

# Comparison & Analysis of Engineering Masters Programs Taught in English in Non-English Speaking Countries

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## Abstract

Higher education has become more globalized. Attracting high quality international students is a priority of most of the world's esteemed universities. The universities in English speaking countries gathered most international students because of their language and other advantages. In order to gain a greater share of the global education market, universities in non-English speaking countries now offer more and more English-taught programs. Among these programs, engineering masters programs account for the largest proportion.

In this paper, we selected 37 higher education institutes in 19 non-English speaking countries and search out the English-taught engineering masters programs on their websites. A total number of 319 such programs were collected and classified. The results show the distribution of disciplines and indicate the most popular engineering masters programs which meet the global demands for professionals in the fields of engineering.

## Introduction

As the world economy in recent years has become globalized, higher education is also becoming more and more international. The dramatic increase during the past ten years in the number of international students provides unambiguous evidence for this global trend in higher education [2]. These outgoing students have played an important role in the promotion of education and academic exchange. Universities in English-speaking countries attract the largest proportion of international students due to the language advantages [2]. In recent years, however, more higher education institutes in non-English speaking countries have been offering various English-taught masters programs to attract more international students. After we did a survey on these programs in 2007, we found out that engineering programs account for the largest proportion of these English-taught masters programs [1].

There is always a strong demand for high-quality engineers in both developed and developing countries. As compared to the social sciences and the liberal arts, engineering knowledge and courses are easier to transfer to different countries. In order to gain a better view of the discipline and regional distribution of these engineering masters programs, we surveyed the English-taught engineering masters programs offered by some universities in non-English speaking countries. The following results of that survey might be helpful to those who run or are planning to offer international masters programs.

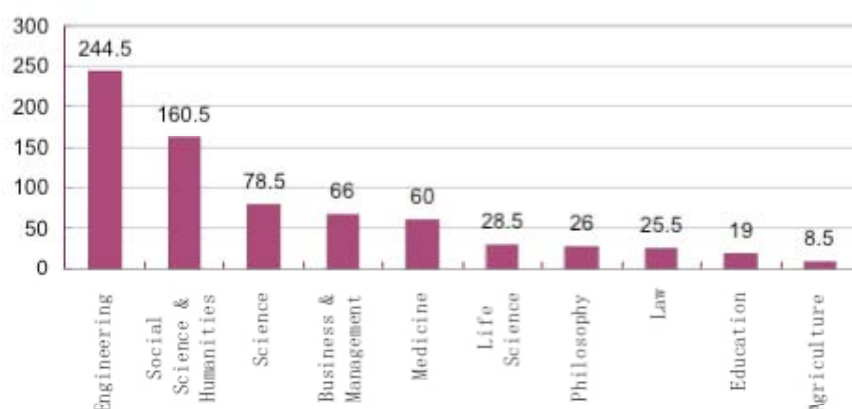
### 1. The Variety of Masters Programs Offered by Universities in Non-English Speaking Countries

In 2007, we surveyed 48 universities in 20 non-English speaking countries in Europe, Asia and South America. Twenty-eight of these universities provided 717 English-taught masters programs. The discipline distribution of the 717 programs is shown in Fig. 1 [1].

As Fig. 1 clearly shows, engineering masters programs make up the greatest proportion of the programs being offered, followed by the social sciences & the humanities, science, business & management and medicine. In all, engineering masters programs account for 34 percent of the total English-taught masters programs.

Among the 28 institutes offering English-taught masters programs, 23 of them offer programs in engineering, which accounts for 82 percent.

Fig.1 Distribution of 717 English-taught Masters Programs in 28 Universities



## 2. Discipline Variety of Engineering Masters Programs Offered by Universities in Non-English Speaking Countries

To develop a better understanding of the English-taught engineering masters programs offered in non-English speaking countries, we selected 37 institutes in 19 non-English speaking countries for closer study and analysis. Most of these institutes are esteemed technical or comprehensive universities in their own countries. The number of engineering masters programs offered by each of these institutes is shown in Table 1.

Table 1 Number of Engineering Masters Programs Offered by Each University

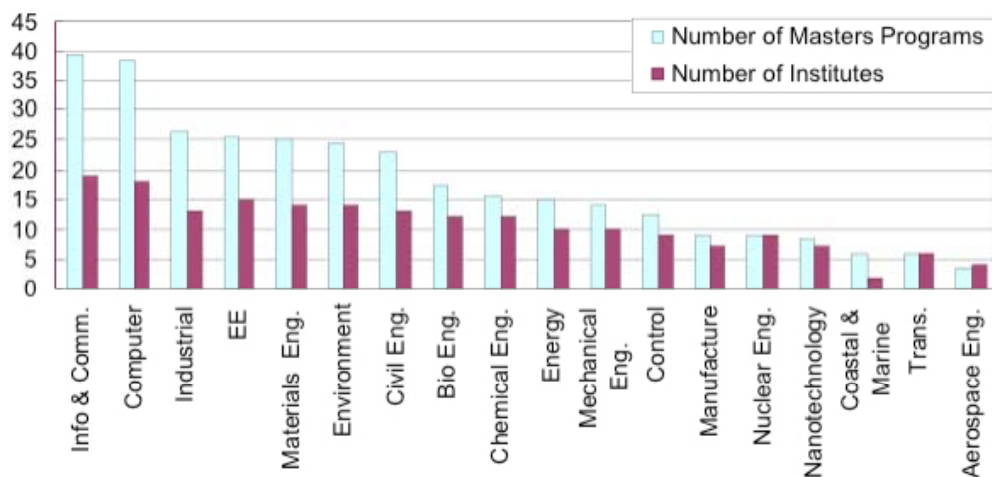
Country	Institute	Number of Eng. M. P.
Austria	Vienna University of Technology	-
Belgium	Ghent University	1
Belgium	Katholieke Universiteit Leuven (KUL)	10
Belgium	Université Catholique de Louvain (UCL)	-
Brazil	University of Sao Paulo (USP)	-
China	Shanghai Jiao Tong University	-
China	Tsinghua University	3
China	University of Science & Technology of China	-
Denmark	Technical University of Denmark	20
Finland	Helsinki University of Technology	10
France	Ecole Polytechnique	-
France	Pierre & Marie Curie University (UPMC)	-
France	The University of Paris-Sud 11	-
Germany	Technical University of Berlin	4
Germany	Technical University of Munich	11
India	Indian Institute of Technology in Bombay	24
India	Indian Institute of Technology in Delhi	39
Israel	Israel Institute of Technology	-
Italy	Politecnico di Torino	14
Japan	Kyoto University	-
Japan	Tokyo Institute of Technology	21
Japan	Tokyo University	4
Netherlands	Delft University of Technology	33
Netherlands	Eindhoven University of Technology	12

Netherlands	Utrecht University	7
Norway	Norwegian University of Science and Technology	16
Russia	Moscow State University	-
Russia	Saint Petersburg State Polytechnical University	1
Russia	Saint Petersburg State University	-
South Korea	Korea Advanced Institute of Science and Technology	-
South Korea	Seoul National University	-
Sweden	Chalmers University of Technology	29
Sweden	Royal Institute of Technology (KTH)	30
Sweden	Uppsala University	6
Switzerland	Ecole Polytechnique Federale de Lausanne (EPFL)	6
Switzerland	Swiss Federal Institute of Technology (ETH Zurich)	14
Thailand	Chulalongkorn University	7

From Table 1 we can see that the number of engineering masters programs offered by different universities varies from 36 to none. Technical institutes provide the greatest number of engineering programs. Of the 37 selected institutes, 23 of them offer English-taught engineering masters programs for international students. That means that 62 percent of the universities offer engineering masters programs.

The total number of engineering masters programs offered by the 23 institutes is 319. To develop a detailed picture of the proportion of different disciplines offered in these engineering programs, we divided the 319 programs into 18 categories. Since the classification of masters programs differs a lot from one country to another, some institutes provide very detailed and specialized programs while others provide more generalized and inclusive programs. We tried to classify them into generally recognized and accepted discipline categories. For example, we use the designation 'Information & Communications' ('Info. & Comm.') to include all the programs in information technology, communication engineering, networking, and informatics. We use the designation 'Computer & Computational Science & Engineering' ('Computer') to include all the programs in computer science, software, computational science and engineering. The number of programs offered in each discipline and the number of institutes which offer the programs in each discipline are listed in Fig.2.

Fig. 2 Discipline Distribution of the Engineering Masters Programs



From Fig.2, we find that Information & Communications and Computer are the most popular engineering masters programs, which is consistent with the finding of our previous survey in 2007[1]. Around 80 percent of the 23 institutes provide masters programs in these two most popular disciplines. More than half of the institutes offer such engineering programs as Industrial Engineering (Industrial), Electrical & Electronic Engineering (EE), Materials Science & Engineering (Material), Environmental Science & Engineering (Environment), Civil Engineering, Bio-

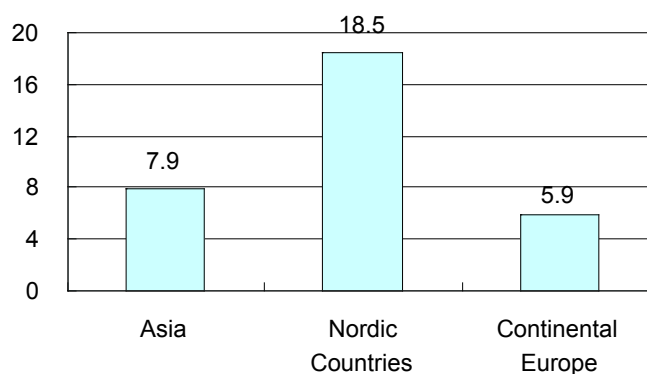
logical & Biomedical Engineering (Bio Eng.), and Chemical Engineering. Less than half of the institutes offer masters programs in Energy Science & Technology (Energy), Mechanical Engineering (Mechanical Eng.), Control & Intelligence (Control), Manufacturing Engineering & Process Systems (Manufacture), Nuclear Engineering & Engineering Physics (Nuclear Eng.), Nanoscience & Nanotechnology (Nanotechnology), Coastal & Marine Engineering (Coastal & Marine), Transportation & Logistics (Trans.), and Aerospace Engineering (Aerospace Eng.).

### 3. Conclusion & Discussion

Many higher education institutes in non-English speaking countries are inclined to offer more English-taught programs at the graduated level rather than the undergraduate in order to attract more high-level international students.

Comparing regional differences among Continental Europe, Nordic Countries and Asia, the program numbers offered for international masters degree students are quite different. Fig. 3 shows a rough regional distribution for the average number of English-taught engineering masters programs.

Fig. 3 Ave. Number of Engineering Masters Programs Offered by Institutes in Different Regions



In Fig.3, the total number of masters programs in each region is divided by the total number of the surveyed institutes in the region. It shows that the Northern European countries provide on average 18.5 engineering masters programs, a much higher average than the institutes in Continental Europe and Asia.

Referring to the countries, universities in India, Sweden, the Netherlands, and Denmark provide more English-taught masters programs. Universities in Brazil, France, Russia, Austria, Israel, China, and South Korea rarely provide English-taught masters programs.

Based on our survey, the ten most popular engineering masters programs are Information & Communications, Computer & Computational Science & Engineering, Materials Science & Engineering, Electrical & Electronic Engineering, Environmental Science & Engineering, Industrial Engineering, Civil Engineering, Biological & Biomedical Engineering, Chemical Engineering, and Energy Science & Technology.

The survey also indicates that there is a great variety of interdisciplinary engineering masters programs offered. Apart from the interdisciplinary programs linking different engineering areas, there are interdisciplinary programs which combine engineering with management, with the social sciences and the humanities, and even with the arts.

### References

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