

Engineering Department Name Duplication in Saudi Arabian Public Universities

Hamed D. Al-Sharari

College of Computing and Informatics, Saudi Electronic University, Riyadh, Kingdom of Saudi Arabia. Phone: +966-50-339-0004. Email: hamed_100@hotmail.com;

Abstract

This paper provides an overview of engineering academic departments in the currently existing 24 Saudi Arabian public universities, with emphasis on department names, and the advent of non-traditional engineering specializations. The aim is to suggest a unified naming scheme for Saudi engineering departments in public universities. Recent data regarding engineering department names in Saudi public universities has been compiled, tabulated, and analyzed in order to determine common trends and differences. Data shows that significant differences exist in equivalent department names without an apparent basis for such discrepancies. It is alarming to see that no standard, uniform basis has been used to choose department names in Saudi public engineering colleges. Authors propose a unified naming scheme as a step in merging nationwide efforts in Saudi engineering colleges. It is also suggested to limit modern engineering academic trends to recently established Saudi public universities.

Keywords: department names; Saudi Arabia; public universities; name duplication

Introduction

The engineer's growing need for knowledge and information has greatly increased the versatility of traditional academic curricula. This has been achieved by the continuous improvement of academic specializations either via the initiation of modern engineering trends or through the merging of traditional programs. Furthermore, the amount of information that should be acquired by an engineer has increased to a level that surpasses the amount that can be accommodated by a single academic program.

New Engineering Trends

Until the early 1980's, for instance, most chemical engineering graduates were in direct demand by petroleum and chemical companies. In recent years, however, a growing need exists for non-traditional engineering fields, such as computer engineering, environmental engineering, and biomedical engineering. Engineering education trends have recently focused on moving away from a certain specialization and towards the integration of knowledge through focusing on collecting and continuously enhancing a number of basic, essential engineering skills (Rugarcia et al. 2000; van Alsté 2007).

A number of leading worldwide engineering colleges have begun to identify and realize the significance of recent engineering trends which have resulted from technological progress, patents, as well as the synergy and collaboration of different engineering disciplines. Their main goal has been to attract students to an engineering education that fulfills both their interests and aspirations. This is in addition to the increasing market demand in engineers who possess multidisciplinary engineering knowledge and skills (van Alsté 2007; Klawe 2004).

Changing Department Titles

Literature shows that engineering curricular names can have a significant effect on student interest and enrollment in different- both classical and new or multidisciplinary- engineering disciplines. Shoup (1989), for instance, discusses how reviewing the name of the agricultural engineering program title with one that is more reflective of the career potential led to a doubling of student enrollment figures as well as a significant increase in job market interest in the specialization.

Minor modifications in the department title can also have a significant effect. This is shown by Young (2006) who discusses the positive statistical significance that the subtle addition of the 'bio' suffix has had on undergraduate enrollment in agricultural engineering and other engineering programs. Many engineering departments across the US have also modified their names in order to better reflect their academic mission and research activities, as with incorporating the 'bio' suffix into several chemical engineering departments (Mote, Jr 2005), or by giving a focus on computers in electrical engineering departments (Fauchet 1998).

Department names should, thus, be chosen wisely. Luppicini (2008) illustrates the tendency of graduates of a certain discipline to attach themselves to the original title even if there exists a need to change that title.

Engineering Education in Saudi Arabia

There has been a strategic movement in Saudi Arabia to replace the currently existing petroleum-based economy with a knowledge-based economy. Saudi higher education has witnessed an unprecedented surge from only four public engineering colleges (namely in *King Saud University*, *King Fahd University of Petroleum and Minerals*, *King Abdulaziz University*, and *Umm Al-Qura University*) and 25 corresponding departments about ten years ago, to 23 colleges and 123 departments today (i.e. 475% and 392% respective increases). These figures, although promising, have recently shown that a rush in establishing academic institutions has, inevitably, had its drawbacks.

Presentation

The purpose of this manuscript is to shed the light on the naming scheme for the different bachelor-offering engineering departments available in Saudi Arabian public universities. It also aims to investigate redundancy existing in different engineering departments among colleges nationwide, particularly how and why new universities are duplicating departments in existing universities. The authors subsequently provide some suggestions intended to restructure some departments to cope both with global educational changes and national demographic resources and restrictions.

This study is based on analyzing and potentially restructuring the 23 existing engineering colleges, pertaining to 21 of the 24 existing public universities in the country. Both *King Abdulaziz University* (KAU) and *Taibah University* have been counted twice due to the existence of regional engineering campuses, namely the *KAU at Rabigh* and *Taibah University at Yanbu* engineering colleges. Three Saudi universities do not currently offer engineering degrees, which are *King Saud bin Abdulaziz University for Health Sciences*, the *Islamic*

University, and Princess Nora Bint Abdul Rahman University (a female-only institution), all of which have been excluded from this study.

It should be noted that the proposed restructuring mechanism is mainly targeted towards the main conventional or traditional engineering disciplines being civil, mechanical, electrical, industrial, and chemical engineering, which constitute more than 70% of the current total engineering department count in Saudi Arabia. The mechanism for analysis has heavily focused on department names, which usually offer a good reflection and indication of the educational nature of the department.

It should also be noted that engineering departments in Saudi Arabia are primarily and almost exclusively targeted towards male students, with very few exceptions for females, including “soft” engineering disciplines like interior design. As a result, this and other science-related disciplines, like computer science, information science and technology, agricultural science, etc., have also been excluded from the analysis.

The main sources for this research are the 2009 *Saudi Ministry of Higher Education’s* (MOHE) statistics report regarding university education (MOHE 2009), as well as the Saudi MOHE’s official Web Site (MOHE 2012). The information and data retrieved from these sources has been translated by the authors from Arabic to English.

Discussion

First, it is important to point out that clear discrepancies do exist in the naming scheme currently adopted by Saudi public universities for various engineering disciplines, as shown in Table 1. This is also a possible indication that no clear or standard reference was used by most universities for such process, as evidenced by the many, inconsistent name variations of a certain specialization and the possible addition of a sub-discipline in some cases. Please note that the university names abbreviated in Table 1 are shown in full in Table 2.

Importance of a Unified Department Naming Scheme

A career in the public sector is usually a popular choice for fresh engineering Saudi graduates due to high job security and superior salaries. The problem, however, lies within the recruitment process, particularly since the *Saudi Ministry of Civil Service* requires engineering graduates to hold degrees that necessarily match one of those available in the MCS job classification guide (MCS 2015). An applicant must access this guide and apply for a job title that exactly matches one of currently 63 available engineering discipline titles, with numerous name variations for each of the major engineering specialization, as mentioned in the previous sections.

This serves as clear proof that public engineering colleges nationwide have predominantly set department names without first returning to the MCS to follow a predefined naming scheme, particularly since such does not currently exist. This, consequently, leaves an almost unlimited number of possibilities open for choosing department titles, and an additional burden on both the MCS and more importantly the graduate to conform –necessarily– to the different name variations.

An additional problem targets the more than 148,000 expatriated students traveling overseas to different countries for higher education (Aleqt.com 2013), many pursuing degrees in scientific disciplines. Some of these graduates have enrolled in modern engineering specializations (such as mechatronics and engineering nanotechnology), which are not currently existent within the MCS guide, and, therefore, suffer greatly when trying to find an appropriate matching job to their earned degree.

Note that this is different than the recruitment process adopted by the private sector which mainly evaluates applicants by the quality of their transcripts, unlike the public sector that evaluates the graduate mainly according to the title in their diplomas. This additionally causes engineering students interested in a

public sector career to stick to conventional specializations due to the added job flexibility that a general degree in, say, electrical engineering may provide, e.g. a job in power or communication engineering. A degree in, say, mechatronics engineering would, on the contrary, require a complicated and time-consuming process by the MCS committee of job classification (MCS 2004).

Finally, it is also worthy of mentioning here that the MCS naming condition is a far greater concern than that involved with accreditation standards. The latter has been set by the Saudi Arabian NCAAA (*National Commission for Academic Accreditation and Assessment*). Recognizing a certain engineering diploma or department, e.g. when transferring from one national college to another, is not usually a concern since accreditation addresses such issues as curricular content and learning outcomes rather than program or department names (NCAAA 2011).

Suggested Department Naming Scheme

The authors have, accordingly, addressed these concerns by merging similar department names under nominated, simpler, yet more representative titles in order to facilitate the analysis, without imposing fundamental changes. Consequently, Table 2 illustrates the engineering department count (totaling 123) in each of the 23 Saudi public engineering colleges. Each of these 25 departments is listed in descending order of its frequency in various Saudi public engineering colleges. The same department order has been, accordingly, maintained throughout the manuscript.

The same results are summarized in Table 3. This reflects the department counts (shown in Table 2) and the possible alternative names (previously shown in Table 1) that each could have.

Table 4 demonstrates that electrical, civil, mechanical, chemical, and industrial engineering are the more dominant among engineering disciplines as indicated -in the third column- by their presence in the majority of the 23 currently existing public engineering colleges. It is expected that such became the basis for the department naming scheme in most newly established universities. The dominance of these departments is also apparent in new universities, as evidenced by the data shown in the last three columns.

The distribution of engineering departments in Saudi public universities, both new and established, at the bachelor's level is further illustrated in Fig.1. The equivalent distribution for newly established public universities is shown in Fig.2. This also serves to show the dominance of the five previously-mentioned disciplines in both new and established Saudi public universities. Note, that in both these figures only the first 10 disciplines are listed, which are precisely the ones present in two or more public engineering colleges nationwide.

It is obvious from the above analysis that department names in most new universities have been chosen almost exclusively by the well-established public universities that were initially appointed by the Saudi MOHE to supervise them. This is a clear indication a) of the absence of a serious study invested in the naming process; and b) of the almost complete inconsideration of the expectation that new and/or remote universities should emphasize disciplines that highlight their prospective and existing demographic and geographic potentials, nor adopting similar successful international experiences as models for the process.

For example, the engineering departments at both the *Northern Border University* and the *University of Tabuk*, both of which were established under the direct supervision of *King Abdulaziz University* hold the exact same names, including 1) electrical e.; 2) mechanical e.; 3) chemical e.; 4) civil e.; and 5) industrial e. The same can be said for universities affiliated from *Kind Saud University*, including *Al Jouf University*, *Qassim University*, and *Prince Sattam bin Abdulaziz University*, all of which not only share the same engineering department names (which include 1) electrical e.; 2) mechanical e.; and 3) civil e.), but also have identical program and course contents. This duplication pattern is also partially existent among most other engineering colleges nationwide.

On the other hand, the college of engineering at the *University of Dammam* has chosen to host several contemporary engineering disciplines for all its departments, including 1) construction and building e.; 2)

environmental e.; 3) medical e.; 4) mechatronics; 5) marine e.; 6) safety and security e., and 7) engineering education. *King Faisal University* has also adopted a similar approach; departments include 1) civil and environmental e.; 2) electrical e.; 3) mechanical e.; 4) chemical e.; 5) desalination e.; 6) biomedical e.; and 7) materials e.

The authors do not find it surprising that many of the disciplines mentioned in the previous paragraph are not among those listed within the MCS job classification guide. This is primarily justified by the fact that the two universities are located at the Eastern province of the kingdom, where many graduates strive to join renowned private sector companies (such as *Saudi ARAMCO*), where (as mentioned in the previous section) engineering recruits are judged according to their transcript rather than discipline title. It is, thus, evident that these two universities have employed a sound naming strategy that fulfills the country's current academic needs.

Conclusions

In summary, this study illustrates that the existing naming scheme for engineering departments in Saudi public universities contains inconsistencies and has not been based on a standard reference. It is also clear that some department names consist of an additional or combined engineering discipline, examples being the chemical and materials e. department, and the department of electrical and computer e. as illustrated in Table 1. To simplify the study, the authors propose a unified, merged, representative name scheme for departments with similar specializations as shown in Table 2 and Table 3.

Furthermore, the study shows that a majority of engineering departments in both established and new Saudi universities consist of classical disciplines, as shown in Table 4. There is also a very close match or "easy" imitation in the department scheme of most new versus corresponding established or parent equivalents. A few new universities like the *University of Dammam*, however, have adopted novel, unconventional disciplines at the bachelor level, which are hardly present in any established university. Some of these disciplines have been chosen as to be compliant to the environment and location of such universities.

Recommendations

First and foremost, the authors highly recommend that the Saudi MOHE seriously consider (in collaboration with the MCS) unifying the existing engineering department names nationwide according to the scheme proposed in this paper. Furthermore, a project should be undertaken to enhance the various Saudi engineering programs as to satisfy market demands for graduates, adapt to international engineering trends, as well as to take advantage of new universities' demographic and social constraints. In addition, the authors highly recommend that at least some of the many new Saudi engineering colleges should focus on adopting novel, multidisciplinary engineering specializations. Well-established Saudi universities should, on the other hand, focus on typical engineering disciplines, especially at the bachelor and master levels.

Furthermore, a survey is needed to show the extent of the market's need for contemporary engineering programs and disciplines. This is one essential step towards preparing engineering graduates for the various challenges of the twenty-first century.

References

- Aleqt.com. ألف 148 [The Minister of Higher Education: Number of Expatriated Saudi Students Overseas is 148,000], 2013<[Http://www.aleqt.com/2013/04/16/article_747990.html#](http://www.aleqt.com/2013/04/16/article_747990.html#)>Accessed August 21, 2015.
- Fauchet, P. Engineering Department Name Change Reflects Emphasis on Computers.<[Http://www.rochester.edu/news/show.php?id=1074](http://www.rochester.edu/news/show.php?id=1074)>University of Rochester Newsroom, September 29, 1998. Accessed June 11, 2012.
- Klawe, M. Engineering for a Better World: The Princeton Vision.<[Http://www.princeton.edu/~seasplan/PrincetonVision.pdf](http://www.princeton.edu/~seasplan/PrincetonVision.pdf)>Princeton University, 2004. Accessed 27 July 2015.
- Luppigini, R. "Educational Technology at a Crossroads: Examining the Development of the Academic Field in Canada." *Journal of Educational Technology & Society* 11, no.4(2008): 281–296.
- MOHE. " إحصاءات التعليم العالي في المملكة العربية السعودية، العام الدراسي ١٤٢٩-١٤٣٠هـ (العدد الثاني والثلاثون) [Higher Education Statistics in the Kingdom of Saudi Arabia: Academic Year 1429-1430H (Volume 32)]." (2009): 9633–1319.
- MOHE. الجامعات الحكومية [Public Universities], 2012<[Http://www.mohe.gov.sa/ar/studyinside/Government-Universities/](http://www.mohe.gov.sa/ar/studyinside/Government-Universities/)>Accessed June 12, 2012.
- MCS. لائحة التعيين في الوظائف العامة [Regulations of Appointment in General Careers], 2004<[Http://mcs.gov.sa/InformationCenter/ArchivingLibrary/Regulations/Regulations/132629_N011.pdf](http://mcs.gov.sa/InformationCenter/ArchivingLibrary/Regulations/Regulations/132629_N011.pdf)>Accessed February 07, 2015.
- MCS. دليل تصنيف الوظائف [Job Classification Guide], 2015<[Https://eservices.mcs.gov.sa/rmcs/ContentView.aspx?cmd=p8](https://eservices.mcs.gov.sa/rmcs/ContentView.aspx?cmd=p8)> Accessed February 07, 2015.
- Mote, Jr, C.D. Memo04048_ENGR_ENCH_ChgDeptNameToChemAndBiomolecEngr<[Http://www.provost.umd.edu/ProvostDocs/04-05/04048_ENGR_ENCH_ChgDeptNameToChemAndBiomolecEngr.pdf](http://www.provost.umd.edu/ProvostDocs/04-05/04048_ENGR_ENCH_ChgDeptNameToChemAndBiomolecEngr.pdf)>University of Maryland, 2005. Accessed August 21, 2016.
- NCAAA. معايير ضمان الجودة والاعتماد لمؤسسات التعليم العالي. [Standards of Guaranteeing Quality and Accreditation for Higher Education Institutions], 2011 <[Http://www.ncaaa.org.sa/siteimages/ProductFiles/20_Product.pdf](http://www.ncaaa.org.sa/siteimages/ProductFiles/20_Product.pdf)> Accessed February 07, 2015.
- Rugarcia, A., Felder, R. M., Woods, D. R., and J. E. Stice. "The Future of Engineering Education. I. A Vision For a New Century." *Chemical Engineering Education* 34, no. 1(2000):16–25.
- Shoup, W. D. "Effects of Curriculum Name Change." *Applied Engineering in Agriculture* 5, no. 3 (1989):412–414.
- vanAlsté, J.A. "Attracting More Students with New Engineering Programs." Paper Presented at the 2010–2020 International Summit, IEEE, 2007. *IEEE Xplore*<<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4760370>> Accessed August 21, 2016.
- Young, R.E., 2006. "The 'Bio'-Type Engineering Name Game." *International Journal of Engineering Education* 22, no. 1 (2006): 23–27.

Table 1 Inconsistencies in Department Names for Saudi Public Engineering Colleges.

Engineering department naming scheme # 1		Engineering department naming scheme # 2		Engineering department naming scheme # 3		Recommended name
Specialization	Universities	Specialization	Universities	Specialization	Universities	Specialization
Electrical E.	ALL*	Computer and Electrical E.	KAU	Electrical E. and Communication Systems	Imam U	Electrical E.
Mechanical E.	ALL*	Production E. and Design of Mechanical Systems	KAU			Mechanical E.
Chemical E.	ALL*	Chemical and Materials E.	U of Tabuk; Northern Border U; KAU at Rabigh			Chemical E.
Petroleum E.	KFUPM	Petroleum and Natural Gas E.	KSU			Petroleum E.
Architectural E.	Taibah U; Taibah-Yanbu; Jazan U; U of Ha'il; Najran U	Architecture	KAU at Rabigh	Islamic Architecture	Umm Al-Qura U	Architectural E.
Architecture and Planning	KKU	Architectural E. and Planning	Imam U			Architecture and Planning
Computer Engineering	Majmaah U; Shaqra U	Computer and Network E.	AlBaha U			Computer E.

* The only exceptions are for the universities shown in the column(s) on the right.

Table 2 Engineering Department Count for Saudi Public Engineering Colleges.

index	Department	Engineering College																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
		King Saud University (KSU)	Minerals (KFUPM)	King Abdulaziz University (KAU)	Rabigh)	Umm Al-Qura University	U. (Imam U)	King Faisal University (KFU)	King Khalid University (KKU)	Taibah University	Taibah University - Yanbu'	Taif University	Qassim University	Al Jouf University	University of Ha'il	Jazan University	University of Tabuk	Northern Border University	Najran University	AlBaha University	University of Dammam	University	Majmaah University	Shaqra University	Total
1	Electrical E.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	22
2	Civil E.	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	21
3	Mechanical E.	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	21
4	Chemical E.	x	x		x		x	x	x	x					x	x	x	x							13
5	Industrial E.	x		x	x				x	x	x				x	x	x	x	x				x		12
6	Architectural E.				x	x				x	x				x	x			x	x					8
7	Computer E.					x														x			x	x	4
8	Thermal and Desalination Technology			x												x									2
9	Petroleum E.	x	x																						2
10	Architecture and Planning						x		x																2
11	Aerospace and Aviation E.		x	x																					2
12	Nuclear E.			x																					1
13	Mining E.			x																					1
14	Construction and Building E.																				x				1
15	Environmental E.																				x				1
16	Biomedical E.							x																	1
17	Medical E.																				x				1

18	Mechanical and Industrial E.						x																1		
19	Mechatronics																				x		1		
20	Safety and Security E.																				x		1		
21	Marine E.																				x		1		
22	Engineering Education																				x		1		
23	Civil and Environmental E.							x															1		
24	Desalination E.							x															1		
25	Materials E.							x															1		
	Total	6	6	8	6	5	5	7	6	6	6	3	3	3	6	7	5	5	6	5	7	3	5	4	123

Table 3 Engineering Department Count Summary in Saudi public Engineering Colleges.

#	Department name	Other existing names	Count
1	Electrical E.	Electrical and Computer E.; Electrical E. and Communication Systems	22
2	Civil E.		21
3	Mechanical E.	Production E. and Design of Mechanical Systems	21
4	Chemical E.	Chemical and Materials E.	13
5	Industrial E.		12
6	Architectural E.	Architecture; Islamic Architecture	8
7	Computer E.	Computer and Network E.	4
8	Thermal E. and Desalination Technology		2
9	Petroleum E.	Petroleum and Natural Gas E.	2
10	Architecture and Planning	Architectural E. and Planning; Architecture and Planning E.	2
11	Aerospace and Aviation E.		2
12	Nuclear E.		1
13	Mining E.		1
14	Construction and Building E.		1
15	Environmental E.		1
16	Biomedical E.		1
17	Medical E.		1
18	Mechanical and Industrial		1

E.		
19	Mechatronics	1
20	Safety and Security E.	1
21	Marine E.	1
22	Engineering Education	1
23	Civil and Environmental E.	1
24	Desalination E.	1
25	Materials E.	1
Total:		123

Table 4 Engineering Department Ratios (Sample) in New and Established Saudi Public Engineering Colleges.

#	Department name	ALL universities		New universities		
		Dept. Count	Dept. Total College Count (%)	Dept. Count	Dept. Total College Count (%)	Dept. Total Dept. Count (%)
1	Electrical E.	22	96	17	74	77
2	Civil E.	21	91	16	70	76
3	Mechanical E.	21	91	16	70	76
4	Chemical E.	13	57	10	43	77
5	Industrial E.	12	52	9	39	75
6	Architectural E.	8	35	7	30	88
7	Computer E.	3	13	2	9	67
8	Architecture and Planning	2	9	1	4	50
9	Thermal E. and Desalination Technology	2	9	1	4	50
10	Petroleum E.	2	9	0	0	0

Fig.1 Distribution of various engineering departments in all Saudi public universities (new and established); note, this includes only data for the bachelor's degree

Fig.2 Distribution of various engineering departments in new Saudi public universities; note, this includes only data for the bachelor's degree