2023 – for more information and instructions on how to pre-register visit www.un-ihe.org/researchmaster



PhD Programme

The PhD programme is at the core of water-related research at IHE Delft. PhD fellows undertake scientific research, often with conclusions that directly relate to water challenges in their own country or region. At IHE Delft, close to 100 PhD researchers from around the world are brought together to participate in problem-focused, solution-orientated research into development issues, resulting in an inspiring research environment.

Sustainable water use is frequently characterised by complex, so-called 'wicked', problems where traditional assumptions of knowledge, causality and predictability may not apply.



PhD programme

Conducting research at IHE Delft is a unique experience, as you will work together with other researchers in an international and multidisciplinary environment. Your research will provide a firm academic foundation for you to help solve the global challenges of sustainable water supply, quality and governance. The PhD research of IHE Delft crosses the spectrum from engineering, information systems, habitat quality and the social and political realities that affect the use and abuse of water. All PhD fellows work within specific Chair Groups, but are encouraged to collaborate internally and externally to produce high-quality results within IHE Delft's research themes. Work often is conducted within larger groupings and can link to the research topics that are a requirement of the institute's MSc

programme and/or embedded in larger multidisciplinary projects. You will often do research in collaboration with the Institute's extensive network of research institutions, governmental and private sector partners throughout the world. Research often includes time in Delft and abroad, mostly in the home country of the research fellows. This directly supports the mission of the Institute and the agenda of the UN Sustainable Development Goals.

All PhD fellows are registered both with the IHE Delft Graduate School and with a partner university. This is normally a Dutch university with the legal authority to award the degree of PhD, although we also have some joint PhD programmes as part of funded networks of research. The time span of a PhD programme is usually planned for four years. The degrees are fully recognised in all parts of the world.

IHE Delft International graduate school in Water and Development

Sustainable water use is frequently characterised by complex, so-called 'wicked', problems where traditional assumptions of knowledge, causality and predictability may not apply. The urgent need to better connect between science, policy and society makes new demands on PhD graduates, who are increasingly expected to be experts in their own disciplines while also being capable of placing that knowledge in a wider understanding of societal needs.

IHE Delft supports PhD level education that is targeted to water related problems, not only in the global south and countries in transition, but in an increasingly globalised world.

In 2015, IHE Delft established the Graduate School in Water and Development to create a hub for a vibrant and an intellectually exciting research and development environment at the heart of the Institute. The Graduate School aims to develop a stimulating research environment for PhD fellows and the Institute's staff. PhD Fellows produce the majority of the research output of the Institute, and future developments are to further support academic quality and relevance in meeting the serious challenges of sustainable water use. Research activities are supported by an individual training plan that build competencies directly related to the specific research programme, as well as wider interactive and awareness skills that are needed in a professional environment. Each PhD fellow develops his/her Training and Supervision Plan (TSP) that builds verified doctoral education credits.



**SENSE
Research School**

IHE Delft is a partner member of SENSE (Research School for Socio-Economic and Natural Sciences of the Environment), a national research school in the Netherlands, that connects more than 10 universities and research institutes. The aim of SENSE is to educate and train PhD Fellows in disciplinary and multidisciplinary environmental issues, to promote scientific research on environmental change, and to support society and policy makers with independent and scientifically based expert advice.

Online and Short Courses

IHE Delft aims to make water education accessible to an increasing number of students and professionals. The Institute therefore offers online and on-campus short courses, tailor-made training, a diploma programme and open courseware on a wide array of topics.



Online Courses

IHE Delft offers high quality online courses in many of the topics of significance in the water sector. The online courses are beneficial to professionals working in public and private institutions, NGOs, and academic institutions, and are ideal for professionals who want to upgrade their skills from the comfort of their home or office. The total study load of a typical online course load is 140 hours, so for example, a four-month course takes around 8 hours of work per week. Lecturing staff offer intensive guidance during these online courses is intensive, and there are many opportunities to get feedback from and interact with fellow participants. The web-based Moodle eCampus is used to disseminate training material and for communication. It contains learning tools such as presentations, videos featuring case studies from various countries, interviews with experts, quizzes and audio material

For a list of online courses in 2022, see page 27.

On-Campus Short Courses

IHE Delft runs a wide range of short, intensive and highly specialized courses which are aimed at upgrading and refreshing the knowledge and skills of mid-career and senior experts. They are meant for professionals - or groups of professionals - with a specific area of interest and a limited amount of time. Short courses usually are one to three weeks in length. The focus and content vary from specialized and technical matters to challenges and approaches in management. Teaching methods include lectures, individual or group exercises in the classroom, at the computer, or in the laboratory. Fieldwork, excursions and field visits to relevant institutions are often part of short courses, allowing the participants to experience practical examples of the theory offered. Through case studies, role-play and workshops, content is made interactive, and participants share know-how.

For a list of short courses in 2022, see page 28.



Discounts

The following discounts apply to the tuition fee for online and short courses:

- 30% for IHE Delft Diploma alumni
- 10% for UN family staff members
- 10% for groups of 5 or more (provided that the course starts at the same time and a group application has been sent)

Please note that discounts cannot be combined.

Tailor-made training

Tailor-made courses are designed for clients whose staff require training in specific topics or seek to develop a common knowledge-base to address future challenges. The focus of the courses can be technical, managerial, strategic or operational, depending on the client's priorities. The training can be organized for groups of various sizes, from one or multiple organizations, sectors or regions. The training can vary in length and depth, ranging from a course lasting several days, to a tailored MSc programme in which regular components are mixed with case studies and modules requested by the client. Training can be delivered online, on-site and/or at IHE Delft. Training techniques include lectures, workshops, role-plays, case studies and study tours to project sites in Europe or in other regions where the training takes place.

For advice on how IHE Delft could be of service to your organization, contact IHE Delft's Liaison Office. Their contact information is available from the website, see bottom of page.

Graduate Professional Diploma Programme

The Graduate Professional Diploma Programme (GPDP) disseminates relevant knowledge and know-how to professionals who do not have the means or time to pursue a full-time Master's course in that subject, or who already have an MSc Degree in a related field and wish to specialize in another. In the programme you will follow a sequence of four to five online courses, on-campus short courses or a combination of both. To ensure that the programme fits your personal circumstances, you select the courses of interest and a personal study plan will be designed in collaboration with a study advisor. The total duration of the programme depends on this study plan and varies between 1.5 to a maximum of 4.5 years.

For information on these tracks and courses, see page 27.

Open Courseware

IHE Delft provides free online educational materials, including recorded lectures and downloadable materials such as course notes, exercises, tools and public domain software on a wide variety of topics.

For a list of open courseware courses, see page 29.

Joint MSc Programmes

Water Cooperation and Diplomacy is a multiple-degree joint MSc programme offered by IHE Delft, University of Peace (UPeace) in Costa Rica and Oregon State University (OSU) in the United States of America. Students start at UPeace, where they have four months of course work prior to coming to IHE Delft. They participate in IHE Delft’s modules 3 to 7, and do an extra module on Interdisciplinary Research, before moving to OSU for course and fieldwork and thesis research.
www.waterdiplomacymaster.org

Water Science and Engineering in Hydropower Development is a double-degree joint MSc programme offered by IHE Delft and University of Kuala Lumpur (UniKL) in Malaysia. Students start at IHE Delft and complete all modules up to and including module 8, and do an extra online module on Environmental Flows, before moving to UniKL for course and fieldwork and thesis research.
www.un-ihe.org/jointprogrammes

Limnology and Wetland Management is a joint-degree MSc programme, offered by IHE Delft, University of Natural Resources and Life Sciences (BOKU) in Austria and Egerton University (EGU) in Kenya. Students start at BOKU, where they have four months of course work prior to coming to IHE Delft. They participate in IHE Delft’s modules 5 to 8, before moving to Egerton University for course and fieldwork and thesis research.
www.un-ihe.org/jointprogrammes

IHE Delft is involved in two different Erasmus Mundus Joint Master Degree programmes, focusing on solutions for global water issues such as environmental degradation, floods and droughts.

Groundwater and Global Change – Impact and Adaptation is a multiple-degree joint MSc programme offered by IHE Delft in cooperation with the Technical University of Dresden in Germany and the University of Lisbon in Portugal. Students start at University of Lisbon before coming to IHE Delft for the 2nd semester, and then move to Technical University of Dresden for the 3rd semester. In the final semester, students undertake a thesis research project in association with one of the abovementioned institutions and possibly external partners.
www.groundwatermaster.eu

Flood Risk Management is a multiple-degree joint MSc programme offered by IHE Delft in cooperation with the Technical University of Dresden in Germany, UPC Barcelona in Spain and University of Ljubljana in Slovenia. Students start at Technical University of Dresden in Germany before coming to IHE Delft for the 2nd semester, and then move to UPC Barcelona and University of Ljubljana for the 3rd semester. In the final semester, students undertake a thesis research project in association with one of the abovementioned institutions and possibly external partners.
www.floodriskmaster.org

At the time of writing three other Erasmus Mundus programmes with IHE Delft’s involvement were under review by the European Commission and may be added to the current offer of joint programmes starting in 2022. Check our website for the latest info.

Graduate Professional Diploma Programme

	Cleaner Production Production and Residuals Management	Humanitarian WASH	Sanitary Engineering	Sanitation	Urban Water Networks and Floods	Water Supply Engineering	Water and Wastewater Treatment Technology
Online Courses (OLC)							
Advanced Water Transport and Distribution*						•	
Analysis of Sanitation Flows*				•			
Behavior Change*				•			
Biological Wastewater Treatment			•				•
Building Resilient Systems in Fragile Contexts		•					
Constructed Wetlands for Wastewater Treatment			•	•			•
Desalination and Membrane Technology						•	•
Disinfection, Adsorption and Natural Processes for Water Treatment						•	•
Experimental Methods in Wastewater Treatment			•				•
Faecal Sludge Management	•		•	•			
Governance in Humanitarian Contexts		•					
Industrial Effluent Treatment	•		•				•
Industrial Resource Management and Cleaner Production	•		•				
Leadership*				•			
Modeling Sanitation Systems			•				
Project Management*				•			
Public and Environmental Health in Emergencies		•					
Public Health*				•			
Sanitation Financing*				•			
Sanitation Governance*				•			
Sanitation Systems*				•			
Sanitation Technology*				•			
Solid Waste Management	•		•	•			
Urban Drainage and Sewerage			•		•		
Urban Flood Management and Disaster Risk Mitigation*			•		•		
Water and Sanitation in Urban Humanitarian Contexts		•					
Water Transport and Distribution					•	•	

Participants select four or five courses among clusters belonging to seven different tracks. Eligible online courses per track are listed in the scheme above. A full list, including eligible short courses, is available from the website, see bottom of page.
*New course currently being developed - please check the website for the latest information

Online Courses 2022

	ECTS	Duration(weeks)	Starting date	End date
Biological Wastewater Treatment: Principles, Modelling and Design	6	22	10/Jan/22	10/Jun/22
Disinfection, Adsorption and Natural Processes for Water Treatment	5	18	10/Jan/22	13/May/22
Faecal Sludge Management	5	18	10/Jan/22	13/May/22
Urban Drainage and Sewerage	5	18	10/Jan/22	13/May/22
Water and Sanitation in Urban Humanitarian Context	5	18	17/Jan/22	20/May/22
Water and Environmental Law and Policy	5	16	28/Feb/22	17/Jun/22
Experimental Methods in Wastewater Treatment	5	12	25/Apr/22	15/Jul/22
Building Resilient Systems in Fragile Contexts	5	18	02/May/22	02/Sep/22
Governance in Humanitarian Contexts	5	18	02/May/22	02/Sep/22
Industrial Resource Management and Cleaner Production	5	18	02/May/22	02/Sep/22
Modelling Sanitation Systems	5	18	02/May/22	02/Sep/22
Constructed Wetlands for Wastewater Treatment	5	18	05/Sep/22	13/Jan/23
Desalination and Membrane Technology	5	18	05/Sep/22	13/Jan/23
Environmental Flows	5	18	05/Sep/22	13/Jan/23
Industrial Effluent Treatment	5	18	05/Sep/22	13/Jan/23
Irrigation Management and Development	2	6	05/Sep/22	14/Oct/22
Public and Environmental Health in Emergencies	5	18	05/Sep/22	13/Jan/23
Remote Sensing for Agricultural Water Management	5	18	05/Sep/22	13/Jan/23
Solid Waste Management	5	18	05/Sep/22	13/Jan/23
Water and Environmental Policy Analysis	5	18	05/Sep/22	13/Jan/23
Water Resources for Agricultural Uses	3	10	05/Sep/22	11/Nov/22
Water Transport and Distribution	5	18	12/Sep/22	13/Jan/23

Dates are subject to change - please check the website for updates.

On-campus Short Courses 2022

	ECTS	Duration(weeks)	Starting date	End date
Port Planning and Infrastructure Design	5	3	17/Jan/22 - 04/Feb/22	
Unit Operations in Water Treatment (coagulation, sedimentation, flotation and filtration)	5	3	17/Jan/22 - 04/Feb/22	
Urban Drainage and Sewerage	5	3	17/Jan/22 - 04/Feb/22	
Asset Management	5	3	14/Feb/22 - 04/Mar/22	
Coastal Systems	5	3	14/Feb/22 - 04/Mar/22	
Conventional Wastewater Treatment	5	3	14/Feb/22 - 04/Mar/22	
Disinfection, Adsorption and Natural Processes for Water Treatment	5	3	14/Feb/22 - 04/Mar/22	
Managing Water Organisations	5	3	14/Feb/22 - 04/Mar/22	
Water and Environmental Law	5	3	14/Feb/22 - 04/Mar/22	
Computational Intelligence and Operational Water Management	5	3	07/Mar/22 - 25/Mar/22	
Design of Breakwaters	3,5	2	07/Mar/22 - 25/Mar/22	
Groundwater Resources and Treatment	5	3	07/Mar/22 - 25/Mar/22	
Management of Irrigation and Drainage Systems	5	3	07/Mar/22 - 25/Mar/22	
Resource Oriented Wastewater Treatment and Sanitation	5	3	07/Mar/22 - 25/Mar/22	
Sanitation Financing	3	2	07/Mar/22 - 18/Mar/22	
Tracer Hydrology and Flow Systems Analysis	5	3	07/Mar/22 - 25/Mar/22	
Water Resources Assessment and Modelling	5	3	07/Mar/22 - 25/Mar/22	
Anaerobic Wastewater Treatment	no	1	07/Mar/22 - 11/Mar/22	
Hydropower Water Conduit Design	no	2	14/Mar/22 - 25/Mar/22	
Groundwater Data Collection and Interpretation	5	3	04/Apr/22 - 22/Apr/22	
Hydrological Data Collection and Processing	5	3	04/Apr/22 - 22/Apr/22	
River Basin Modelling	5	3	04/Apr/22 - 22/Apr/22	
Wastewater Treatment Plants Design and Engineering	5	3	04/Apr/22 - 22/Apr/22	
Water and Environmental Policy Analysis	5	3	04/Apr/22 - 22/Apr/22	
Water Conflict and Cooperation	5	3	04/Apr/22 - 22/Apr/22	
Water Quality Assessment and Monitoring	5	3	04/Apr/22 - 22/Apr/22	
Water Transport and Distribution	5	3	04/Apr/22 - 22/Apr/22	
Desalination and Membrane Technology	5	3	25/Apr/22 - 13/May/22	
Environmental Planning and Implementation	5	3	25/Apr/22 - 13/May/22	
Industrial Resource Management and Cleaner Production	5	3	25/Apr/22 - 13/May/22	
Integrated Hydrological and River Modelling	5	3	25/Apr/22 - 13/May/22	
Modelling Wastewater Treatment Processes and Plants	5	3	25/Apr/22 - 13/May/22	
Climate Change Impacts and Adaptation in Deltas	5	3	25/Apr/22 - 13/May/22	
River and Floodplain Rehabilitation	5	3	25/Apr/22 - 13/May/22	
River Flood Analysis and Modelling	5	3	25/Apr/22 - 13/May/22	
Urban Flood Management and Disaster Risk Mitigation	5	3	25/Apr/22 - 13/May/22	
Water Conflict Management and Tools for Water Diplomacy	5	3	25/Apr/22 - 13/May/22	
Water Resources Planning	5	3	25/Apr/22 - 13/May/22	
Project Management for Sanitation	3	2	02/May/22 - 13/May/22	
Design of Hydropower Schemes	no	1	02/May/22 - 06/May/22	
Data Analysis and Modelling for Aquatic Ecosystems	5	3	23/May/22 - 10/Jun/22	
Research Methods for Sanitation	3	2	23/May/22 - 03/Jun/22	
Applied Groundwater Modelling	5	3	13/Jun/22 - 01/Jul/22	
Aquatic Ecosystems: Processes and Applications	5	3	13/Jun/22 - 01/Jul/22	
Environmental Assessment for Water-related Policies and Developments	5	3	13/Jun/22 - 01/Jul/22	
Flood Risk Management	5	3	13/Jun/22 - 01/Jul/22	
Industrial Effluents Treatment and Residuals Management	5	3	13/Jun/22 - 01/Jul/22	
Partnerships, Networks and Stakeholder Analysis in the Water Sector	5	3	13/Jun/22 - 01/Jul/22	
Remote Sensing for Water Resources Management	5	3	13/Jun/22 - 01/Jul/22	
Urban Water Systems	5	3	13/Jun/22 - 01/Jul/22	
Water Treatment Processes and Plants Design	5	3	13/Jun/22 - 01/Jul/22	
Advanced Water Transport and Distribution	5	3	04/Jul/22 - 22/Jul/22	
Decentralised Water Supply and Sanitation	5	3	04/Jul/22 - 22/Jul/22	
Experimental Methods in Wastewater Treatment	no	3	04/Jul/22 - 22/Jul/22	
Remote Sensing for Agricultural Water Management	5	3	04/Jul/22 - 22/Jul/22	
Solid Waste Management	5	3	04/Jul/22 - 22/Jul/22	
Strategic Planning for River Basins and Deltas	5	3	04/Jul/22 - 22/Jul/22	
Water Sensitive Cities	5	3	04/Jul/22 - 22/Jul/22	
Wetlands for Livelihoods and Conservation	5	3	04/Jul/22 - 22/Jul/22	
Data Acquisition, Preprocessing and Modelling using HEC-RAS	no	2	19/Sep/22 - 30/Sep/22	

On-campus Short Courses 2022

	ECTS	Duration(weeks)	Starting date	End date
Data Acquisition, Preprocessing and Modelling using PCRaster Python	no	2	19/Sep/22 - 30/Sep/22	
Data Acquisition, Preprocessing and Modelling using SWAT	no	2	19/Sep/22 - 30/Sep/22	
Geostatistics for Water Resources and Environmental Science	no	2	19/Sep/22 - 30/Sep/22	
Implementing Environmental Flows to Support Sustainable Water Resources Management	no	2	19/Sep/22 - 30/Sep/22	
Small Hydropower Development	no	2	19/Sep/22 - 30/Sep/22	
Water Economics	3	2	19/Sep/22 - 30/Sep/22	
QGIS for Hydrological Applications	no	1	19/Sep/22 - 23/Sep/22	
Python for Geospatial Hydrological Applications	no	1	26/Sep/22 - 30/Sep/22	
Hydraulic Modelling using HEC-RAS	no	1	26/Sep/22 - 30/Sep/22	
Morphological Modeling Using Delft3D	no	1	26/Sep/22 - 30/Sep/22	
River Basin Modelling using SWAT	no	1	26/Sep/22 - 30/Sep/22	
GIS and Remote Sensing Applications for the Water Sector	no	2	18/Oct/22 - 05 Nov/22	
Where there is little data: How to estimate design variables in poorly gauged basins	no	2	31/Oct/22 - 11/Nov/22	
Financing Water Investments for Water Professionals	no	1	05/Dec/22 - 09/Dec/22	

Dates are subject to change - please check the website for updates.

Open Courseware

Benchmarking for Improved Water Utility Performance	continuous
Biological Wastewater Treatment: Principles, Modelling and Design	continuous
Computational Hydraulics	continuous
Constructed Wetlands for Wastewater Treatment	continuous
Data Sharing for Water Sector Organisations using Spatial Data Infrastructures	continuous
Delta Planning and Management	continuous
Ecological Sanitation	continuous
Experimental Methods in Wastewater Treatment (eBook) (also available in Spanish)	continuous
Faecal Sludge Management (eBook)	continuous
Flood Infrastructure Asset Adaptation through Innovations, Interconnections, Realignments and Resilience (FAIR)	continuous
Fundamentals of Freshwater Health	continuous
Governance of Decentralized Sanitation	continuous
Greening Risk Reduction with Nature Based Solutions	continuous
Industrial Resource Management and Cleaner Production	continuous
Introduction to Modflow and Model Muse	continuous
Irrigation Management and Development	continuous
Open Source Software for Preprocessing GIS Data for Hydrological Models	continuous
Preparing for Extreme and Rare Events in Coastal Regions	continuous
Science Communication Skills for Water Cooperation and Diplomacy	continuous
AfriAlliance MOOC on Social Innovation in Water and Climate Change in Africa	continuous
Urban Drainage and Sewerage	continuous
Understanding Climate Change Basics	continuous
AfriAlliance MOOC on Water and Climate Change in Africa	continuous
MOOC Water Transport and Distribution	continuous
Water Quality Assessment	continuous
Water Productivity and Water Accounting using WaPOR (also available in Arabic and French)	continuous

SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDGs) are important and ambitious goals that guide us at IHE Delft in our work to address water and development challenges. As a water education institute developing capacity in water-related

topics, we particularly focus on SDG 6, 'Clean water and sanitation'. However, our work is also important for other goals: water cannot be seen in isolation and is a precondition for achieving other goals.

Therefore, together with our partners, we contribute to many SDGs including zero hunger, gender equality, affordable and clean energy, life on land, life below water, and sustainable cities and communities. As we approach 2030, IHE Delft will use an inter- and transdisciplinary approach to further strengthen the connections between our education, research and project activities.



United Nations
Educational, Scientific and
Cultural Organization

**IHE
DELFT**

Institute for
Water Education
under the auspices
of UNESCO

IHE Delft is the largest international graduate water education facility in the world and is based in Delft, the Netherlands. Since 1957 the Institute has provided water education and training to 23,000 professionals from over 190 countries, the vast majority from Africa, Asia and Latin America. Also, numerous research and institutional strengthening projects are carried out in partnership to strengthen capacity in the water sector worldwide.

www.un-ihe.org

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