

College of Engineering Strategic Plan 2013-18

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1. Mission and Vision of the College of Engineering

Mission

The College of Engineering's mission is to provide a world-class education in select engineering fields allowing its graduates to make a substantial contribution to the welfare of Saudi society and the world at large through professional practice and/or postgraduate studies.

Vision

The College of Engineering's vision is to be an internationally-recognized leader in the creation, integration, application and transmission of applied science and engineering knowledge, through high-quality research, technology development, innovation, and entrepreneurship. This will occur through undergraduate and graduate education of scholars and professionals, who will be distinguished in their ability to design, analyze and build.

2. State of the College of Engineering

2.1. Facilities

At present, the College of Engineering does not have its own building, though one is planned in the near future. In the meantime, we have been setting up labs on an as-required basis elsewhere on the Alfaisal University campus. Moreover, the College of Engineering has access to laboratories at King Saud University (KSU), the King Abdulaziz City for Science and Technology (KACST) and the King Abdullah University of Science and Technology (KAUST) through individual or institutional agreements.

2.2. Organizational Structure & Personnel

At present the formal organizational structure of the College of Engineering consists of the Acting Dean, fourteen faculty members, two Principal Instructors (one in mechanical engineering and one in electrical engineering), one instructor in electrical engineering, a Workshop Technician, a Business Administration Officer and several adjuncts. The overall faculty count in each program is as follows:

- Architectural Engineering: 2
- Electrical Engineering: 4
- Industrial Engineering: 3
- Mechanical Engineering: 3
- Software Engineering: 2

Note that, as shown in Fig. 1, one faculty member is also acting as the chair of the electrical and software engineering programs, while another is acting as the chair of the architectural, industrial and mechanical engineering programs.

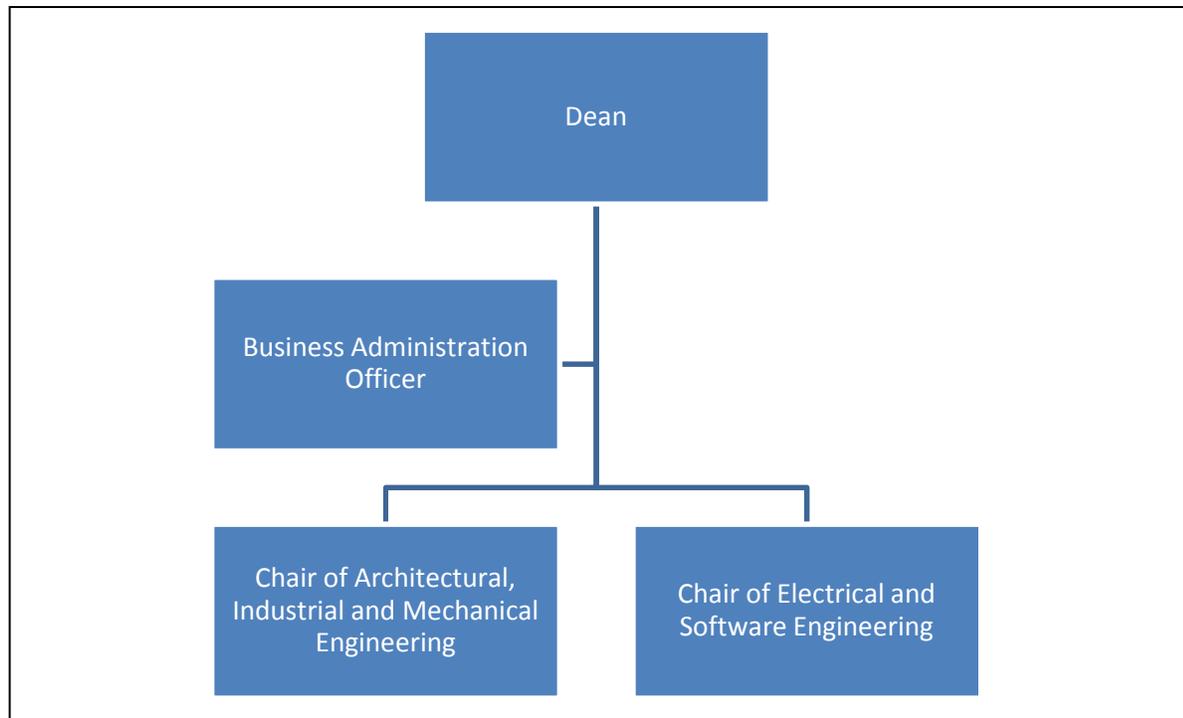


Fig. 1: Organizational Structure of the College of Engineering

2.3. Programs

The College of Engineering currently offers bachelor's degrees in Architectural, Electrical, Industrial, Mechanical and Software Engineering, while a bachelor's degree in Aerospace Engineering was frozen due to low enrolment. A master's degree in Engineering & Systems Management is currently going through the approval process.

2.4. Student Enrolment and Recruitment

At present, there are 45 freshman students with a total enrolment of 145 in the College of Engineering. Since the beginning we have participated in various student recruiting activities such as visiting high schools, speaking to students during their visits to Alfaisal University, and organizing Open Houses in which displays and explanations helped to demystify engineering. For instance, at the Open House held in December 2012, a guest speaker, Mr. Xavier Fouger, Senior Director of Global Learning at Dassault Systemes, gave a talk on "Digital Engineering for Exciting Employment in all Industries".

2.5. Research

College of Engineering students have actively participated in Alfaisal University's Annual Student Poster Competitions. Notably, it was an engineering student who won the 1st prize in the 2010-2011 edition of the competition.

Engineering professors, in the period 2009-2011, were awarded a total of SR 7,962,750 in research funding by KACST, along with SR 5,536,005 in internal start-up funding. A major achievement in sponsored research to date has been the success of Alfaisal University's engineering faculty in the Saudi Aramco University Collaboration Programs. Specifically, the following projects are currently under way:

- Nano-composite carbide coatings for wear resistant applications
- Advance anode materials for direct hydrocarbon proton conducting solid fuel cell (PC-SOFC) in auxiliary power units
- Wear behaviour characterization of Stellite alloys using computational modelling

Engineering faculty members have been very prolific in research publications in spite of a lack of facilities, as demonstrated in Table 1. It should be pointed out that this translates into a productivity of more than 2 refereed journal papers per faculty, in addition to all their other contributions, which can be attributed in large part to faculty members' professionalism, determination and collaborations with outside institutions.

Table 1: College of Engineering Faculty Research Output

Year	2008	2009	2010	2011	2012 (up to June)
Refereed Journal Papers	14	22	26	27	24
Patents	0	1	1	0	0
Books	0	2	1	1	2
Book Chapters	1	2	1	2	2
Conference Papers	8	8	18	14	5

2.6. External Relations

The aforementioned sponsored research is an excellent example of the kind of collaboration which we are currently pursuing with industry. In fact, much effort has been devoted to this, as highlighted below:

- An agreement is forthcoming with KACST whereby Alfaisal University will be the Academic Partner in Saudi Arabia of the Center of Excellence in Nano-manufacturing Applications (CENA). In this role, the College of Engineering will coordinate up to 50 graduate students from universities throughout the MENA region who will be jointly registered at their home university and at Alfaisal University
- Alfaisal University is being considered to participate in Dassault Systemes' (DS) "Program for the Advancement of Higher Education" and to become the sole "Center for 3D Digital Experience" in Saudi Arabia, with many benefits, some of which being as follows:
 - Key software will be provided along with technical support and other expert services
 - One-week international study tours
 - Opportunity for Alfaisal students to participate in conferences on engineering education under the sponsorship of DS
 - Private on-line access to a vast database of more than 500 courses
 - Students will have access to an internationally recognized certification
 - Turnkey educational material will be provided which is adapted to high school students in order to facilitate recruitment at Alfaisal University

- The opportunity to work with high schools and industry throughout Saudi Arabia in order to develop digital teaching and training materials, thereby providing us with enhanced visibility with a significant potential for positive impact on student recruitment and industrial development.
- Thales Group: Various facets for academic cooperation are being considered following meetings that were held, namely student internships, faculty exchange and sharing of teaching material
- SAP: Engineering faculty attended a training session which could eventually lead to Alfaisal University offering certification programs for the students
- Saudi Electricity Company: There could be opportunities for some applied research and training.
- K.A. CARE: Prospects for applied research and training.

Moreover, Alfaisal University currently has a Memorandum of Understanding and a Memorandum of Agreement with Queen's University Belfast, the provisions of which are summarized as follows:

- Visits by, and exchange of graduate students
- Visits by and interchange of staff
- Exchange of information
- Joint research activities
- Alfaisal University engineering students may enroll at QU Belfast as non-graduating visiting students.

Three of our students have completed the senior year of their aerospace engineering degree there.

3. SWOT Analysis

3.1. Strengths

- S1. Alfaisal University is a pioneer in Saudi Arabia in offering all its engineering programs to both male and female students while at the same time respecting the country's culture.
- S2. Faculty and students are from diverse countries and background, providing a rich cultural environment.
- S3. Faculty members possess well-rounded knowledge and experience, which in turn translates into well-rounded students.
- S4. Relatively small class sizes (small student/faculty ratio, in the range of 10:1) means that students are given fair attention, with teaching having a mentoring pedagogical flavor.
- S5. Our curricula encompass the latest technologies while maintaining an emphasis on a strong foundation in the universal basics of the offered engineering majors.
- S6. There is a dynamic work environment.
- S7. Alfaisal University obtained NCAAA general accreditation.
- S8. The current facilities that the College of Engineering occupies are of a very high standard.
- S9. Alfaisal University is located in a large metropolitan area.
- S10. Engineering programs are four years in length and taught in English, giving a marketing advantage.
- S11. There is a strong potential for research funding from various sources.
- S12. Alfaisal University is under the umbrella of the very prestigious King Faisal Foundation.

3.2. Weaknesses

- W1. There are currently few elective courses in the engineering programs.
- W2. Study plans have undergone frequent revisions.
- W3. Operating procedures in the College of Engineering are not well established.
- W4. The College of Engineering's organizational structure needs improvement.
- W5. Student enrolment is low.
- W6. There has been a high turnover rate among faculty and other staff members, which could be due to the lack of a sense of stability. This in turn can have negative impact on the students' sense of stability as well.
- W7. There currently are no graduate programs.
- W8. There are not enough research facilities.
- W9. There are few established connections to industry.
- W10. The programs are not yet ABET accredited.
- W11. There is no separate building housing the College of Engineering.
- W12. Lab facilities are somewhat basic.
- W13. The faculty teaching load (six per year in some cases) hinders faculty professional development and their faculty's ability to keep up with research and current advances in their fields.
- W14. There is no feel of an engineering community at Alfaisal University, with a lack of extracurricular activities such as seminars, clubs, competitions, etc.
- W15. The College of Engineering does not yet have an established reputation.
- W16. Tuition fees are high as compared to other institutions in the region.
- W17. The College of Engineering is not well advertised.

3.3. Opportunities

- O1. The government of Saudi Arabia enthusiastically supports higher education.
- O2. The fact that we are a co-educational institution allows recruiting both genders.
- O3. Renewable energy systems along with competitive manufacturing systems, in which many faculty members possess a high degree of expertise, have been identified as strategic areas for future sustainability in Saudi Arabia.
- O4. We have five active undergraduate programs into which we can recruit students.
- O5. There is a perceived lack of public confidence in other universities in the region.
- O6. Local and regional employment needs emphasize the importance of engineering as a career path.
- O7. The availability of internal funding allows the support of good student projects.
- O8. We are getting a lot of attention from prestigious outside organizations like KACST, Intel, Dassault Systemes, etc.
- O9. Our students are very dynamic in terms of wanting extra-curricular activities, including competitions (for instance, Lego Mindstorms), undergraduate research, and teaching assistantships, to name only a few.
- O10. The university's upper management is very supportive of initiatives to help the College of Engineering move forward.

3.4. Threats

- T1. There are an increasing number of universities in Saudi Arabia.
- T2. Scholarships which are awarded to Saudi students to study abroad may diminish the pool of students that apply to Alfaisal University.
- T3. Low student enrolment jeopardizes the reputation and even the very existence of the College of Engineering.
- T4. The lack of a separate College of Engineering building can limit our capacity to increase student enrolment.
- T5. There is a lack of effective research funding from certain important sources, e.g., KACST.
- T6. There have been negative responses from students about the frequent study plan revisions and inadequate labs. The ensuing potential bad publicity could have a negative impact on future student enrolment.
- T7. There is difficulty in managing many engineering specializations given the current organizational structure of the College of Engineering.

4. Long-Term Goals

Table 2. The College of Engineering's Targets for Programs, Student Enrolment and Personnel

	2013-4	2014-5	2015-6	2016-7	2017-8
Number of UG Students	190	225	271	326	360
Number of Postgraduate Students	0	10	40	70	80
New Postgraduate Programs Planned	0	1	2	1	0
Projections of Required Faculty (Assistant, Associate, Full Professors)	18	22	27	30	33
Projected Student /Faculty Ratio	10.6	10.7	11.5	13.2	13.3
Required Support Staff (lab instructors, administrators)	6	7	8	10	11

Recall that our vision is enabled by our ability to deliver quality undergraduate and graduate education. Consequently, as shown in Table 2, we consider our key long-term goals in the next five years to be: i) the total student enrolment, culminating in a total undergraduate and graduate enrolment of 440 in 2017-18; and ii) the number of new programs introduced. Table 2 was developed under the following assumptions:

- UG enrolment: Figures are for all five currently offered majors combined (architectural, electrical, industrial, mechanical and software engineering), spread approximately equally. Given the current enrolment (145), this assumes an increase of about 10% per year in the freshman intake (specifically, we project, from September 2013 until September 2017, freshman intakes of 70, 77, 85, 94 and 104. In 2017-18 there is hence projected to be a total of 360 undergraduate students (the sum of the last four numbers), or 18 students per cohort per program, which is about the current capacity of the physical facility.
- Postgraduate enrolment: We assume 10 students per cohort per program.
- Required faculty includes lecturers.

5. Strategic Objectives, Strategic Actions and Key Performance Indicators

The strategic objectives and actions presented in this section were established by taking into account the SWOT analysis with the purpose of allowing us to achieve the targets which embody our long-term goals presented in the previous section.

5.1. Facilities

Strategic Objectives	Strategic Actions	Key Performance Indicators
The College of Engineering must move into a separate, appropriately-sized building, at the earliest possible time	The university's upper management must develop and implement a plan to achieve this objective	<ul style="list-style-type: none"> • College of Engineering building designed • Construction project planned • College of Engineering building complete
Laboratories must continue to be developed	Order equipment and secure space	Labs available on time in each concerned course

5.2. Organizational Structure & Personnel

Strategic Objectives	Strategic Actions	Key Performance Indicators
The College of Engineering must maintain a sufficient, stable, high calibre team of faculty and staff.	<ul style="list-style-type: none"> • Provide faculty members with job security tied to annual faculty evaluations (rolling contracts) • Offer competitive compensation • Promote faculty development through sabbatical leaves • Implement hiring plan in Table 2 	<ul style="list-style-type: none"> • Faculty and staff turnover • Number of faculty and staff in the college
The College of Engineering must have an effective organizational structure.	Implement the new organizational structure shown in Fig. 2.	New organizational structure implemented

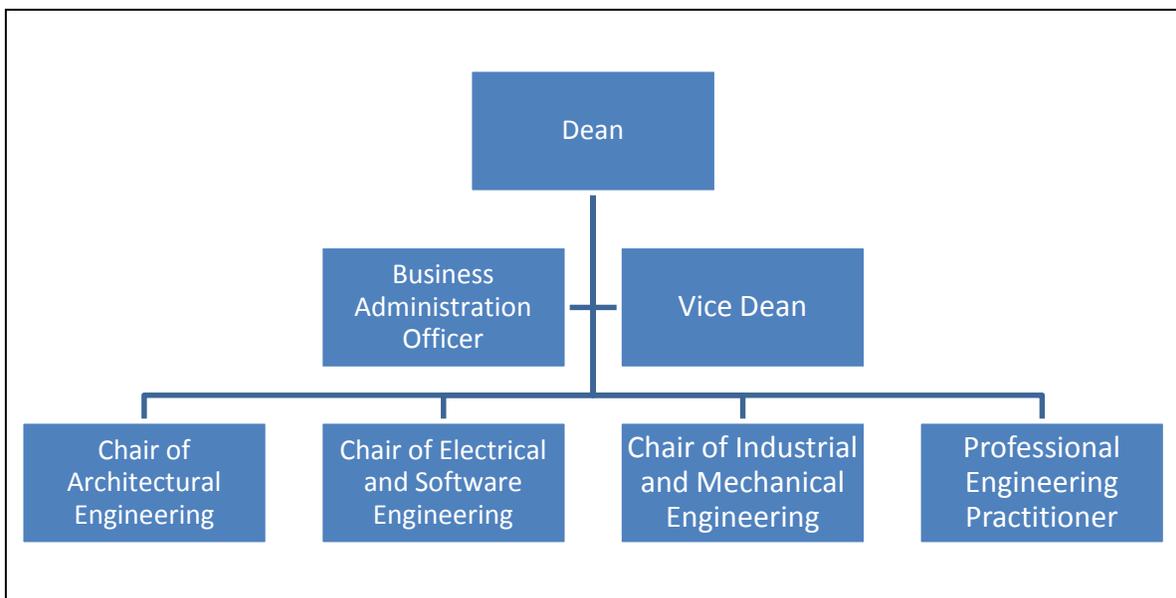


Fig. 2: Proposed Organizational Structure for the College of Engineering

The positions of Vice Dean and Professional Engineering Practitioner are described as follows:

Vice Dean: Responsible for academic affairs within the College of Engineering, including student success by organizing student advising and following up on students on academic probation. Ensure that all quality assurance functions are fulfilled within the College of Engineering. Coordinate the preparation of Annual Program Reports, Self-Study Reports, collection and archiving of all documents pertaining to NCAAA and ABET accreditation. Spearhead ABET accreditation. Responsible for student summer internships, including following up on the students to ensure the learning outcomes are being achieved. Coordinate curriculum revisions to ensure their relevance to the Saudi context and compliance with NCAAA and ABET standards.

Professional Engineering Practitioner: Responsible for outreach and student recruitment activities. Assist the engineering departments in developing material used for 1st year design experience along with material for liaising with schools throughout Saudi Arabia, in particular, science teachers and principals. Organize events at Alfaisal University such as Open Houses and summer and/or weekend engineering camps for high school students. Attend various trade fairs and student recruitment. Participate in preparing promotional material in cooperation with PR & Marketing. Act as Co-Director of the “Center for 3D Digital Experience”.

5.3. Programs

Strategic Objective	Strategic Actions	Key Performance Indicators
The College of Engineering must be known for the quality and relevance of its educational programs.	<ul style="list-style-type: none"> • Develop some postgraduate programs* • Revise all undergraduate curricula to maximize the attainment of all constituents’ expectations** • Achieve NCAAA program-specific and/or ABET accreditation • Increase the number of engineering textbooks in the university library 	<ul style="list-style-type: none"> • Number of postgraduate programs implemented • Number of undergraduate programs revised • Number of textbooks per program available in the university library • Number of programs accredited • Proportion of graduates who within six months of graduation are either employed or enrolled in further study • Student evaluations of teaching • Student evaluations of programs

		<ul style="list-style-type: none"> • Evaluations of internship performance • Ratio of students to teaching staff • Percentage of students entering an engineering program who successfully complete each year • Proportion of students entering an engineering program who complete their studies in the minimum time
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* Such as an M. Sc. in Renewable Energy Engineering, an M. Sc. in Nano-manufacturing Engineering, along with a Ph.D. program. These proposals stem from the complementary expertise areas of faculty members, priority areas which have been identified by KACST along with our involvement with CENA.

** For instance, by obtaining the Dassault Systemes' "Program for the Advancement of Higher Education" in order to incorporate their advanced design software into our programs; by including more electives; by removing duplication between courses, introducing elements of social responsibility and entrepreneurship, etc.

5.4. Student Enrolment and Recruitment

Strategic Objective	Strategic Actions	Key Performance Indicators
Implement effective means of enhancing the College of Engineering's visibility outside the university	Participate in student recruitment activities organized university-wide while continuing to develop College of Engineering-specific recruitment activities	Number of undergraduate and graduate students enrolled (versus projections in Table 2)

5.5. Research

Strategic Objective	Strategic Actions	Key Performance Indicators
The College of Engineering must maintain its reputation for producing high quality research.	<ul style="list-style-type: none"> • Involve undergraduate students in research • Offer a research option in the senior year of our 	<ul style="list-style-type: none"> • Number of publications per faculty • Research grants per faculty

	undergraduate programs <ul style="list-style-type: none"> • A maximum course load of 5 per faculty per year, allowing time for research • Build partnerships with industry 	
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5.6. External Relations

Strategic Objectives	Strategic Actions	Key Performance Indicators
Excellent relations must be established with industry and other educational institutions.	<ul style="list-style-type: none"> • Solicit the higher ranks of the university and the Placement & Alumni Office to establish strong ties with industry. • Establish an Industry Advisory Board. • Serve industry needs via applied research, knowledge transfer and short courses***. • Promote social responsibility. • Seek high-profile academic partners. 	<ul style="list-style-type: none"> • Number of short courses offered • Industry Advisory Board established • Number of sponsored research projects per faculty • Value of sponsored research projects per faculty • Collaboration agreement(s) signed • Number of actions taken under collaboration agreements

*** For instance, by serving as Dassault Systemes' "Center for 3D Digital Experience" in order to develop computer-based training material for Saudi industries.