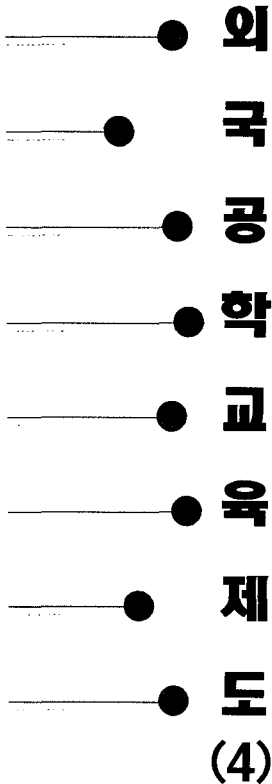


# 네델란드의 공학교육



## Engineering Education in the Netherlands

### 1. Introduction

The Netherlands has its own character and culture, and its gracefully historic city centers reflect age-old traditions. The country today is among the world's most modern and advanced, but these traditions add a unique richness to the contemporary scene. Similarly, while Dutch society increasingly specializes in advanced forms of knowledge-based services and industry, these are built on a long tradition of world trade. Dutch society is multi-cultural, safe and modern. Many communities-Chinese, Indonesian and Surinamese, for example - are fully integrated into society but at the same time are able to maintain their own values. This helps to give the Netherlands its cosmopolitan, open atmosphere.

The Netherlands' location makes it an ideal gateway to Europe. From Schiphol, the national airport, it is just a one-hour flight to such cities as London, Paris and Berlin, all of which can also be reached easily and quickly by train. The Dutch people are international-oriented and nearly everyone speaks English as a second language. This makes it easy for people from other countries to function well in Dutch society without having to learn the Dutch language.

In the field of education, research, science and technology, the Netherlands for many years has put great effort into maintaining its strong position. Because of its success in doing so, the Netherlands has taken special measures to make its science and education accessible to people from other countries. Students and scholars seeking to expand and deepen their knowledge are very welcome in the Netherlands.



## 2. Higher Education

Higher education in the Netherlands can be divided into three categories: higher professional education(HBO), university education(WO) and the Open University.

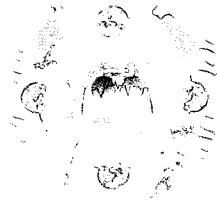
- higher professional education(HBO), given at colleges('hogescholen') admission requirements: HAVO or senior secondary vocational education(MBO), or a special entrance examination;
- university education, admission requirements: VWO or entrance examination;
- the Open University, admission requirements: no formal entrance qualifications are required, minimum age 18 years.

At both universities and hogescholen the formal length of most study programmes is four years, although in some cases students are allowed more time than this. The main exceptions are university programmes in engineering, which take five years. The starting level of Dutch higher education is high. The academic year is long, starting at the end of August and ending in mid-June. Programmes are designed to require 40 hours a week, including both contact hours and hours of independent work. The quality of the Dutch universities is thought to be the same so that in the Netherlands what matters is the degree that you earned and not where you earned it. The same is true of the hogescholen.

### 2.1 Higher Professional Education ( HBO )

Higher professional education(HBO) is given at a few dozen colleges spread around the whole country. There are seven different sectors in higher professional education. Within the seven sectors, there are over 400 different courses on offer. The admission requirements vary from one course to another. For example, mathematics and physics will be required for an engineering or technology course.

HBO courses train students to enter a profession. Practical training by means of work experience placements in companies or institutions plays a major role but students are also given the theoretical education they need to practice their chosen profession. Courses usually last four years. At the end of that period graduates have the right to use the title 'baccalaureus'('bc.') or 'ingenieur'('ing.'). The maximum period for which a student can be enrolled is six years. This restriction applies in fact to the whole of the first phase of higher education (i.e. all undergraduate courses, whether at college or university). A number of HBO courses can also be taken on a part-time basis ( during the day or in the evening ). After passing their first-year examinations('propaedeuse'), HBO students can transfer to a university course.



Hogescholen vary in size; some enroll 300 students, others 25,000. Hogescholen generally tend to be regional in character; often they interact with Chambers of Commerce and other representatives of local industry through regional networks. Internationally, HBO can be compared to the education offered in Fachhochschulen in Germany and in the new universities of the United Kingdom. Advanced programmes are available in virtually all sectors of HBO. They can last anywhere between two weeks and two years. Some lead to postgraduate diplomas, and some to accredited masters degrees. The latter are often conferred in cooperation with a British university. Like university graduates, HBO graduates are also eligible to pursue a doctorate at a university.

## 2.2 University education (WO)

The Netherlands has 14 universities, which train students for the independent practice of science. The universities differ in the programmes they offer. Nine offer education in a broad range of fields. Three universities specialize mainly in engineering (Delft, Twente and Eindhoven), and one specializes in agriculture.

Students must have a VWO diploma or have passed their first-year HBO examinations to go to university. There are thirteen universities in the Netherlands, spread fairly equally throughout the country. Students can choose from over 200 different courses, within higher education as a whole. Courses end in a 'doctoraal' exam-

ination and graduates can use the title of 'doctorandus' ('drs.'),

'ingenieur' ('ir.') or 'meester' ('mr.'), depending on the

type of course. It is the title in engineering and agri-

culture, mr is the title in law, and drs is used in

all other fields. Dutch university graduates

also have the right to use the international-

ly more familiar title Master. University

titles are legally protected in the

Netherlands, conferred only by recog-

nized institutions that meet the same stan-

dards. A number of courses can also be

studied on a part-time basis (during the day or

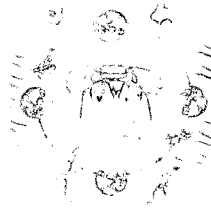
in the evening).

A few courses take longer. To qualify to teach a

particular subject takes 1 year longer than the usual under-

graduate course in that subject. On some courses, there are fewer places





available than the number of students applying for them. There may then be a lottery to decide which applicants get places. Most students' academic careers end with the doctoraal. There are many possibilities for further study, however, in virtually all sectors. Post-doctoraal training is required for qualification to teach at secondary schools. Students learn the practical skills needed for the specific profession. Another type of post-doctoraal study leads to the doctorate, the highest academic degree in the Netherlands. Candidates conduct independent research, and report the results in a dissertation, which must be publicly defended. If successful, they may use the title doctor.

| Comparison of Dutch Diplomas |                          |   |                   |                        |
|------------------------------|--------------------------|---|-------------------|------------------------|
| Dutch                        | Havo                     | VWO   | HBO               | Doctoraal              |
| UK                           | GCSE, grades, A, B, or C | GCE A-levels  | Bachelor's degree | Master's degree        |
| Germany                      | Fachhochschulreife       | Allgemeine Hochschulreife (Abitur)  | Diplom FH         | Diplom/Magister Artium |
| France                       |                          | Baccalaureat  | DUT               | Maitrise/DEA           |
| USA                          | high school diploma      | top-stream high school diploma/high school diploma plus 1 year of college | Bachelor's degree | Master's degree        |

### 3. What Kinds of Courses are Offered?

More than 450 courses have been developed especially for international students. All of them are in fields in which the Netherlands is known around the world for its expertise. The international courses are unique in several respects.

The courses are taught in the English language. The Dutch understand that people from other countries would rather not have to learn a language that is not much use to them anywhere else.

#### 3.1 International Education in the Netherlands

Today, 14 Institutes of International Education provide over 150 specialized courses designed primarily for professionals who have already embarked on their careers. Most courses are at postgraduate level and relatively short. A bachelor's degree or its equivalent is a prerequisite for most of these courses, plus at least some



years of professional experience. Above all, the courses are practically oriented. They can be adapted to suit individual needs and wishes. The courses introduce participants to new methods and techniques. But more than this, they make sure that the participants know how to apply their new knowledge when they get back home.

At the same time, 14 universities and 70 universities for professional education (known in the Netherlands as hogescholen) are conducting a growing number of their study programmes in English for the benefit of their own students as well as exchange students and other foreign students. These include courses that are part of regular degree programmes, as well as special courses. Students taking regular courses can earn credits, and eventually the equivalent of a bachelor's or master's degree. A diploma from an advanced form of secondary school, or a bachelor's degree, is the admission requirement. A full study programme may take four or five years to complete; more commonly, foreign students transfer the credits they have earned in the Netherlands and graduate from their own institutions. Dutch universities, hogescholen, and specialized institutes often work together, and many have exchange arrangements with partner institutions in other countries.

Dutch higher education is regulated by Dutch law. Several education acts provide for a strict system of quality control which ensures the maintenance of high standards from an international point of view.

Fellowships are available for many of the courses. The Netherlands government offers grants to people from developing countries through the various schemes under the Netherlands Fellowships Programme (NFP).

International courses are offered in the following categories:

- Science and technology / Agriculture and related sciences
- Management and business / Cultural and social studies
- Development-oriented studies / Education
- Fine and performing arts
- Law, international relations and European studies
- Medical and related sciences / Multimedia and communication

### ***3.2 Study for a Doctorate or Ph.D. Degree***

For foreign students with a degree equivalent to a doctoraal, the universities offer the possibility of pursuing a doctorate and obtaining the doctor's graad, the title for which is abbreviated dr. This is the highest academic degree to be earned at a university in the Netherlands. A candidate for this Dutch equivalent to a Ph.D. is not generally considered a student, but in most cases is employed by a university as a research assistant. Holders of bachelors degree are not automatically eligible to pursue a doctors degree in the Netherlands.

Obtaining a doctorate is known in Dutch as being admitted to the promotie. Normally this takes four years or

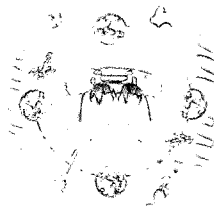


more and consists of conducting independent research and writing a dissertation. The first step is to find a supervisor, known as a *promotor*, and to agree on a topic. The promotor is generally a university professor. The candidate then writes a research proposal, which is also requires faculty approval. The period of research follows, and the writing of the dissertation. This must be defended orally at a formal public session. Candidates are questioned by several professors and specialists in the field. The dissertation may be written and defended in Dutch, English, French or German. For all other languages, special permission is required. For foreign students there are very few Dutch scholarships or fellowships available for pursuing a doctorate at a Dutch university. Several International Education institutions offer the possibility of earning a doctors degree or a Ph.D. and for this purpose also a small number of scholarships are available. These institutions tend to specialize in fields with particular relevance for developing countries. The scholarships are provided by the Dutch government from its budget for development cooperation. To be eligible, you must be from a developing country and able to guarantee that you will go back to your own country to work when you are finished. Ph.D. candidates at *International Education institutions generally do field work in their own country or in another developing country*, and their research topic must be related to development.

Also, a growing number of Dutch university departments are making a special effort to accommodate doctoraal candidates from other countries. For example, foreign students can earn a doctors degree using the sandwich model. They prepare their research projects at the Dutch university, conduct field work in their own countries, and then return to the Dutch university to write up and defend their dissertations and receive their degree.

The following universities and international institutes offer possibilities for earning a Ph.D. or a doctorate in any of their faculties. For further information, contact the faculty in question, or the office of foreign relations or student affairs.

Delft University of Technology / Eindhoven University of Technology  
 Erasmus University Rotterdam / Leiden University  
 Tilburg University / Universiteit van Amsterdam  
 University of Groningen / University of Limburg  
 University of Nijmegen / University of Twente  
 Utrecht University / Vrije Universiteit Amsterdam  
 Wageningen Agricultural University / Institute of Social Studies (ISS)  
 Institute for Housing and Urban Development Studies (IHS)  
 International Institute for Aerospace Survey and Earth Sciences (ITC)  
 International Institute for Infrastructural, Hydraulic and Environmental



Engineering(IHE) / Maastricht School of Management (MSM).

#### 4. Courses and Study Programmes conducted in English in Science and Technology

International Institute for Aerospace Survey and Earth Science(ITC)  
International Institute for Infrastructural, Hydraulic and Environmental Engineering (IHE)  
IRC International Water and Sanitation Centre  
Rijkshogeschool IJsseland / Faculty of Chemistry, Environment and Technology  
University of Twente / Technology and Development Group, Faculty of Applied Math.  
Utrecht University / Research Institute of Toxicology (RITOX)  
Universiteit van Amsterdam / ACCESS  
Maastricht University / Faculty of Arts and Culture  
Mathematical Research Institute  
Hogeschool van Utrecht / Faculty of Science and Engineering  
University of Groningen / Faculty of Mathematics and Natural Sciences  
Delft University of Technology / Faculty of Chemical Engineering and Materials Science,  
Faculty of Electrical Engineering, Faculty of Technical Mathematics and Informatics,  
Faculty of Aerospace Engineering, Faculty of Applied Earth Sciences, TopTech Studies  
Institute for Biotechnology Studies Delft / Leiden  
Hogeschool West-Brabant  
Graduate School BioCentrum Amsterdam