

**KU LEUVEN**



Vrije  
Universiteit  
Brussel

# Master of Science (MSc) in Water Resources Engineering



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# Water Resources Engineering



**Water Resources Engineering** deals with the methods and techniques applied in the study of:

- water needs for agriculture, industry, households, recreation, navigation and hydroelectric power generation;
- problems related to storm water drainage and flood damage mitigation;
- problems related to water quality in streams and aquifers, erosion, sedimentation, protection of ecosystems and other natural resources;
- integrated water management;
- institutional, socio-economic, and policy issues related to water resources development and management.

## Scope

The MSc in Water Resources Engineering addresses water-related issues in developed and developing countries, with a focus on problems in the latter. The general programme objective is to educate professionals and scientists who contribute effectively to the development and management of water resources on both a local and global scale. The Master's programme provides multi-disciplinary and high-quality university education in the field of water resources engineering. Students will be trained with technical and managerial knowledge and skills to: (i) successfully plan, design, operate and manage water resources projects; and (ii) advise and support authorities in decision-making and policy-making that enhance the safe exploitation and re-use of wastewater and the equitable distribution and conservation of local, regional and global water resources.

## Research

The Interuniversity Programme in Water Resources Engineering (IUPWARE) has a long tradition of research and education in the field of water engineering. Benefiting from the cooperation between the three faculties of KU Leuven's Science, Engineering and Technology Group and the Department of Hydrology and Hydraulic Engineering of the VUB, IUPWARE enables a sound and comprehensive engineering approach to the management and exploitation of available water resources.

# Discover KU Leuven

Situated in the heart of Western Europe, KU Leuven has been a centre of learning for nearly six centuries. Today, it is Belgium's largest university. Founded in 1425, it is one of the oldest and most renowned universities in Europe.

As a leading European research university and co-founder of the League of European Research Universities (LERU), KU Leuven offers a wide variety of programmes in English supported by high-quality, innovative, interdisciplinary research.

The university welcomes more than 40,000 students, of which 16% are international students from more than 140 countries. KU Leuven's doctoral schools organise internationally oriented PhD programmes for over 4,000 doctoral students.

The university is located in Flanders, the Dutch-speaking part of Belgium. Leuven is a modern, bustling and safe student city with a long and rich history. Cultural and recreational opportunities abound. KU Leuven's central location offers a truly international experience. Major European capitals such as Brussels, Paris, London and Amsterdam are only a (very) short train journey away.

# Discover Brussels and the Vrije Universiteit Brussel (VUB)

Brussels, the capital of Europe, is one of the most cosmopolitan cities in the world. It is officially bilingual (French and Dutch), although it boasts an astonishing variety of cultures, styles and nationalities. As the capital of an expanding Europe, Brussels is an international city unlike any other. 31% of its population is of foreign origin, and this makes for a unique atmosphere in which cultures interact easily with one another. English is rapidly becoming an important language in Brussels because of the city's numerous international organisations.

The VUB is the offshoot of the French-speaking Université Libre de Bruxelles (ULB), which was founded in 1834 by a Brussels lawyer with Flemish origins, Pierre-Théodore Verhaegen. His aim was to establish a university independent from the state and the church where academic freedom would reign. With the Act of 28 May 1970, the VUB and the Université Libre de Bruxelles officially became two separate legal, administrative and scientific entities.



# Admission requirements

## Holders of the following degrees may be directly admitted to the programme:

- Bachelor (of Science) in de ingenieurswetenschappen
- Bachelor (of Science) in de bio-ingenieurswetenschappen
- Bachelor (of Science) in de geografie
- Bachelor (of Science) in de geologie
- Bachelor (of Science) in de biologie
- Master (of Science) in de biowetenschappen
- Master (of Science) in de industriële wetenschappen

## Holders of the following degrees may be admitted to the programme upon evaluation of a complete application file:

- Bachelor of Science in Engineering
- Bachelor of Science in Bioscience Engineering
- Bachelor of Science in Environmental Engineering
- Bachelor of Science in Geography
- Bachelor of Science in Geology
- Bachelor of Science in Biology
- Bachelor of Science in Sciences

## Holders of the following degrees may be admitted to the programme after successfully completing the 60-ECTS Preparatory Programme:

- Bachelor (of Science) in de biowetenschappen
- Bachelor (of Science) in de industriële wetenschappen: chemie

Applicants who have already obtained a Master's degree from a university in the European Economic Area (EEA) may be exempted from a maximum of 60 ECTS pending the recommendation of the Programme Committee (see 'reduced programme').

All applicants must have a good command of spoken and written English. Applicants who are non-native English speakers must present a TOEFL score of at least 550 (paper-based test); and 79/80 (internet-based test), or an equivalent score on another language test.

## Personalising your programme

Through the choice of 3 elective courses and a specific topic for thesis research, you can tailor your study programme to fit your interests. The MSc in Water Resources Engineering programme is a joint programme of KU Leuven and VUB. This partnership strengthens and supports a highly competitive educational programme firmly rooted in the research currently being conducted at the participating departments. The coordinating departments run numerous projects in developing countries. These projects provide students with a good framework for teaching, practical experience and thesis research.

# Programme

## MSc in Water Resources Engineering, 120 ECTS programme

The first year (60 ECTS), held at KU Leuven, is the same for all students. In the second year, held at the VUB, students design a more personal programme through their MSc thesis research (30 ECTS), the selection of an integrated project (5 ECTS) and 3 elective courses (5 ECTS each).

<b>MSC IN WATER RESOURCES ENGINEERING</b>		<b>120 ECTS</b>
COURSE		ECTS
<b>YEAR 1</b>		<b>60</b>
<b>COMMON COURSES</b>		<b>48</b>
• Advanced Mathematics for Water Engineering		6
• Statistics for Water Engineering		6
• Hydraulics		6
• Groundwater Hydrology		6
• Surface Water Hydrology		6
• Irrigation Agronomy		6
• Aquatic Ecology		6
• Water Quality Assessment Monitoring & Treatment		6
<b>WORKSHOPS</b>		<b>12</b>
• Hydrological Data Processing		3
• GIS		3
• Measuring Techniques for Water Resources Engineering		3
• Remote Sensing in Water Resources Engineering		3
<b>YEAR 2</b>		<b>60</b>
<b>COMMON ADVANCED COURSES</b>		<b>10</b>
• Systems Approach to Water Management		5
• Social Political Institutional Economic and Environmental Aspects of Water Resources		5
<b>ELECTIVE COURSES: DETAILED AND SPECIALISED KNOWLEDGE IN WATER RESOURCES ENGINEERING AND MODELLING</b>		<b>15</b>
• Groundwater Modelling		5
• Soil Water Modelling		5
• Irrigation Design and Management		5
• Surface Water Modelling		5
• River Modelling		5
• Urban Hydrology and Hydraulics		5
• Advanced Aquatic Ecology		5
<b>INTEGRATED PROJECT IN WATER RESOURCES ENGINEERING</b>		<b>5</b>
The Integrated Project Work is compulsory and alternates yearly between the Humid Climate Case Study and the Arid Climate Case Study.		
• Integrated Project: Humid Climate Case Study		5
• Integrated Project: Arid Climate Case Study		5
<b>MSC THESIS RESEARCH PROJECT</b>		<b>30</b>

## MSc in Water Resources Engineering, 60 ECTS reduced programme

Applicants with a Master's degree in agricultural, civil or environmental engineering or equivalent from an EEA university may apply for the reduced Master's programme and be exempted from a maximum of 60 ECTS. Applicants should have obtained an equivalent of 60 or more relevant ECTS in their previous education, for instance, in mathematical, statistical and/or chemical techniques, data processing tools, one or more aspects of water resources engineering and/or through Master's research. Applications are evaluated on an individual basis.

<b>REDUCED PROGRAMME</b>	<b>60 ECTS</b>
COURSE	ECTS
<b>COMMON ADVANCED COURSES</b>	<b>10</b>
• Systems Approach to Water Management	5
• Social Political Institutional Economic and Environmental Aspects of Water Resources	5
<b>ELECTIVE COURSES</b>	<b>25</b>
The student selects a number of elective courses for an equivalent of 25 ECTS from Year 1 and/or 2. Course selection should be complementary to previous training and based on personal interest. Elective choices must be approved by the Programme Committee.	
<b>INTEGRATED PROJECT IN WATER RESOURCES ENGINEERING</b>	<b>5</b>
The student follows one integrated project. These projects are organised in alternating years:	
• Integrated Project: Humid Climate Case Study	5
• Integrated Project: Arid Climate Case Study	5
<b>MSC THESIS RESEARCH PROJECT</b>	<b>20</b>
• Thesis Research Project Water Resources Engineering	20

For detailed descriptions of this programme's courses and for the course timetable, please consult [www.kuleuven.be/ma/mwrel](http://www.kuleuven.be/ma/mwrel)





## Career prospects

Career prospects in the water sector are excellent. The water sector proves to be a stable employment environment with a continually rising need for highly educated professionals. Programme graduates will deal with the exploitation and management of water resources and, to a lesser extent, with education and research. Graduates are therefore prepared to fulfil both a professional and academic role. The programme's academic-level education not only prepares water sector professionals but also future lecturers and researchers, creating a multiplier effect that spreads across many countries.

Government agencies, drinking water companies, and other companies play a decisive role in the management of present and future aquifers and river basins. They need well-trained water professionals. Many graduates find employment with private companies, such as consultancy agencies and industrial firms. Others go on to careers in non-governmental organisations.

*The IUPWARE programme offered me a good opportunity to learn the field's different facets ranging from irrigation and drainage to surface and groundwater hydrology to the use of hydrologic and hydraulic models, and applications of GIS and remote sensing. This forms a solid foundation for anyone aspiring to pursue more advanced studies or a specialised career in the field of water resources engineering. One of the strengths of the programme is its nice mix of theory and practice, giving students a more complete insight into the topics addressed. Some of the exercises were conducted in groups, which provided good training for the real-world demands of working in a team. Aside from the technical aspects, IUPWARE also offers an excellent opportunity to meet a variety of people and learn different cultures, as the student population is very international. The group I graduated with included students from 10 different countries.*

*(Student, MSc in Water Resources Engineering)*

## Learn more

[www.kuleuven.be/ma/mwrel](http://www.kuleuven.be/ma/mwrel)  
[www.iupware.be](http://www.iupware.be)

### **General information**

[www.kuleuven.be/english](http://www.kuleuven.be/english)  
[www.kuleuven.be/internationalprogrammes](http://www.kuleuven.be/internationalprogrammes)

### **Faculty of Bioscience Engineering**

#### **KU Leuven**

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[international.msc.programmes@biw.kuleuven.be](mailto:international.msc.programmes@biw.kuleuven.be)  
[www.biw.kuleuven.be/english](http://www.biw.kuleuven.be/english)

### **Grant Assistance for International Students**

Flemish Interuniversity Council  
VLIR-UOS  
tel. + 32 2 289 05 50  
[www.scholarships.vliruos.be](http://www.scholarships.vliruos.be)

### **Marketing Office**

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*This brochure provides the most complete and accurate information available concerning this Master's programme offered at KU Leuven and the VUB. However, amendments to the composition of this programmes may be approved at any time. Consequently, KU Leuven is in no way legally bound by the information provided in this brochure. The most recent information on all our academic programmes can be consulted at [www.kuleuven.be/coursecatalogue](http://www.kuleuven.be/coursecatalogue)*

Last updated: February 2014