

Environmental Science



The higher professional course in ENVIRONMENTAL SCIENCE leads to a job as an environmental engineer. Essentially, this involves sustainably improving the environment, ranging from clean air, soil and water to, for example, waste recycling. This is done from a foundation of applied science, bearing in mind what is achievable in terms of society.



Environmental engineers mainly work in consulting and engineering firms, where they are responsible for conducting research. They collect data (from field work, desk research, laboratory research), analyse and interpret this data and help to formulate and design solutions. It is very important that the work is customer-oriented and project-based. Similar advisory roles are also performed in the industrial domain, as a member of a staff department focusing on improving the sustainability, environment and safety of the company. Communication skills are essential as the role involves interaction with stakeholders.

In the role of environmental technologist, there is greater emphasis on improving technologies (e.g. for a water treatment plant); as a researcher or assistant researcher, graduates collect and interpret data on the quality of the environment. In the case of government bodies, such as environmental agencies, the environmental engineer has the role of enforcing regulations, granting permits or developing policy.

Institution that offers the programme

- Avans University of Applied Sciences, Breda

ILLUSTRATION OF PROFESSIONAL FIELD

Occupations, jobs and roles for graduates are mostly to be found in the following professional domains (for a full description of the professional domains, see Section 2). A few examples are given for each domain.

Research and development

- Environmental researcher (in research institutes)

Engineering and manufacturing

- Environmental technologist (optimising environmental technology)

Commerce and customer service

- Environmental consultant
- Sustainability (CSR) consultant
- Environmental (HSE) coordinator
- Inspector or enforcement officer
- Official responsible for issuing permits
- Policy adviser

Programme profile

	Competence							
	Research	Development	Experimentation	Management	Advice	Instruction	Leadership	Self-management
Minimum attainment target adopted for the programme	III	I	I	II	III	II	I	II

Environmental Science

KNOWLEDGE

- **Sustainable development:** people, planet, prosperity, passing the burden in space and time, CSR, system-oriented thinking
- **Environment:** quality of the environment, sustainable design and planning, impact on our environment
- **Soil, water, air, noise:** sources of pollution, behaviour of substances, research, regulatory process, impact, measures, management
- **Nature/ecology:** basic natural principles (ecology), ecosystems, biodiversity, types of landscape, cultural heritage values
- **Climate change:** causes, effects, measures
- **Waste and raw materials:** cradle-to-cradle, circular economy (biobased and technical)
- **Energy:** sources, sustainable energy management
- **Safety:** sources, standards, risk assessment, measures, management
- **Legislation and environmental policy:** spatial planning, flora/fauna, environmental law, EIA, environmental policy (European, national, international, water, soil), policy instruments
- **Economics and management:** financial feasibility, SCBA, quality management/Deming circle, QHSE
- **Ethics:** moral dilemmas in professional practice

SKILLS

- **Research skills:** problem analysis, problem statement articulation, preparing research questions, research planning, reviewing, analysis, desk research, statistical methods, performing multi-criteria analyses
- **Consultancy skills:** holding intake and consultancy interviews, issuing quotations, carrying out stakeholder analyses, involving stakeholders in the implementation of assignments (environmental awareness, sensitivity regarding policy and political issues), effective collaboration with other disciplines, presenting recommendations
- **Specific ICT skills:** using geographical information systems, dispersion and sustainability models
- **General laboratory skills:** analysing soil, water, air in accordance with protocol
- **Fieldwork skills:** soil, water, flora/fauna, region

The Body of Knowledge and Skills is a summary of graduates' basic knowledge and basic skills which has been prepared by the HBO-programmes in consultation with the professional field. These are obtained during the first two years of education.

The Body of Knowledge and Skills for Environmental Science is laid down in the national consultative document covering all Environmental Science degree programmes. All other Environmental Science programmes are outside the scope of the Applied Science Domain and are not presented here. For more information, a detailed national document is available, see reference 2 on page 75.

TYPICAL TEXTBOOKS

- *Environmental Science, A Global Concern*, W.P. Cunningham, M. Cunningham
- *Introduction to Environmental Engineering and Science*, G.M. Masters, W.P. Ela
- *Campbell Biology*, L.A. Urry, M.L. Cain e.a.
- *Chemistry the Central Science*, T.E. Brown, H.E. LeMay e.a.
- *Brock Biology of Microorganisms*, M.T. Madigan, K.S. Bender e.a.
- *Foundations Maths*, A. Croft, R. Davison
- *Managing your competencies*, R. Grit
- *Project Management*, R. Grit
- *Praktisch Omgevingsrecht*, H.M. Liedekerken

The list of typical textbooks serves as an illustration to give an impression of the level at which the subject is taught in the study programme.



Process engineer Geert van Lith: **‘The most challenging projects are those in other countries’**

Name: Geert van Lith

Age: 25

Course of study:
Environmental Science

Place of employment:
Maris Projects

Job: Process engineer

‘I chose this programme at the time because it fitted in well with my previous studies: I had already completed the senior secondary vocational land, water and environmental engineering programme. I therefore knew that I wanted to have something to do with the environment. The breadth of my course provides sufficient opportunities. Eventually, I ended up – through my programme – at Maris Projects, where I have progressed from environmental technologist to process engineer. This company’s practical way of working really suits me, also because of my previous studies.

My job is difficult to describe in a couple of sentences. On the one hand, I’m involved in selling new and second-hand process equipment. These are machines or components for milling, crushing, pumping, extraction, etc. I help my boss in buying, selling, issuing quotes, supervising the workshop, etc. On the other hand, I work on projects: we develop technologies, machines and plants for re-using residues (e.g. culturing algae, fermenting biomass, drying residual products), using physical, thermal or biological treatments only. I manage and supervise the projects from start to finish. They often start in the laboratory, where we determine the properties of the residues. Once the options are clear, we build a scale model (from second-hand machinery) on which we test our idea. I then help to design or develop the final solution. After being successfully tested, the plants

are built full-size. My responsibilities are to supervise the workshop, help to optimise the plants and start them on the customer’s premises. There are also other aspects to take into consideration in projects, such as subsidy and financing processes in which I submit applications, reports and work plans. And the practical aspects, such as arranging transport for international projects, which I never learned about at university but which still has to be done.

International

The most challenging aspects of my job are the projects in other countries. As we are developing new technologies and most waste and residual flows are often in developing countries, it is easier to implement certain projects in these countries. I myself have been to India a number of times to help build a plant for extracting oil from waste meat residues from the leather industry.

Research and experimentation are very important competences in my professional field. The way I use them now is certainly different from the way we had them at university.

I definitely see my opportunities for advancement within the company, although that also depends of course on the growth of the business. There are great opportunities nationally and internationally and I’m sure I can progress internationally. For the time being, I’m still learning so much in practice every day that no university can compete!’ ■

Project worker Bianca Peeters: 'I can now focus on specific competences'

I did a job aptitude test just before completing my senior secondary vocational programme. This showed that my interest lay in the environment, society and technology. After visiting an open day for the environmental science programme, I became really enthusiastic: it looked like an enjoyable and interesting programme which would be sufficiently challenging and provide a choice of professional field.

My programme was wide-ranging and involved a combination of different environmental subjects, such as water, soil, air and noise, ecology, climate change, sustainable energy, sustainable development and legislation. The subject was taught in the form of courses, training sessions and project-based work. In the third and fourth years I did two internships and gained some practical experience. During my graduation project, I conducted research into a proposal for a new Nature Conservation Act and how it compared with current nature protection legislation. I was asked by the Environmental Law and Permits department of Witteveen+Bos whether I would like to do research into this as they had a lot to do with nature protection legislation and I was interested in nature.

I have now been working in the Environmental Law and Permits department for nine months. As a Project worker I check out which permits are required for different projects, prepare permit applications, give instructions for environmental and other investigations relating to the permit applications to be carried out and submit them to the relevant governing bodies.

Wide-ranging

I think my study programme fitted in well with my current job, thanks to the wide-ranging nature of the programme. While working with permits, I now find that I have some knowledge of a variety of environmental subjects. The project-based work that I learned during my programme also fits in well with my job. This is partly because Witteveen+Bos regularly work with environmental science stu-

dents in supervising and implementing all kinds of projects. I was one of them myself in the third year of my programme!

Thanks to the competence-based approach in my programme, I learned which competences I was good at and which not so good. This means that I can now focus extra hard on specific competences, such as **instruction** and **management**, in order to develop further. My ambition is first of all to become an experienced consultant on permits. Later, I would like to become a project manager in order to keep the permit process and related matters on the right track for a project. Eventually, I would like to work as the head or manager of a department. But that's an ambition for the long term! ■

Name: Bianca Peeters
Age: 24
Course of study: Environmental Science
Place of employment: Consultancy and engineering firm Witteveen+Bos
Job: Project worker for environmental law and permits



