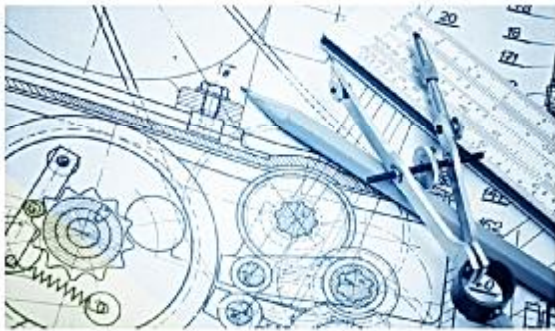
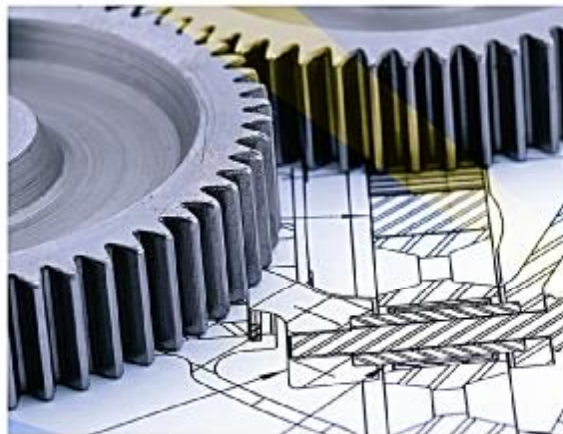




Uniqueness | Partnership | Success



# King Faisal University College of Engineering ORGANIZATIONS



## ORGANIZATIONS

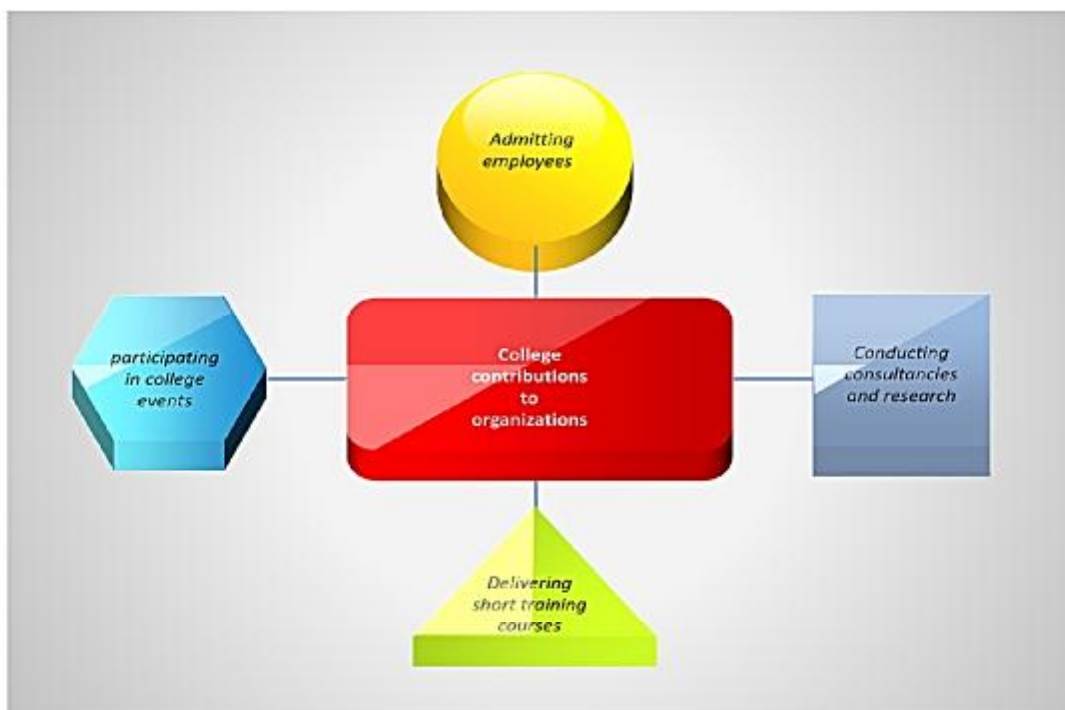


The theme known as *community engagement* represents the fundamental key feature of the COE strategic plan as well as the most highlighted aspect in its vision and mission statements. The theme calls for establishing fruitful collaborations and partnerships based on mutual benefits and successful win-win scenarios, and as such, set the stage for long-lasting sustainable relationships. In our approach, we build on firm commitment to quality on the one hand, and the long tradition and deep-rooted commitment of our respected national organizations to serving higher education and the community at large, on the other.

In this partnership, the College possesses the expertise to contribute to improving business competitiveness and add value to their final products. In return, organizations can support the college in multitude of ways in the academic, research, and funding. The following paragraphs present more details in this regard.

### THE COLLEGE POTENTIAL CONTRIBUTIONS

The COE at KFU envisions that it can provide services to partners in the following main domains:





- *Admitting qualified employees into the College undergraduate and graduate programs:* The College shall provide a number of seats for distinguished employees to pursue higher degrees in the various majors in the college. The College hosts seven degree programs, namely, Biomedical Engineering; Chemical Engineering; Civil and Environmental Engineering; Desalination Engineering; Electrical Engineering; Materials Engineering; and Mechanical Engineering.

- *Conducting consultancies and research:* There is a good number of faculty members in the College with impressive credentials and substantial cumulative experiences and expertise in the various domains of engineering. Several of them qualify for consultancy in their fields of specialization and have the capacity to manage and conduct, either on their own or jointly, research projects that lead to solving some of the challenges facing partner organizations. The College has decided to focus its research on the following areas:



- High temperature climate and discomfort
- Air conditioning and energy-inefficient buildings
- Corrosion
- Sand and dust storms
- Water scarcity
- Open, unpopulated, and underserved areas, and
- High energy consumption.

Thus, the College focuses on specific industries including Oil and Gas; Petrochemicals; Fertilizers; Mining; Energy; Water Desalination; Telecommunications; Transportation; Construction; Air Conditioning and Energy-Efficient Buildings; and Healthcare Facilities. In the process, it singled out efficiency as the fundamental competency.

In this regard, the College record has been promising. It has recently conducted two consultancies for two public sector organizations. And, the total research grant funds in the last three years exceeded



SAR 6,000,000.00 of which more than 70% from sources external to KFU such as KACST and some other organizations and companies. Moreover, most of the findings from those projects is published in respected publishing media and high impact international journals that are listed and indexed in the best databases (ISI and SCOPUS). In addition, the College hosts a number of scientific chairs in rail research, roads, energy-efficient buildings, and advanced materials.

- *Delivering short training courses:*

Building on their acknowledged expertise and distinguished experiences, the college teaching staff members have been quite active in delivering a wide spectrum of high quality short training courses to various industries within the Kingdom and beyond. The



College faculty conducted numerous training workshops including heat exchangers, boilers, commissioning, pneumatics and hydraulics, rotating equipment (pumps and compressors), Distillation, Coatings; ... . So far, several organizations have benefited from our training courses most notably SABIC; ... etc. Below is a list of the training courses delivered by our faculty over the last five years:

Name of the program	Brief description
<b>Piping Design, Analysis and Maintenance</b>	Factors affecting the design of piping system, ASME B31.3 and ASME B31.1 Codes. Piping layout design and review of the different types of loads in the piping system and the different type of piping fabrication and inspection methods.
<b>Computerized Maintenance Management Systems (CMMS)</b>	Employ a management system that optimizes the use of scarce resources (manpower, equipment, material, and funds) to maintain the facilities and equipment that are the responsibility of the maintenance organization.
<b>Petrochemical Essentials</b>	Interactive guide to the basics of petrochemicals' production technology with brief chemistry knowledge and processing technique. Also it provides insights into the main petrochemical markets.
<b>Chemical Waste Management</b>	Routes of entry for hazardous chemicals. Classify the hazard classes for dry chemicals, liquid chemicals and compressed gases. Understand and define acute and chronic health effects. Introduce the impact of chemicals on human bodies and show how those chemicals can enter our bodies. Give an overview of the various hazards offered by different chemicals and show how to handle and store chemicals.
<b>Design of Rigid (Concrete) Pavements</b>	General information on pavement materials, rigid pavement design, highway pavement layers including both high-type and low cost surfaces, and highway maintenance
<b>Design of Flexible (Asphalt) Pavements</b>	General information on asphalt pavement materials, flexible pavement design, highway pavement layers including both high-type and low cost



	surfaces, and highway maintenance
<b>Introduction to the New AASHTO Design (MEPDG) for Flexible Pavements</b>	General information on the new AASHTO Mechanistic Empirical Pavement Design Guide (MEPDG)
<b>Super pave Mixture Design</b>	Demonstrate the Super pave asphalt mixture design system developed by the Strategic Highway Research Program (SHRP) in the United States
<b>Boilers: Operation, Maintenance and Troubleshooting</b>	Boiler design aspects, installation, operation, control, Maintenance, Legal requirements and regulations, Environmental and safety aspects, Energy consumption, efficiency, Water treatment.
<b>Heat Exchangers: Operation, Maintenance and Troubleshooting</b>	Basic concepts on heat exchangers and their utilization in different applications, basic design, construction, types, and the operation and maintenance of heat exchangers, selection and buying of heat exchangers Fouling and corrosion of heat exchangers
<b>Rotating Equipment: Operation, Maintenance and Troubleshooting (May be limited to pumps and compressors)</b>	Pumps and compressors are the two pieces of equipment which are used in almost all manufacturing and processing plants. The effectiveness of their selection, specifications, operations, maintenance and troubleshooting has tremendous impact on plant productivity. An understanding of the basic principles involved, how they work, what can go wrong, troubleshooting and preventive maintenance can go a long way to increase productivity. In addition, pumps and compressors are generally critical machines in any production process, and hence it is vital that maintenance is most effective for these units.
<b>Reading Of Electronic Circuit Drawings</b>	This course is aimed at introducing the electronic circuit layout and design to utility. It covers some of electronic layout, controls, design, generation and operation.
<b>Cable Installation</b>	State-of-the-art cable installation and cable testing while keeping additional damage to the good cable system to a minimum.
<b>Microwave and Antenna Design using HFSS Software of Ansoft Inc.</b>	Training on microwave design using Ansoft HFSS. Variety of topics associated with microwave circuit design including various types of transmission lines, transitions from one type line to another, components and antennas.
<b>RF Propagation, Fading, and Link Budget Analysis</b>	How does the RF energy propagate through space? How is it impacted by the presence of buildings, mountains, lakes, vegetation, and other natural and man-made structures? How does one "budget" for the gains and losses that inevitably occur on the way from the transmitter to the receiver? These are the issues at the heart of this course.
<b>RF System Fundamentals</b>	basic understanding of RF fundamentals. The main topics include: Basics of RF , Basics of traffic engineering, RF Design, RF Deployment, Antennas.
<b>Antenna Theory and Design</b>	The basics of antenna and antenna array theory. Fundamental concepts such as beam patterns, radiation resistance, polarization, gain/directivity, aperture size, reciprocity, and matching techniques. Different types of antennas such as dipole, loop, patch, horn, dish, and helical antennas . The locations of the reactive near-field, radiating near-field (Fresnel region), and far-field (Fraunhofer region), the Friis transmission formula with worked examples, Propagation effects.
<b>Advanced Process Control</b>	Technical look at the state of the art in modern control engineering, focusing on techniques that are applicable to the process industries. Example cases such as Separation Process, Reactors, Power and pumping Systems.
<b>Applied Hazard and Operability (HAZOP) Study</b>	Understanding of the fundamental concepts and methodology of the HAZOP study technique, risk assessment and risk reduction.
<b>Effective Maintenance Planning &amp; Scheduling</b>	The definition and role of the Maintenance Function in the organization; Maintenance Planning and Scheduling theory and basics;

	Maintenance documentation; The improvement maintenance planning and scheduling skills; Computerized Maintenance Management Systems, their functionality and role in planning and scheduling; Planning and Scheduling practice.
<b>Blowers, Compressors and Pumps Maintenance and Troubleshooting</b>	Fundamentals of compressors, blowers and turbochargers and their maintenance techniques. How to properly overhaul, repair and troubleshoot these type of machineries. Examine proper methods of parts repair techniques as well as diagnostic tests for identifying and determining problems.
<b>Corrosion Control and Prevention</b>	Basic Concepts in Corrosion; Thermodynamics: Nernst Equation and Potential-ph Diagrams; Kinetics of Corrosion; Forms of Corrosion: Uniform, Pitting, and Concentration-Cell Corrosion; Galvanic Corrosion and Stress-Corrosion Cracking; Erosion-Corrosion, Intergranular Corrosion, and Dealloying; Corrosion Testing and Monitoring; Electrochemical Test Methods; General Material Considerations and Application to Ferrous Alloys; Nonferrous and Nonmetallic Materials; Corrosive Environments; Economics and Failure Analysis; Methods to Control Corrosion: Design, Material Selection, and environment Modification; Methods to Control Corrosion: Protective Coatings and Potential Modification
<b>Machinery Failure Analysis and Prevention</b>	Failure Analysis and Trouble-shooting ; Metallurgical Failure Analysis Methodology Machinery Component Failure ; Analysis and Reliability Improvement; Continuous Reliability Improvement; Machinery Troubleshooting; Vibration Analysis; Structured Problem Solving; Process/Mechanical/Technical Interaction; Examinations of Failed Components; Formalized Failure and Reporting.
<b>Powder Coating and Manufacturing</b>	Formulation and manufacturing of powder coating, pretreatment, shop and equipment maintenance, equipment selection, oven and cure issues, powder selection, troubleshooting, and tips and tricks for the custom coater.
<b>Root Cause Analysis</b>	Develop an understanding of the principles and techniques involved in the practice of Root Cause Analysis. Emphasis is placed on the practical aspects of how to perform an analysis. In addition, this course will provide effective methods which can be used with a Corrective Action system to ensure costly issues are resolved quickly and do not get dropped through the cracks.
<b>Distillation Control and Troubleshooting</b>	The fundamental knowledge of distillation control. The operation, control and trouble shooting of a distillation columns and it's associated equipment, An overview of distillation, practical solutions as well as theory; An understating of essential distillation concepts.
<b>Solid Design and Optimization using Pro-Engineer</b>	Introduction to Pro-Engineer software wildfire 5; Basic two-dimensional skills of engineering drawings; Typical exercises on two-dimensional modeling; Geometrical constraints. Three-dimensional modeling; Trajectories; Introduction to Mechanics; Basics of finite element methods; Thermal examples and solutions; Solid examples and solutions Designing of solid and optimization criteria.
<b>Computational Fluid Dynamics (CFD): Theoretical Background</b>	This course will focus on the theoretical aspects of the CFD packages; fine difference and finite volume method; treatment of the convective-diffusion terms for steady and unsteady flows; the stream-function-vorticity approach; discuss various upwind schemes used in convectional CFD packages; turbulence modeling starting from the eddy viscosity models, one equation model, and two equations models and an introduction to large eddy simulation; the solution of the Navier-Stokes Equations using the primitive variable approach using the

	SIMPLE, SIMPLEC schemes.
<b>Computational Fluid Dynamics for Industrial Applications</b>	Introduce computational fluid dynamics as a computational tool to solve industrial problems. Use the ansys-fluent package for running CFD simulations. Laminar and turbulent flows simulations. Isothermal flows and flows with heat transfer. Natural and forced convection applications. The standard procedure of CFD simulation that includes: creation of geometry, grid generation, applying boundary conditions and initial conditions, numerical solution schemes, post processing and uncertainty assessment.
<b>Spatial Variation Applications in Environmental Engineering using Spatial Software Packages.</b>	Introduction to spatial variation applications in environmental engineering, Available software packages, Working with Data and Importing Data from External Files, Summary Statistics, Semi-variance Analysis, Autocorrelation Measures, Variance Clouds and h-Scatter grams, Kriging and Co-kriging, Inverse Distance Weighting, and Mapping.
<b>Application of GPS and GIS in Surveying</b>	Understand the principles, applications, trends, and pertinent issues of geographic information systems and sciences, cartography, geography, and global positioning systems (GPS). Increase proficiency in communicating objectives and results of research and production conducted with geographic information systems. Understand how to obtain, manipulate and analyze data such as that focused on watersheds, population, cultural resources, terrain, natural hazards, land cover, and land ownership.
<b>Control Valve Selection, Sizing, Operation and Maintenance</b>	Control valve types and designs, materials, selection, sizing, actuators and controllers, preventive maintenance procedures, operation and troubleshooting. A number of different case studies from manufacturing and service industry are described to enable the delegates to operate, select and troubleshoot control and safety valves upon course completion.
<b>Pressure Relief Valve Selection, Sizing, Operation and Maintenance</b>	Different types and designs of pressure relieve devices, PRV, SRV, RD, and Pin-Actuated Valves. The operation, installation, testing and repair of the valves according to the related ASME and API codes and standards. Problems and solutions associated with valves. The Codes requirements and limits. Calculation of the relieve capacities due to different overpressure causes and sizing different type of Pressure relieving devices.
<b>Pressure Vessel Inspection</b>	Understanding of the relevant international codes on the inspection, maintenance and repair of pressure vessels and their protective devices. Codes presented include the API 510 (pressure vessel inspection code), API rp-576 (inspection of pressure relieving devices), and ASME section v (non-destructive examination).
<b>Cooling towers Operation and troubleshooting</b>	To obtain an understanding of cooling towers, including the types of cooling towers, how to assess their performance and the main areas for energy conservation.
<b>Industrial water treatment</b>	To obtain an understanding of the operations used for industrial water treatment including external and internal treatment operations and their troubleshooting.
<b>Sulfur recovery &amp; process troubleshooting</b>	Detailed up-to-date information and analysis of the sulfur recovery processes from natural gas. Absorption processes for CO <sub>2</sub> and H <sub>2</sub> S including the chemistry of the processes, equipment used, processes variables and processes troubleshooting. Sulfur recovery processes. CLAUS sulfur recovery process, the chemistry of the process, the variables that affect the process, analysis of the process equipment, recent trends and process troubleshooting and Tail gas clean-up processes.



<b>An overview of 3<sup>rd</sup> and 4<sup>th</sup> Generation Wireless Systems</b>	Basic concepts of all aspects of Air interface of 3 <sup>rd</sup> and 4 <sup>th</sup> generation Wireless systems. Radio Frequency deployment challenges for all of these systems. Broadband Access technology. Voice, Data and Video throughput data rate and requirements.
<b>Digital Signal Processing: Fundamentals, Applications and Hardware Architecture</b>	Basic concepts of all aspects of Digital Signal Processing from Theory to Applications to Hardware Architecture. Ability to decide on what is the right technology for your application (Digital Signal Processor, Programmable Logic, Microprocessor or Microcontroller) . Few tips on debugging issues that you may face in real world applications.
<b>Hardware Description Language (HDL) and Field Programmable Logic Design</b>	Basic concepts of all aspects of Hardware Description Languages and Field Programmable Logic from Theory to Applications to Hardware Architecture. Walk through complete design flow cycle with Field Programmable Logic (simulation, VHDL/Verilog programming, compiling, downloading to Xilinx FPGA hardware chip and testing). Few tips on debugging issues that you may face in real world applications
<b>Introducing Wireless Communication Systems and Technologies.</b>	Wireless systems for voice communications, video conferencing, data transfer, video surveillance among other applications, and by using Wireless technologies such as WiFi Mesh networking, WIMAX, LTE and Wireless Sensors Networks.
<b>AutoCAD 2D and 3D</b>	Navigate the user interface, use the fundamental features of AUTOCAD 2D/3D, use the precision drafting tools to develop accurate technical drawings and present drawings in a detailed and visually impressive manner. 3D viewing techniques. Working with simple and composite solids. Creating complex solids .Modifying objects in 3D space .Editing solids. Creating sections. Converting 3D objects. Creating 2D drawings from 3D models and working with the User Coordinate System.
<b>Finite Element Analysis using ANSYS</b>	Deal with ANSYS and how to perform a complete ANSYS analysis step-by step. learn the basics of ANSYS capabilities, and terminology, learn about building solid models & meshing, apply loads, solving & reviewing results.

- *Attending and participating in college events (conferences, workshops, seminars, ...):* Over the last few years, the college has been successful in convening a number of specialized events that witnessed the attendance of international and national audiences. Examples on such vents include the First International Conference on Hot Arid Region Issues, Workshop on Transportation, Workshop on Wireless Communication, and a Workshop on Engineering Solutions to Handicapped Problems, in addition to planned future workshops on other specific themes. The efforts in this domain were intended to identify sufficiently narrow research priorities and themes that contribute to a distinct research identity for the college. The outcomes were

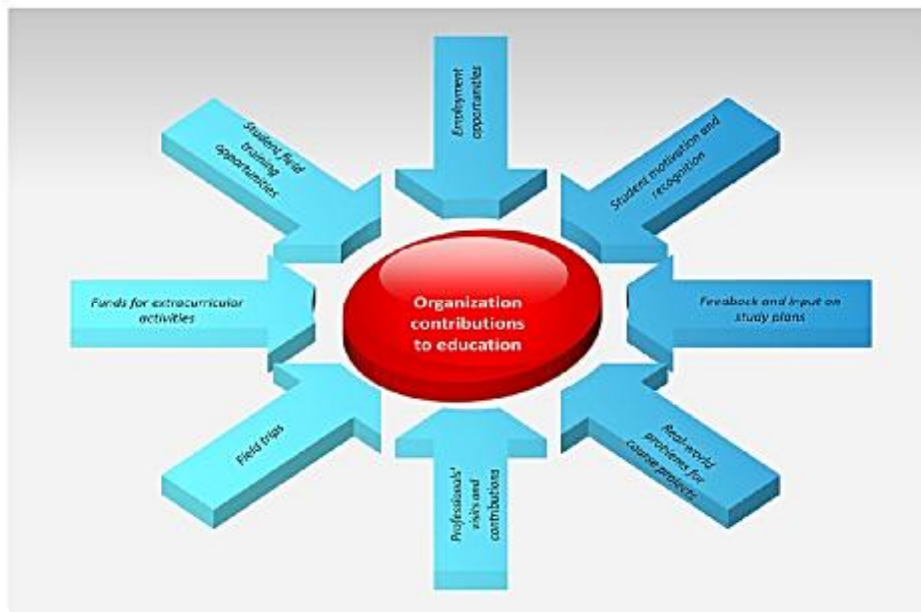




quite rewarding; the college was granted a number of Scientific Chairs as elaborated in the next section of this document.

### EXPECTED ORGANIZATION CONTRIBUTIONS

As indicated above, the College envisions a two-way relationship with partner organizations, which leads to expecting supporting activities on the part of the organizations. These support activities may be classified in two main categories:



- **Educational Process and Students:** This category encompasses the following main aspects:
  - *Feedback and input on study plans:* As an important stakeholder of the College with substantial field experiences, the College expects to have partner organizations actively and regularly engaged in revising the program study plans to maintain them up-to-date and meet potential employers and job market expectations.
  - *Real-world problems for course projects:* The College adopts the so-called project-based learning model where students learn a good part of essentially each and every course material via course projects. In an attempt to achieve the maximum benefit from this



effort for both parties, our partner organizations can provide a list of real-world problems to serve as the project problems.

- *Professionals' visits and contributions:* With the substantial highly regarded human resources available in our organizations, the College looks forward to benefiting from this significant asset. Professional may come in teach part of a course, deliver a special practical-oriented lecture, make suggestions, send comments, present a special software package, ... .
- *Field trips:* It is well-known that academic institutions emphasize the theoretical component in their curriculum. Organizing Student field trips to relevant industries and organizations is an excellent tool that fill a gap and provide students with hands on experiences, help them relate the theory they learn in classrooms to reality, get a glimpse of real world engineering setups, etc., in addition to contributing to strengthening the ties between the College and partner industries and organizations.
- *Funds for extracurricular activities:* The College firmly believes that the complete and rewarding learning experience goes beyond lectures and is more than just getting high grades. As such, it makes all possible attempts to build the students' *integrated character*. The most highlighted of these include some extracurricular activities and initiatives that include, for instance, a set of soft skills and leadership doses, a design competition contest, and professional chapters, among others. Partner organizations may come in here and contribute to this vital component.
- *Student field training opportunities:* Field training is an integral part of our curriculum as in all engineering curricula. The College allocates a dedicated compulsory course entitled "Engineering Training" that requires all our students to undergo an 8-week field training experience in a relevant organization. Our partners are expected to provide a number of such opportunities for our students.





- *Employment opportunities:* As the College obligation entails preparing graduates based on high quality standards that live up to the employers' expectations, employers are expected to provide adequate job offers and appropriate employment opportunities that fulfill graduates aspirations.
- *Student motivation and recognition:* The College strongly believes in recognizing distinguished students and celebrating their achievements, be academic or otherwise, as an efficient means of encouragement, motivation, and positive competition. In fact, the College has already a written framework for this purpose (Outstanding Student Award) where our partners can get in an contribute to this important aspect.

- **Scientific Research:** This category may address the following areas:



- *Providing specialty labs:* As the College is still a new one and is still essentially in the establishment phase where the priority and focus are almost solely on educational infrastructure including labs, our partners can provide some research-oriented specialty labs that is mostly tailored for their particular needs. With this, they serve to



improve the College research base as well as help better serve their research needs.

- *Supporting research by providing funds to research projects:* Our partner organizations may provide research grants to the College as part of their social responsibility for serving and paying back to their community, as a part of an agreement, or as sponsorship of relevant joint research projects.
- *Funding scientific chairs:* Due to the fact that scientific chairs typically require a substantial sum of fund, only a very limited number of venues are available for the College and its faculty in this respect. Consequently, sponsoring scientific chairs represents a unique contribution by national organizations. Scientific chairs bear particular significance as they may establish for national or regional leadership in as specific area and have the potential to evolve into a national or regional center of excellence. In this regard, the College within its few years of establishment has already set an impressive record for itself. Recently, KFU granted the College a SAR 2-million Chair on Rail Research and ARAMCO granted a SAR 6-million chair on asphalt pavements. Moreover, a chair proposal on Energy Efficiency in Buildings and A/C Systems has come a long way of approval by ARAMCO while another chair proposal on Non-metallic Coatings has been submitted to SABIC and is still in the initial stages.
- *Sponsoring conferences and workshops*

The College plans to conduct a number of workshops in the near future in order to identify additional strategic priorities, provide the latest scientific updates as well as the latest findings of relevant and related research, and establish communication networks with both industry and experts.





For instance, the College has plans to launch workshops on Energy Efficiency in Buildings; Silicon as an Energy Vector; Bioenergy and Biogas Technology; Advanced Nonmetallic Materials; and Phosphate Technology.

In an attempt to maximize the benefits from such workshops, the College calls upon organizations to support these workshops by sponsoring and providing the financial support for them and enjoy in return a generous package of sponsorship privileges that include acknowledging the sponsor's name in the opening ceremony, the closing ceremony, and on the workshop internet website in addition to posting the sponsor's name on all the workshop publications and flyers, among others.

#### **PARTNER ORGANIZATIONS**

Thanks to persistent efforts and mutual desire to cooperate, the College has already forged a number of collaboration and partnership ventures with the following prominent organizations:

- *Saudi ARAMCO*
- Honeywell Co.
- *SABIC*
- *SCECO*
- Al-Ahsa Municipality
- Al-Ahsa Irrigation and Drainage Authority



<b>Organization</b>	SAUDI ARAMCO	Honeywell	SABIC	SCECO	Al-Ahsa Municipality	Irrigation and Drainage Authority
<b>Contribution</b>						
Real-world problems for course projects	+					
Professionals' visits	+	+				
Field trips	+	+	+	+	+	+
Funds for extracurricular activities		+				
Student field training opportunities	+	+	+	+	+	+
Employment opportunities	+					
Student motivation and recognition		+				
Providing specialty labs		+				
Providing funds to research projects			+			
Sponsoring scientific chairs	+					
Sponsoring conferences and workshops	+			+		





### **A CALL FOR COLLABORATION**

The College welcomes any initiative of or approach to collaboration, providing support and/or seeking a service, and will take any such call and deal with it seriously. For all such calls, please contact the College via any one of the followings:

Phone Number : **00966 3 5817 065**  
Fax Number : **00966 3 5817 068**  
P.O.Box : **380 Alahsa,31982**  
Emails : **Engineering@kfu.edu.sa**



### ***Vision***

"The College of Engineering aspires to be recognized for supporting and sustaining the **success** of its community and stakeholders for realizing the Kingdom's development objectives and enrichment of humanity."

### ***Mission***

"The College of Engineering strives for providing quality services through *partnership with the community* by demonstrating commitment to

- quality education that prepares graduates through a project-based curriculum with broad basic engineering knowledge to be professionals and to pursue postgraduate studies and research.
- quality research that leads to better solutions to hot arid region issues with emphasis on efficiency as it pertains to cost minimization by working closely with industry and research centers."

### ***Values***

- Planning and continuous assessments and improvement
- Transparency
- Understanding the needs of customers
- Close relationship with customers that is based on courtesy, patience, appreciation, and continuous communication
- The eagerness to provide complete solutions
- Flexibility through employee empowerment and decentralization
- Continuous improvement and learning process
- Team work
- Commitment through compliance with procedures, regulations, and standards
- Initiative