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Double Master Degree Programme: Enhancing Multicultural Engineering and Mobility between France and Finland

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Abstract

Mobility and multiculturalism among engineering students in Europe are mainly accomplished through the ERASMUS student mobility programme. This programme contributes to the development of an integrated European labour market and increases the chance for participating students to work abroad later on [1]. However through the ERASMUS programme the length of the study period abroad cannot be more than twelve months and students only “collect” credits in the host institution to be recognized and transferred in their home institution.

The European labour market is driven by a knowledge-based economy and motivated students seeking to increase their assets on such labour market aspire for more than exchange periods abroad. Setting up double master degree programme between trusted institutions is the foremost move institutions can have towards these students. A double Master Degree Programme is a framework promoting multiculturalism where students get the opportunity to gain additional skills and competencies.

This paper presents a double master degree programme in Embedded Systems between a Finnish university and a French school of engineering. It shows how the Finnish three plus two years education system can be coupled to the French engineering system of two plus three years of studies.

Keywords: *Double Master Degree, Engineering, Finland, France*

1. Introduction

When looking at the mobility and multiculturalism opportunities among engineering students in Europe, the development of the ERASMUS student mobility programme is definitely a success story. The programme increases the chance for participating students to work abroad later on and contributes to the development of an integrated European labour market and an advanced knowledge-based society [1]. However, some motivated students seeking to increase their assets on the labour market aspired for more than exchange periods abroad.

Establishing double master degree programme between trusted institutions is the foremost move institutions can have towards these students. From the institutions point of view a double master degree programme facilitates the recruitment of foreign students. At the same time such programme can help them to stand out from the crowd and to better position them in the international labour market.

Indeed, with the current globalisation trend companies become closer to each other, and within companies the geographical distances and national borders are losing their meaning [2]. Moreover differences in the local culture of the employees can be problematic when the companies, partners and clients are spread all over the world [3] [4]. Very often trust as well as communication problems are linked to multicultural issues [5] [6]. A double master degree programme is also an attempt to train students in a multicultural environment such that they could easily cope with cross-cultural issues.

This paper presents a newly established double degree programme between a Finnish university, Åbo Akademi University, and a French school of engineering, l'École supérieure d'ingénieurs en génie électrique (ESIGELEC). It describes the structure of the programme and demonstrates the feasibility of such programme despite the substantial differences between the Finnish and French education systems.

ESIGELEC is a school of engineering created in 1901, i.e. a higher education institution offering long technical studies. It is recognised by the French government and supported by the Chamber of Commerce and Industry of Rouen in Normandy. The school is accredited by the "Commission des Titres d'Ingénieur" to award the ESIGELEC *Diplôme d'ingénieur* or Master's Degree in engineering, signed by the Ministry of National Education in the following fields: telecommunications, electronics, embedded systems, information technologies, networks, automation & robotics, electrical engineering, mechatronics, energy and sustainable development, biomedical engineering, business engineering, finance engineering. ESIGELEC also offers doctoral studies. Its research institute in Electronic Embedded Systems is nationally and internationally recognised in the automotive, aeronautics, electronics and telecommunications areas.

Åbo Akademi University is a medium-size, public, multidisciplinary and Swedish-language university, celebrating its establishment in 1918. Åbo Akademi University offers both undergraduate and graduate studies and extensive research opportunities to some 7000 students on three campuses. It has an acknowledged position at the forefront of research in such areas as biosciences, computer science, democracy, human rights, material sciences, process chemistry and psychology.

1.1. Different Engineering Education Systems

The Finnish engineering education system is based on the framework adopted in the Bologna Process defining three cycles of higher education qualification. Students in Finland are awarded in the first cycle a Bachelor's degree in Engineering (180 ECTS) after three years of full time studies and a Master's degree in Engineering (120 ECTS) in

the second cycle after two years of full time studies in a Finnish university like Åbo Akademi University.

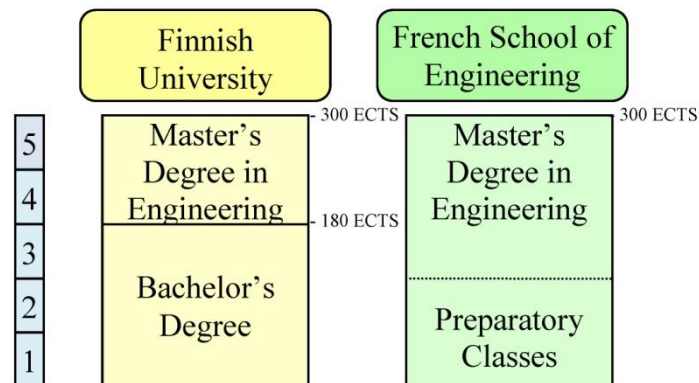


Figure 1. Overview of the French and Finnish Engineering Education System

On the other side, higher engineering education in France is essentially provided by non-university institutions dedicated to specific subjects. The Master's degree in Engineering is awarded to students by state-recognized schools of engineering (*Ecoles d'ingénieurs*) after five years of study. Master's degrees from these schools of engineering are often favoured over university degrees because of their selective admissions procedures based on competitive written and oral exams. Students in France are admitted in a school of engineering after two year of full time studies and are awarded a Master's degree in Engineering (300 ECTS) after three years of full time studies in a school of engineering.

Figure 1 illustrates the difference between the three plus two years scheme of the Finnish engineering education systems (three years of bachelor followed by two years of master studies) and the two plus three years scheme of the French engineering education systems (two years of preparation followed by three years of engineering studies).

2. Description of the Double Degree Programme

Through this 6 semesters programme, including two mandatory placements, students will be able to gain two Master level degrees: the Diplôme d'ingénieur from the French school of engineering and the Diplomingenjör from the Finnish university. Participating students are pre-selected by their home institution before being accepted by the host institution on the basis of their applications and study merits. The programme languages of instruction are English, French and Swedish.

This programme was established in the end of 2011 and the first enrolled students are expected to start in August 2012. The maximum number of accepted students from each institute is five.

Through this double degree agreement, Åbo Akademi University offers students from ESIGELEC the opportunity to participate into the programme in order to graduate with

the degree of Master of Science in Technology (120 ECTS) awarded by Åbo Akademi University. Reciprocally, ESIGELEC offers students from Åbo Akademi University the opportunity to participate into the engineering cycle leading to the *Diplôme d'ingénieur* (300 ECTS) awarded by ESIGELEC. Figure 2 illustrates the timeline of the double degree programme compared to the French and Finnish standard programmes.

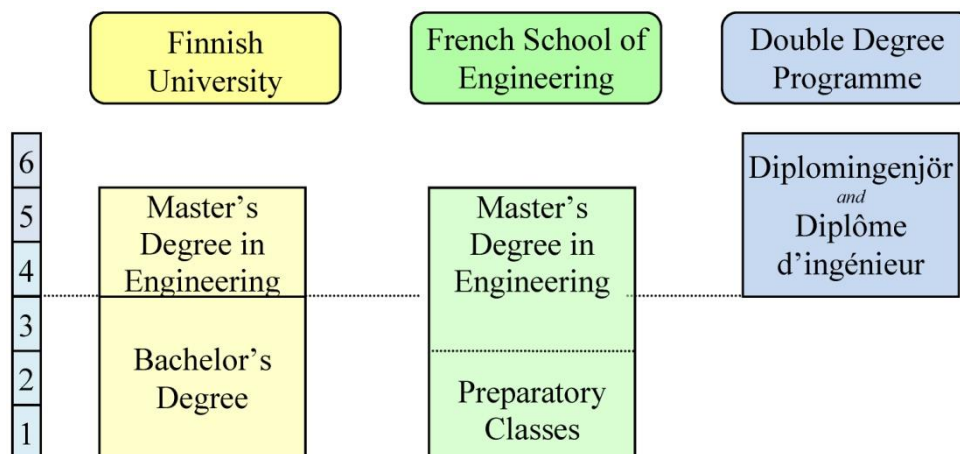


Figure 2. Timeline of the Double Degree Programme Compared to the Standard Programmes

2.2. ESIGELEC Students going to Åbo Akademi University

Students from ESIGELEC participating in this programme are selected by ESIGELEC after having completed 4 years of study in higher education. In order to graduate with the Master of Science in Technology, ESIGELEC students must stay under the academic control of Åbo Akademi University during four academic periods and one internship which has to be approved by both Åbo Akademi University and ESIGELEC. Figure 3 illustrates the academic calendar students need to follow in order to graduate from both institutes.

After completing 4 academic periods at Åbo Akademi University, students from ESIGELEC must carry out an internship in a company, research centre or university, in France or in Finland or in any other country of their choice. The internship is under the academic responsibility of ESIGELEC and Åbo Akademi University. The internship is to be assessed by Åbo Akademi University in relation with the host company, research centre or university, and with ESIGELEC.

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Year 1		Engineering Cycle (2nd year, semesters 1 & 2) at ESIGELEC								Internship 2 from 2 to 3 months		
Year 2	Periods I, II, III and IV at Åbo Akademi University									Final internship/project MSc. Thesis		
Year 3	Final internship/project MSc. Thesis											

Figure 3. Academic Calendar for ESIGELEC Students going to Åbo Akademi University

The structure of the programme and the required ECTS for ESIGELEC students going to Åbo Akademi University is illustrated in table 1. Students will need to gain ECTS credits from 6 course modules and write one master thesis which is going to be approved by both institutes. Credits gained at Åbo Akademi University are transferred to ESIGELEC in order for the students to be awarded the *Diplôme d'ingénieur* from ESIGELEC. In the same way credits gained at ESIGELEC are transferred to Åbo Akademi University in order to be awarded the *Diplomingenjör* from Åbo Akademi University. Two compulsory foreign languages, English and Swedish, are required in the compulsory language courses module.

Table 1. Structure of the modules for ESIGELEC Students going to Åbo Akademi University

Module	Required ECTS		Total
	From ÅA	From Esigelec	
1. Advanced module	15	5	20
2. Compulsory advanced module	-	20	20
3. Project course	10	-	10
4. Compulsory intermediate studies	5	15	20
5. Compulsory language courses	8	-	8
6. Free optional courses	6	6	12
7. Master's thesis	30		
TOTAL	120		

2.3. Åbo Akademi University Students going to ESIGELEC

Students from Åbo Akademi University participating in this programme are selected by Åbo Akademi University after having completed 4 academic periods in the Master of Science in Technology of Åbo Akademi University. In order to graduate with the French "*Diplôme d'ingénieur*", students from Åbo Akademi University must stay under the academic control of ESIGELEC during 4 semesters: three academic semesters and one internship semester which has to be approved by both Åbo Akademi University and ESIGELEC. Figure 4 illustrates the academic calendar students need to follow in order to graduate from both institutes.

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Year 1	Periods I, II, III and IV at Åbo Akademi											
Year 2		Engineering Cycle (2 nd year, semesters 1 & 2) at ESIGELEC								Internship 2 from 2 to 3 months		
Year 3		Engineering Cycle (3rd year, semester 1) at ESIGELEC				Final internship/project – MSc. Thesis						

Figure 4. Academic Calendar for Åbo Akademi University Students going to ESIGELEC

After completing a minimum of 3 academic semesters at ESIGELEC, students from Åbo Akademi University must carry out an internship in a company, research centre or university, in France or in Finland or in any other country of their choice. The internship

is under the academic responsibility of ESIGELEC and Åbo Akademi University. The internship is to be assessed by ESIGELEC in relation with the host company, research centre or university, and with Åbo Akademi University.

In order to graduate from ESIGELEC students from Åbo Akademi University must follow the same curriculum as regular ESIGELEC students from the second and third year of the engineering cycle. In addition students will have two compulsory foreign languages: English and French as foreign language. The ESIGELEC curriculum for the second and third year of the engineering cycle is illustrated in Figure 5.

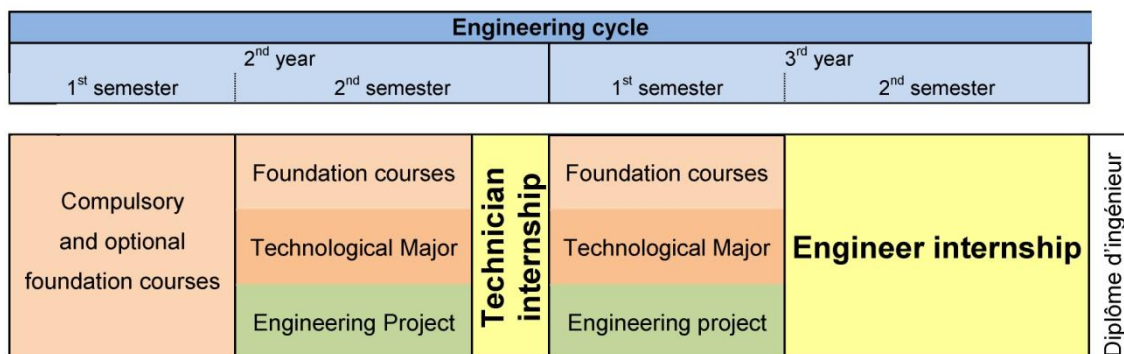


Figure 5. Second and third year of the engineering cycle at ESIGELEC

In order to graduate from Åbo Akademi University the students will have to follow the structure of modules illustrated in Table 2. Students will need to gain ECTS credits from 6 course modules (the same as in Table 1) and write one master thesis which is going to be approved by both institutes. Credits gained at ESIGELEC are transferred to Åbo Akademi University in order to be awarded the *Diplomingenjör* from Åbo Akademi University. In the same way, credits gained at Åbo Akademi University are transferred to ESIGELEC in order for the students to be awarded the *Diplôme d'ingénieur* from ESIGELEC.

Table 2. Structure of the modules for Åbo Akademi University Students going to ESIGELEC

Module	Required ECTS		Total
	From ÅA	From Esigelec	
1. Advanced module	8	12	20
2. Compulsory advanced module	15	5	20
3. Project course	10	-	10
4. Compulsory intermediate studies	5	15	20
5. Compulsory language courses	-	8	8
6. Free optional courses	6	6	12
7. Master's thesis	30		
TOTAL	120		

2.5. Programme coordination

ESIGELEC and Åbo Akademi University have an overall coordinator for the programme in each institution. The coordinator will serve as the contact person on campus, being responsible for promoting the programme, informing students and giving appropriate advice, for arrangements associated with visits, ensuring that necessary approvals are in place and the general welfare of the students.

Figure 6 illustrates the application procedure. The home institution will be responsible for screening and selecting students, subject to acceptance by the host institution. Students apply to the host institution via a simplified procedure which consists in sending an application file to the host institution coordinator of the programme. After a possible interview, the host institution grants admission to the double degree programme on the basis of the application and study merits of the selected student from the home institution.

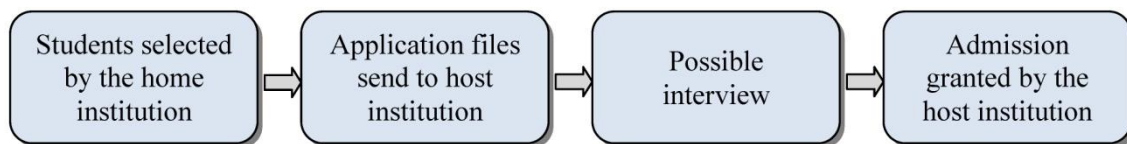


Figure 6. The Application Procedure

4. Conclusion

This paper introduced a double master degree programme in Embedded Systems between a Finnish university and a French school of engineering. It shows through a concrete example how the Finnish three plus two years education system (three years of bachelor followed by two years of master studies) can be coupled to the French engineering system of two plus three years of studies (two years of preparation followed by three years of engineering studies).

For the participating institutions the programme facilitates the recruitment of foreign students. For the students this framework promotes multiculturalism and gives the opportunity to gain additional skills and competencies. Such programme can help them to acquire cultural awareness and therefore better position them in the international labour market.

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