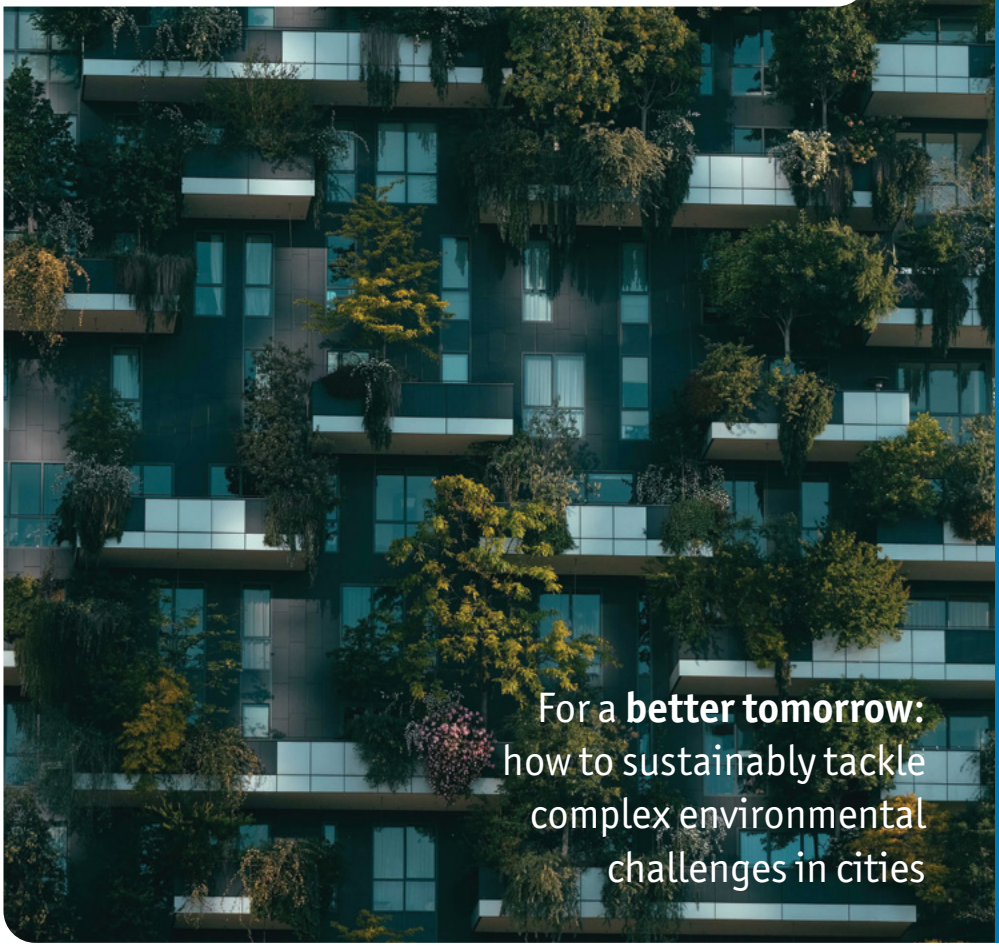
Master of Bioscience Engineering:

Sustainable Urban Bioscience Engineering - SUBE

2025-2026



University of Antwerp

GHENT UNIVERSITY

KU LEUVEN

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Cities are where the battle for sustainable development will be won - or lost if we fail.

Former UN Deputy Secretary General Jan Eliasson

In brief

The University of Antwerp, Ghent University and KU Leuven have combined their expertise to offer you this unique Master's programme. Through a multidisciplinary approach you will gain in-depth knowledge, skills and attitudes to tackle complex urban environmental challenges by offering sustainable and (eco)technological solutions.

In detail

The Master of Bioscience Engineering: Sustainable Urban Bioscience Engineering aims to address rapid global urbanisation and its impact on the urban living environment. Resource use and waste production are increasing, air and water quality are under pressure, energy demand is changing, climate change effects are intensifying, risks of health problems are increasing, and so on.

The Master's programme will qualify you to become a bioscience engineer who can provide (eco)technological and sustainable solutions to these various societally relevant challenges. The programme will provide you with in-depth knowledge of urban environmental challenges from different disciplines and of the right tools to address them. Key in the Master's programme are the multidisciplinary CityLabs in the first year of the curriculum. Each CityLab is coordinated by a different university and focuses on a particular urban environmental challenge.

The CityLabs deal with

1. the impact of an urban environment on water, atmosphere, soil, urban green and biodiversity (**CL 1**: The Urban Ecosystem, coordinated by the University of Antwerp)

2. the optimisation of resource consumption in cities, focusing on water, energy, food and materials (**CL2**: Urban Resources, coordinated by Ghent University) and

3. the impact of an urban environment on human health and the liveability of a city (**CL 3**: Human Health & Urban Liveability, coordinated by KU Leuven).

In the second year, you will have the opportunity to deepen your knowledge on these topics and technologies even further by choosing advanced electives.

Urban environmental challenges arise all over the world, although the specific context and challenges may vary greatly locally. It is thus important to provide you with the necessary competences to tackle sustainable urban development in a broad context, so that you will be able to offer solutions in an international perspective. Therefore this Master's programme is **taught in English**.

The programme is open to international students and carries a workload of 120 ECTS credits.

Programme structure

Learning outcomes

A. The Master as an expert

1 The Master has advanced knowledge of and insight in the city as a micro- and macro-ecosystem and of urban sustainability challenges related to ecological, (micro) biological, chemical, physical, physiological and processes. The Master monitors actual environmental developments of the urban system and related processes and of their evolutions on medium- and long-term, such as the effects of climate change on the urban environment.

2 The Master has basic knowledge and understanding of urban planning, urban economics, urban sociology and the relevant legal framework.

3 The Master has advanced and application-oriented insight in technology for sustainable production, process, management and use of ecological, (micro) biological, chemical, physical and physiological components in an urban environment.

4 The Master can independently integrate, deepen and critically reflect upon multidisciplinary knowledge, insight and skills concerning sustainable urban bioscience engineering, to develop innovative and creative concepts and possible applications.

To tackle (super) wicked problems, such as urban environmental challenges, we are in need of experts with a multidisciplinary mindset.

B. The Master as an engineer

5 The Master can independently, accurately and result-oriented conceive, plan and execute an engineering project at the level of a starting investigating professional. The Master formulates goals, keeps focus on specific objectives and development routes and reports effectively.

6 The Master controls system complexity with regard to sustainable urban bioscience engineering using quantitative methods. The Master has advanced and application-oriented insight in leading theories and methods for schematically representing and modelling of processes and systems, to develop and/or implement innovative and sustainable concepts in an urban environment.

A future-proof bioscience engineering profile focuses on a combination of technological competences and 21st-century skills, complemented by multidisciplinary, international and intercultural competences. All of which are represented in this Master's programme.

7 The Master formulates and analyses complex problems within the urban context, and reduces them to manageable sub-problems, designs concepts and effective (eco)technological solutions for the specific cases with attention to sustainability and the broader conceptual implications.

8 In interaction with stakeholders, the Master designs groundbreaking, high-quality, innovative and application-oriented systems, products, services, and processes. The Master assesses the risks and feasibility of the proposed solutions, weighs specifications and technical, economical, legal, and societal boundary conditions, with attention to the business context.

C. The Master as a researcher

9 Through sufficient knowledge and with attention to the conceptual framework, the Master can conduct and critically interpret a literature search and critically evaluate the research results. The Master can extract new research questions from design problems and useful information from incomplete, conflicting, or redundant data.

10 The Master can select, adapt and eventually develop advanced research, design and solution methods, and adequately apply these and scientifically process the obtained results. The Master can scientifically motivate the choices made based on the foundations of the discipline.

D. The Master as a communicator

11 The Master can communicate and present both written and verbally about the own discipline to colleagues and third parties (such as citizens).

12 Through integral thinking the Master can formulate policy proposals for a sustainable urban environment.

E. The Master as a member of a multidisciplinary team

13 The Master takes his/her role and responsibility in a multidisciplinary team and can integrate different disciplines through his/her position. The Master can develop leadership.

F. The Master as a citizen

14 The Master acts professionally, ethically, and socially responsible with attention to technological, (business) economic and social sustainable arguments, both in a local and in a global and intercultural context.

Curriculum

Model Path Part 1

All courses are compulsory

Course	ECTS	Semester	University *
Sustainable Cities	3	SEM1	●
Data Management and Visualisation	3	SEM1	●
Spatial and Sustainability Analysis Tools	4	SEM1	●
Societal Perspectives on Urban Sustainability	5	SEM1	●
CityLab 1: The Urban Ecosystem			
├ Conceptual Framework	9	SEM1	●
└ Integrated Case	6	SEM1	●
CityLab 2: Urban Resources			
├ Conceptual Framework	9	SEM2	● ●
└ Integrated Case	6	SEM2	● ●
CityLab 3: Human Health and Urban Liveability			
├ Conceptual Framework	9	SEM2	● ●
└ Integrated Case	6	SEM2	● ●

*** University**

- ● University of Antwerp
- ● Ghent University
- ● KU Leuven

Model Path Part 2

Compulsory courses

Course	ECTS	Semester	University *
Professional Internship	6	SEM1+2	
Master's Thesis , including research internship	30	SEM1+2	

Electives

A. Advanced electives

(choose min. 18 ECTS credits)

Course	ECTS	Semester	University *
Bioresponse Measurements and Process Control	3	SEM1	
Data Mining	3	SEM2	
Entrepreneurship in Biotechnology	6	SEM2	
Environmental Epidemiology	3	SEM2	
Environmental Technology: Waste	3	SEM1	
Remote Sensing of Urban Systems	4	SEM1	
Renewable Energy	3	SEM1	
Smart Cities	3	SEM2	
Sustainable Food Systems	5	SEM2	
Technologies and Infrastructure for Sustainable Water Use and Resource Recovery	3	SEM2	
Technologies for Alternative Proteins	3	SEM1	
Urban Air Modelling	3	SEM1	
Urban Green Design and Management	3	SEM2	

B. Free choice
(max. 6 ECTS credits)

For this part of the programme, you can choose freely (for max. 6 ECTS credits) from courses in other programmes at the University of Antwerp, Ghent University and/or KU Leuven. You motivate why this free elective is related to urban environmental challenges and/or applications. Your choice is subject to approval by the Study Progress Committee.

Job opportunities

During the Master's programme, you will interact with **different types of stakeholders** that are active in a city, both locally and globally (citizens, policy makers, businesses, organisations and many more).

The Master's programme prepares you for a global employability in a broad international professional field. You will find employment with a **wide variety of employers**, both with those already providing sustainable and (eco) technological solutions to urban environmental challenges and with those still lacking a sustainable approach: in the public sector at local, national or supranational level (e.g. ministries of environment or European institutions), in international organisations, in academic or research institutions (e.g. universities or research institutes), in non-governmental organisations, and in private companies (e.g. environmental sector, food industry or engineering firms).

Particulary relevant is that this Master's programme is jointly organised by the University of Antwerp (coordinator), Ghent University and KU Leuven, which is unique in Belgium and will result in **a jointly awarded degree**.

Why choose

a programme jointly offered by the University of Antwerp, Ghent University and KU Leuven?

The University of Antwerp, Ghent University and KU Leuven each are high-quality universities and each have valuable expertise and experience in adressing urban environmental challenges in a sustainable way. By combining all of our strenghts, expertises and experiences, we are able to **jointly offer you this unique Master's programme**.

The **University of Antwerp** is remarkably progressive, open-minded, diverse and transparent. It has a cosmopolitan nature on a human scale. Students and staff are socially committed and future-minded. UAntwerp offers internationally accredited education with a personal approach towards students. It is strong in competitive research with social impact. Internationalisation is one of the keywords in its mission statement. It is no coincidence that the University of Antwerp is a partner in one of the most promising European university alliances, the Young Universities for the Future of Europe (www.yufe.eu). The University of Antwerp is located in the city of Antwerp, in the heart of Belgium and Europe. The port of Antwerp is one of the biggest in the world. Antwerp is not just an ancient medieval and baroque city, full of history. It is also a bustling metropolis with a vibrant social scene, impressive architecture and cultural contrasts. Over 170 nationalities live there, more than in New York! This cosmopolitan nature is also reflected at the University of Antwerp.

Ghent University is a pluralistic university open to all, regardless of ideological, political, cultural or social background. Its credo is 'Dare to Think'. Ghent University was

founded in 1817. As a top 100 university with more than 49 000 students and 15 000 staff members, Ghent University is one of the largest universities in the Dutch language area, located in Flanders, Belgium. The Ghent University Global Campus is also the first European university in Songdo, South Korea. Its 11 faculties offer more than 200 courses and conduct in depth research within a wide range of scientific domains. Several of its research groups, centres and institutes are renowned worldwide, in disciplines such as biotechnology, aquaculture, microelectronics, history, etc. In 2017, Ghent University celebrated its 200th anniversary. Over the past 200 years, the university has seen many eminent scientists, ministers and even Nobel Prize winners among its staff and alumni.

KU Leuven is one of the world's great universities, home to leading researchers who have made us Reuters' highest-ranked European university for innovation. This achievement builds on a 600-year tradition of academic excellence and ethical integrity that serves as the backbone for everything we do. As a comprehensive university, we offer a wide selection of academic programmes, all of which are in the top 100 of the world rankings for their respective fields, half of which are in the top 50. More than 140 different nationalities are represented amongst our 10,000+ international students, with more than 20 international student organisations on campus and a dedicated international student centre, Pangaea. The city of Leuven is a only a stone's throw from the Brussels, the capital of Europe and home to one of our 10 campuses in Belgium.

Admission criteria

Students with a Bachelor's degree in bioscience engineering *(bachelor in de bio-ingenieurswetenschappen)*, issued by an institution recognised by the Flemish government, are admitted without further requirements.

The Master of Bioscience Engineering: Sustainable Urban Bioscience Engineering is open to applicants

- **holding an academic Bachelor's degree** in engineering (bioscience engineering, agricultural engineering, environmental engineering, biotechnology engineering or any equivalent engineering degree); or other Bachelor's or Master's degrees encompassing thorough coursework in mathematics, statistics, physics, chemistry, and basic engineering courses; and

- **with in-depth knowledge** of at least one of the following two domains (i) earth and environmental sciences, and/or (ii) biology and ecology.

This degree should be obtained at a recognised university, college or institute, with an end result of at least second class upper or equivalent.

Since the programme is taught in **English**, candidates with a prior degree issued outside Belgium, the Netherlands or Luxembourg are required to demonstrate their proficiency in English. They can do so in two ways:

- Either by submitting a **language certificate** showing their TOEFL, IELTS, ITACE or Cambridge English test results (the level required can be checked on www.uantwerpen.be/admission)

- Or by submitting **proof** they have studied at least one academic year (or 60 ECTS credits) in an English-language Bachelor's or Master's programme.

Please note that the Board of Admission may still ask for additional proof of proficiency in English.

Students who are still completing their Bachelor's degree are also encouraged to apply. Applicants that are enrolled in their final year should, instead of the degree, submit a copy of an original and signed letter from their college or university confirming that they are expected to complete the programme at the end of the current academic year.

Application procedure

For this interuniversity Master's programme, you will **enrol at the University of Antwerp** (coordinating university).

Students with a Bachelor's degree in bioscience engineering, issued by an institution recognised by the Flemish government *(bachelor in de bio-ingenieurswetenschappen)*, can enrol **directly** into the programme. Students with a Bachelor's degree in bioscience engineering, issued by an institution recognised by the Walloon government *(bachelier en sciences de l'ingénieur, orientation bioingénieur)*, or Benelux students with another academic degree must submit their application through the **Helpdesk** of the University of Antwerp.

Other students and/or students who need a student visa must submit an online application through the **Mobility Online** tool of the University of Antwerp. Application files for the academic year 2025-2026 can be uploaded in Mobility Online as from early November 2024 onwards.

Students are advised to check the programme's website for more detailed information on the application procedure (www.sube.be/admission-and-enrolment/application-procedure/).

Application deadlines

Non-EEA* nationals
before 1 March 2025

EEA nationals (except Benelux nationals)
before 1 June 2025

Benelux nationals
before 1 October 2025
(however, an earlier application is strongly recommended)

ECTS credits

The three organising universities apply the '**European Credit Transfer and Accumulation System**' (ECTS) in all their degree programmes.

A full-time one-year study programme amounts to **60 ECTS credits** (30 ECTS credits per semester), which implies an annual student workload of about 1500 to 1800 hours. One ECTS credit stands for 25 to 30 hours of work including contact hours, preparatory work, study and assessment. This Master's programme consists of 120 ECTS credits and thus amounts to a full-time two-year study programme.

* **EEA** = European Economic Area
Member states: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden

Quick facts

Level
Master

Language
English

Credits
120 ECTS credits

Number of years
2

Tuition fee per year *
EUR 1116 for EEA nationals
EUR 5800 for non-EEA nationals

University of Antwerp
Faculty of Science
Campus Groenenborger

Ghent University
Faculty of Bioscience Engineering
Campus Coupure

KU Leuven
Faculty of Bioscience Engineering
Campus Arenberg Kasteelpark

More information
www.sube.be

* subject to yearly revision

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This brochure was published in January 2025.
As all information is subject to change, please check the programme's website for the latest updates.