

## **European Master Programs in Wood Science and Technology**

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### **ABSTRACT**

The restructuring of the European system of higher education, known as the Bologna Process, was a great challenge for all parties engaged in this transition, including universities, students, employers and funding organizations. Therefore it does not surprise that there were considerable uncertainties, misunderstandings and even reluctances against the new degrees. Some of the newly established bachelor and master programs appear to be only slightly restructured versions of the old programs, and quite a few universities have already started to reform the reform. On the other hand, many well-structured promising programs have been established in recent years, showing quite some diversity despite formal standardisation of the new degrees. Such diversity is certainly one of the benefits of the Bologna process, and this also holds for the degrees offered for the European wood industry. The aim of this presentation is to give a general overview over master programs established in the wood sector. Some emphasis will be given to the concept of a research master, as it has started in 2009 at the Bern University of Applied Sciences in Biel (Switzerland) in cooperation with the University of Applied Sciences Rosenheim (Germany).

### **General Remarks on the Bologna Process**

The signing of the Bologna Declaration eleven years ago triggered the most profound restructuring of the European system of tertiary education within the last 200 years. This restructuring had significant consequences for all parties engaged in this transition, including universities, students, employers and funding organizations, and it does not surprise that the consequences of the Bologna process have been discussed heavily, sometimes even emotionally, among these players until today. The resistances to the changes were considerable; they were motivated by the frank worry about our educational system which has been successful for such long time, by the awareness of insufficient resources allocated by the officials to cope with such severe changes, but also by the limited willingness of individuals to go new ways. Looking back, the planners of the reform also have to admit that not all aspects of the new system were unambiguous and practicable. In some cases a look at those countries in which university systems in agreement with the Bologna Declaration are established for long time would have helped to avoid problems.

Although not all problems and distortions have been solved yet, today nobody seriously questions that the started reform is irreversible. As a good indicator, the transformation of four to

five year diploma courses into consecutive bachelor and master programs is quite advanced in most countries (see Figure 1 as an example).

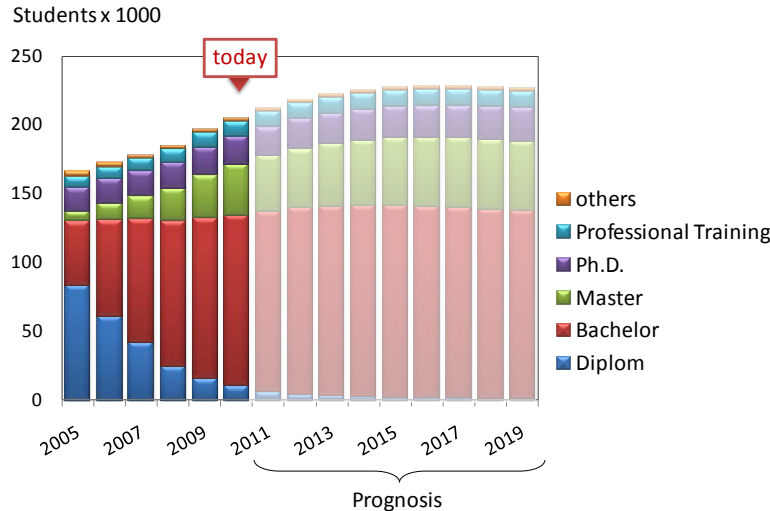


Figure 1. Development of students enrolled in Swiss universities, including universities of applied sciences (FH) and teacher training colleges (PH). Data from Federal Statistical Office (2010).

In the so-called D-A-CH countries<sup>1</sup> the introduction of the bachelor and master programs also implied an approximation of the degree formats offered by the classical universities on the one side and the *Fachhochschulen* (universities of applied sciences) on the other hand. One consequence for the students is that the degree of freedom to design their individual qualification has increased. A comparison of the two types of universities before and after Bologna is displayed in Figure 2. It was hardly possible to change from one to the other university system before Bologna, including the fact that graduates from a university of applied sciences only had limited access to Ph.D. programs. In the new system students may change their major subject or even the university after finishing the undergraduate degree, allowing them to tailor their qualification according to their personal needs or interests.

<sup>1</sup> D = Germany, A = Austria, CH = Switzerland

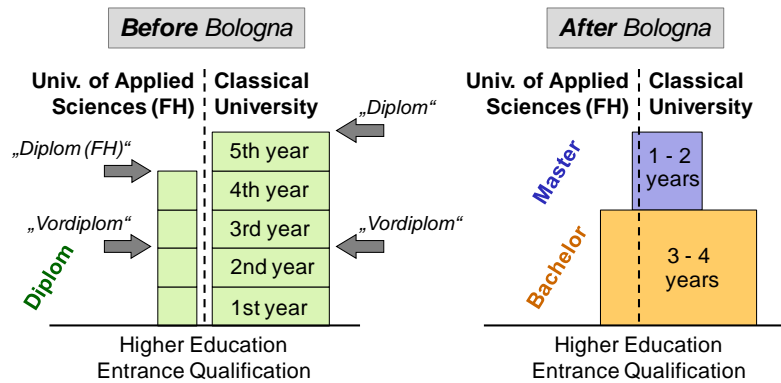


Figure 2. Systems of tertiary education in the so-called D-A-CH countries before (left) and after (right) signing the Bologna Declaration (based on DAAD 2010).

For both, classical universities and universities of applied sciences, the introduction of the bachelor and master degrees implied considerable changes. While the former were forced to guaranty a coherent professional qualification within six or seven semesters (instead of eight to ten semesters), the latter had to provide advanced postgraduate programs on the master level, a level formerly mainly served by the classical universities. It is no question that both systems, the classical science-oriented universities and the universities of applied sciences, are needed, and it cannot be of anybody's interest to even out the differences between them. However, it is visible that the classical universities, as an average, have included more applied, profession-oriented components in their programs, while many universities of applied sciences newly started or enhanced their research and development activities.

Another consequence of the Bologna Process can be recognized. Keeping in mind that the first degree from a classical university before Bologna corresponds to a master degree, it is clear that the total number of students with such higher level tertiary degree will have to decrease due to the Bologna Process. There are no definite numbers available on how many percent of an age group will continue their academic education after finishing their bachelor degree in a long run. However, the capacity plans of the universities indicate that probably less than half of an age group, as an average, will continue in graduate programs (with considerable differences between classical universities and universities of applied sciences as indicated in Figure 2). Consequently, the majority of the students will enter the job market after finishing their bachelor degree. This change certainly will have consequences on the human recourse planning of the companies, on the universities, and on many other aspects of society.

It is also noticeable that names and concepts of today's undergraduate courses are more or less analogous to those from the previous diploma programs. In contrast, completely new concepts were needed for the master programs, which often led to new thematic or even institutional alliances within one program. As a consequence, a great diversity of graduate programs has come into existence, with attractive option for the students not known before.

## **MASTER PROGRAMS IN WOOD SCIENCE AND TECHNOLOGY**

Clearly, those programs with a focus on wood science and technology as they are subject to this paper may have a variety of different names. Without attempting to be complete Barnes (2007) listed eight different names used in North America for programs concentrating on the subject of wood science and technology, including terms like "Forest Products", "Wood Science and Engineering", and "Bio-based Products". The diversity of names for European programs is similar, keeping in mind that most of the names are more or less direct translations from regional languages. In this paper the term "Wood Science and Technology" (WST) is used synonymously for all programs in this field.

It is not easy to provide a complete overview on European master programs in WST. An attempt of such overview is displayed in Figure 3. We count 38 programs<sup>2</sup> currently offered or announced to start within one year (including Turkey). The actual number is likely to be somewhat higher.



Figure 3. Master programs in Wood Science and Technology in Europe (names of the programs may differ). Excluded are civil engineering programs, teacher training courses and programs focusing on paper making.

In view of such numbers it is legitimate to ask the question how big the demand on highly qualified employees is for the European wood sector.

To answer this question it may be helpful to have a look at the situation of the European wood industry. CEI-Bois (2005) estimates that 25 to 30 % of the world's forest-based products are

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<sup>2</sup> Excluding civil engineering programs even if they have a focus on timber buildings, teacher training courses, and paper making programs.

produced in Europe, although Europe only has 5 % of the global forest area. There is a strong supply industry, particularly in the fields of machinery, chemicals and instrumentation. All together, about 8 % of the total value added in the manufacturing industry comes from the forest-based industries. There is no doubt that the European wood sector has a considerable demand on highly educated employees.

It is also interesting to have a look at North America, again. According to Barnes (2007) in 2007 a total of 31 programs in WST were counted in the US and Canada (after 27 programs in 1979). Considering that the population in Europe is twice as much as in North America, and taking into account the importance of the European wood industry and related economic sectors, the number of 38 programs in Europe does not appear to be too high. Above, when comparing the situation in North America and in Europe we have to keep in mind that Europe consists of different countries with a large number of individual languages and national economies, where many universities rather serve the regional needs than it is the case in the US and Canada.

For the D-A-CH countries another interesting observation can be made. As stated above, as an average over all disciplines and university types about one third to half of the undergraduate students will continue their education to obtain a higher level tertiary degree. On the other hand, before Bologna most of the students in WST were educated at universities of applied sciences rather than at classical universities. As a consequence, the share of students striving for a higher level degree (university diploma, equivalent to a master degree) was quite low, and still is. Assuming that the wood sector needs highly educated employees as it is the case in other industries, it becomes obvious that still more students in the master programs are needed. The situation is illustrated in Figure 4.

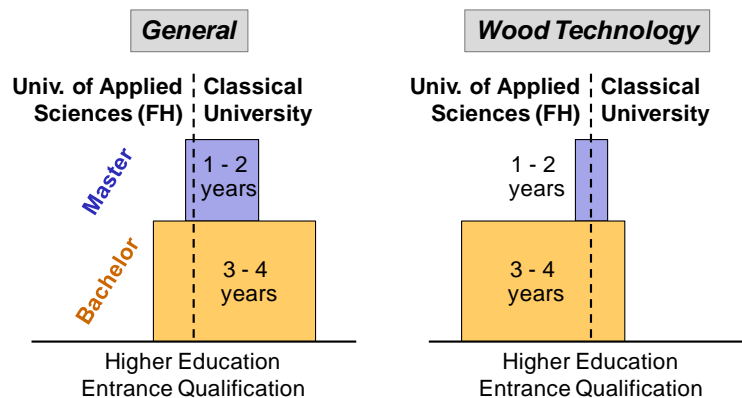


Figure 4. System of tertiary education in the so-called D-A-CH countries. Anticipated average over all disciplines (left) and current situation in WST programs (right).

And finally, the following aspect may become important in the future: While most international students (particularly from Asian countries) came to Europe as undergraduate students in the past, many of the home countries have now established their own undergraduate programs. As a consequence there is an increasing demand on European postgraduate programs for international

students which have finished their first degree in their home country. This observation was described by the Grigat (2009) for the United Kingdom, and not for any specific field of studies. However, it is likely that such trends will also affect the demand on master programs in the field of WST and in other European countries, particularly if these programs are offered in English language.

### **MASTER OF ENGINEERING IN WOOD TECHNOLOGY: A SWISS-GERMAN COOPERATION**

To illustrate the developments triggered by the Bologna Process, a brief description of the international Master of Engineering in Wood Technology (MWT) jointly offered by the Bern University of Applied Sciences Architecture, Wood and Civil Engineering (Biel, Switzerland) and the Rosenheim University of Applied Sciences (Germany) will be given.

Both universities offer 180 or 210 ECTS credits undergraduate programs in wood technology, which are the standard degrees for entering professional life. During the joined consecutive master program, students acquire extensive professional knowledge in the area of wood technology, as well as further management, methodological and social competencies. The program (90 to 120 ECTS credits) has a modular structure and takes three semesters on a full-time basis or up to a maximum of six semesters part-time. Course work in the first semester takes place in Rosenheim. Depending on the choice of Master Research Unit (specialization), from the second semester onwards the course may be completed in Biel or Rosenheim. The following Master Research Units are available:

- Materials and wood
- Production and logistics
- Timber and composite structures
- Management
- Building physics and building services engineering
- Dry construction, lightweight construction and finishing
- Furniture design and furniture testing
- Windows, facades, winter gardens, doors and gates

The first four of the Master Research Units listed above are offered in Biel, while the responsibility for the other MRUs is in Rosenheim. Those students continuing their studies in Biel from the second semester on will work in research projects at the Bern University of Applied Sciences Architecture, Wood and Civil Engineering (BFH-AHB). This is possible as the BFH-AHB has built up a research department within the last 15 years, with currently more than 100 scientists working on research and development projects. The students may be directly involved in applied research and development projects which are quite often conducted in close cooperation with commercial partners. Similar to the North American system a 0.5 graduate research assistantship may be offered to the students at the BFH-AHB. Alternatively, part-time students can also work externally in companies.

Even today, about one third of the classes are taught in English. From fall semester 2011 on the master program will be offered fully in English.

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